GURPS®

STEAM-TECH™

A COMPENDIUM OF MARVELLOUS DEVICES FOR THE AGE OF STEAM

COMPILED BY WILLIAM H. STODDARD

STEVE JACKSON GAMES

GURPS

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A COMPENDIUM OF MARVELLOUS DEVICES FOR THE AGE OF STEAM

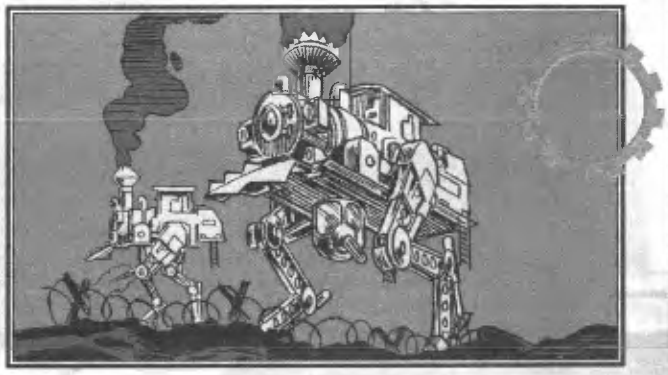
Compiled and Edited by
William H. Stoddard

Written by William H. Stoddard and the Faculty of Weird Science: Volker Bach, Glen Barnett, William A. Barton, Roland M. Boshnack, Frederick Brackin, Jim Cambias, David A. Cunnius, Peter V. Dell'Orto, Kevin Flanagan, John M. Ford, Werner H. Hartmann, James H. Hay, Phil Masters, David Morgan-Mar, Jason Morningstar, Kenneth Peters, Erik Peticolas, Lance Purple, Joanna Ramsay, Matt Riggsby, Marcus L. Rowland, Gordon Shumway, Nancy Sterling, Michael Suileabhain-Wilson, Joe Taylor, Joe Trela, Chad Underkoffler, Gwenydd Way, and John G. Wood

Additional editing by Andrew Hackard

Cover, typography, design, and layout by Alex Fernandez

Illustrated by Peter Bergting, Paul Daly, David Day, Zach Howard, Gary McKee, Eric Lofgren, and Klaus Scherwinski



***GURPS* System Design by Steve Jackson**
***GURPS* Line Editor ⬡ Sean Punch**
Production Manager ⬡ Gene Seabolt
Creative Director ⬡ Philip Reed
Prepress Assistant ⬡ Monica Stephens
Errata Coordinator ⬡ Andy Vetromile
Sales Manager ⬡ Ross Jepson
Lead Playtester ⬡ Devin L. Ganger

Playtesters: Roland Boshnack, Frederick Brackin, Nathaniel Eliot, M.A. Lloyd, Phil Masters, David Morgan-Mar, Kenneth Peters, Lance Purple, Jeff Raglin, Jo Ramsay, Marcus L. Rowland, Allen Smith, Brian C. Smithson, Kevin Z. Taylor, Chad Underkoffler, and Earl Wajenberg.

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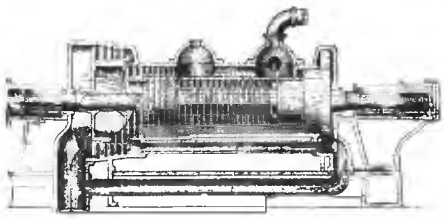

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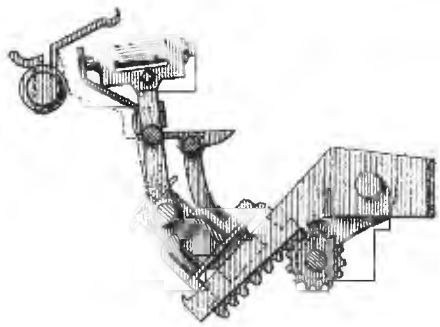

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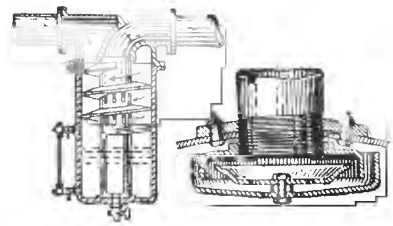

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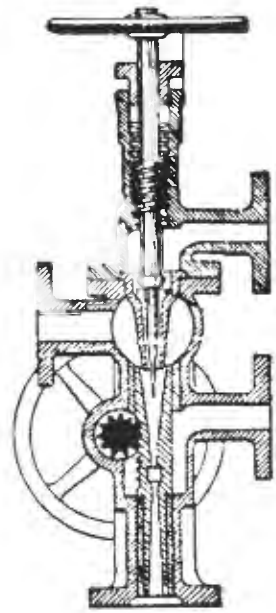

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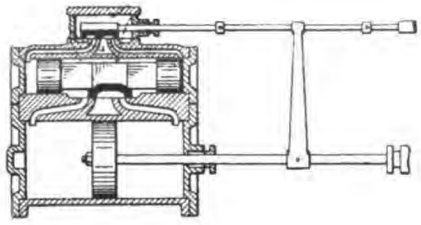

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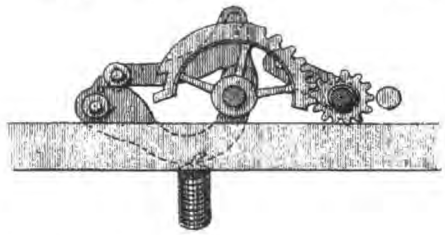

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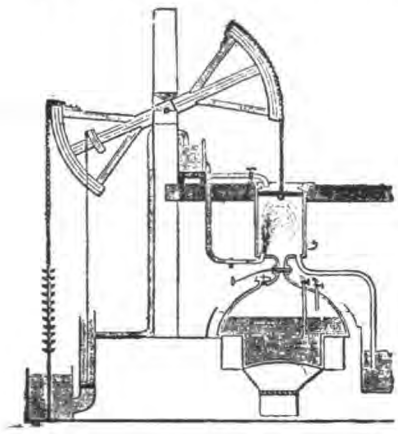
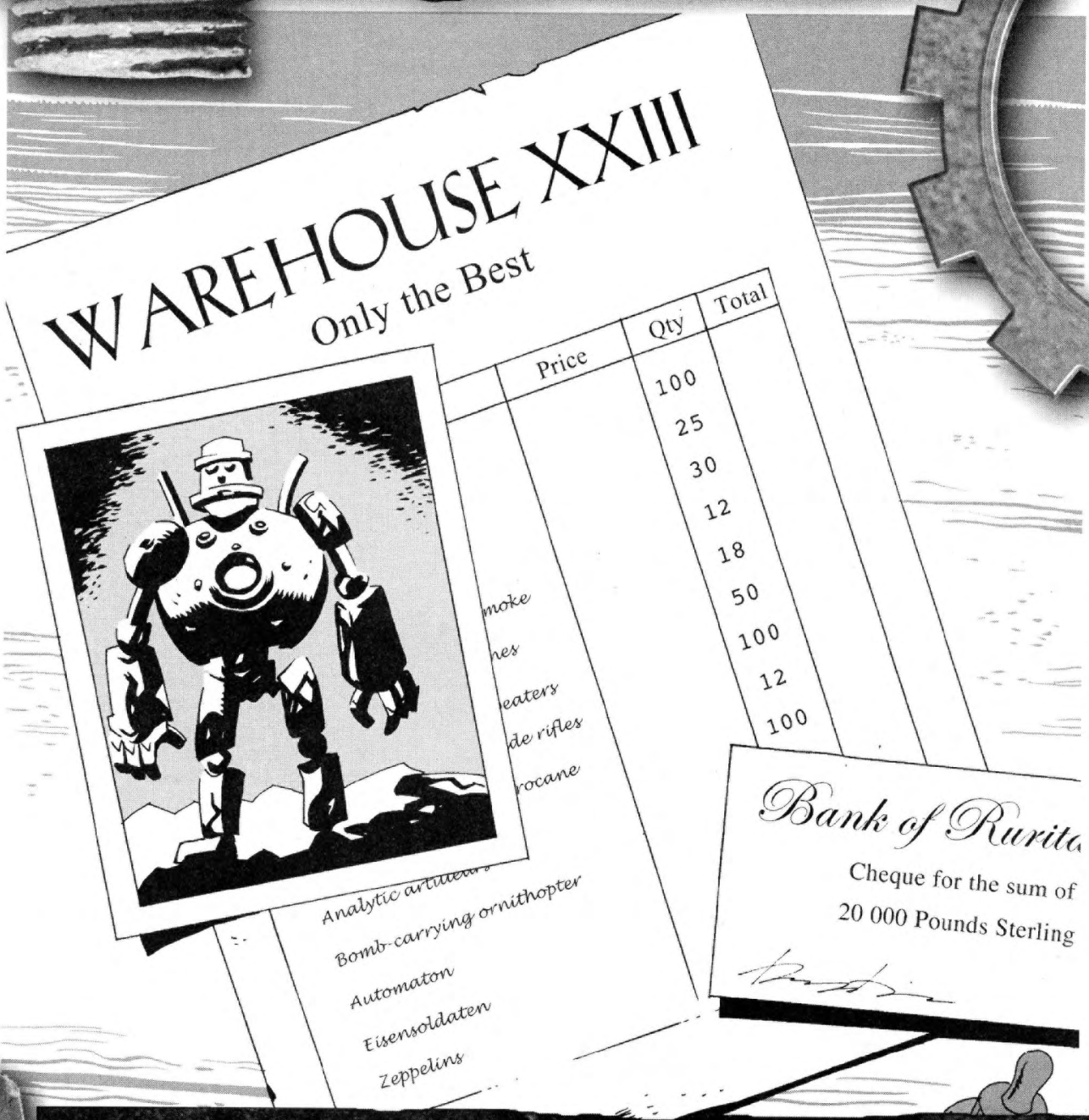


INTRODUCTION



The bourgeoisie, during its rule of scarce one hundred years, has created more massive and more colossal productive forces than have all previous generations together. Subjection of Nature's forces to man, machinery, application of chemistry to industry and agriculture, steam-navigation, railways, electric telegraphs, clearing of whole continents for cultivation, canalisation of rivers, whole populations conjured out of the ground – what earlier century had even a presentiment that such productive forces slumbered in the lap of social labor?

– Karl Marx and Friedrich Engels, ***The Communist Manifesto***

About *GURPS*

Steve Jackson Games is committed to full support of ***GURPS***. Our address is SJ Games, Box 18957, Austin, TX 78760. Please include a self-addressed, stamped envelope (SASE) when you write us! Resources include:

Pyramid (**www.sjgames.com/pyramid/**). Our online magazine includes new ***GURPS*** rules and articles. It also covers ***Dungeons and Dragons, Traveller, World of Darkness, Call of Cthulhu***, and many more top games – and other Steve Jackson Games releases like ***In Nomine, INWO, Car Wars, Toon, Ogre Miniatures***, and more. *Pyramid* subscribers also have access to playtest files online!

New supplements and adventures. ***GURPS*** continues to grow, and we'll be happy to let you know what's new. A current catalog is available for an SASE. Or check out our website (below).

Errata. Everyone makes mistakes, including us – but we do our best to fix our errors. Up-to-date errata sheets for all ***GURPS*** releases, including this book, are available from SJ Games; be sure to include an SASE. Or download them from the Web – see below.

Gamer input. We value your comments, for new products as well as updated printings of existing titles!

Internet. Visit us on the World Wide Web at **www.sjgames.com** for an online catalog, errata, updates, Q&A, and much more. ***GURPS*** has its own Usenet group, too: rec.games.frp.gurps.

GURPSnet. This e-mail list hosts much of the online discussion of ***GURPS***. To join, e-mail majordomo@io.com with "subscribe GURPSnet-L" in the body, or point your web browser to **gurpsnet.sjgames.com**.

The ***GURPS Steam-Tech*** web page is at **www.sjgames.com/gurps/books/steamtech/**.

Page References

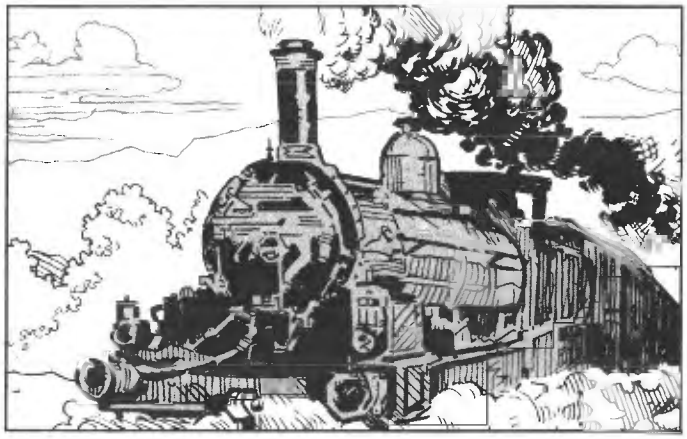
Rules and statistics in this book are specifically for the ***GURPS Basic Set,*** *Third Edition Revised.* Any page reference that begins with a B refers to ***GURPS Basic Set*** – e.g., p. B144 refers to page 144 of ***Basic Set.*** AT refers to ***Atlantis,*** BE to ***Bestiary,*** CI to ***Compendium I,*** CII to ***Compendium II,*** HT to ***High-Tech***, LT to ***Low-Tech,*** P to ***Psionics,*** RO to ***Robots,*** STM to ***Steampunk,*** TT to ***Time Travel,*** UT to ***Ultra-Tech,*** VE to ***Vehicles.*** For a full list of abbreviations, see p. CI181 or the updated web list at **www.sjgames.com/gurps/abbrevs.html**.

Marvelous inventions are one of the big attractions of steampunk, and ***GURPS Steampunk*** provided a sample of them. If those just whetted your appetite . . . here's a feast.

GURPS Steam-Tech is a "tech" book, a catalog of gadgets – but gadgets specific to the Age of Steam, in both its historical and fictional versions. Its inspirations range from real 19th-century technology to the wildest visions of Mary Shelley, Jules Verne, and H.G. Wells. Between these pages is a Great Exhibition to rival the one Prince Albert sponsored in 1851 at the Crystal Palace, filled with weapons, vehicles, analytical engines, miscellaneous equipment, and even drugs, chemicals, and living creatures.

GMs can use this book to help define the technology of a steampunk campaign. Players can look here for inventions to work on, or to start the campaign with. And several of the technologies presented here offer springboards for further creations.

All these devices are designed for compatibility with other ***GURPS*** publications, especially ***GURPS Robots*** and ***GURPS Vehicles***. If you want to design airships or mechanical men incorporating weapons, power systems, or analytical engines from this book or ***GURPS Steampunk***, go ahead! A good steampunk world can never have too many gadgets.



About the Compiler

William H. Stoddard is the author of the award-winning ***GURPS Steampunk***, a co-author of ***GURPS Low-Tech***, and a contributor to several other ***GURPS*** volumes. He has been playing roleplaying games since 1975, when he attended his first science fiction convention and walked in on a session of ***Dungeons and Dragons***. He works as a developmental editor for a large scientific publisher, where his job responsibilities include researching obscure questions, a skill that helped a lot with ***GURPS Steam-Tech***. He lives in San Diego in an apartment furnished mainly with bookshelves. In his spare time, he edits the Libertarian Futurist Society's quarterly newsletter, *Prometheus*.

This book offers a selection from the Age of Steam's technological advances. The discriminating scientist, inventor, or adventurer will find devices to support a variety of projects, from probing the secrets of life to battling invasions from other planets. Complete statistics are provided on every device. In various cases, this includes some or all of the following:

Complexity: The functional sophistication of a clockwork device, automaton, or analytical engine. Ranges between -2 (clocks and adding machines) and 6 (analytical engines capable of full sentience).

Holdout Modifier: An indication of the difficulty of concealing a portable device on one's person.

Legality Class (LC): For combat equipment, especially weapons, an indication of how much the right to possess a given item is restricted (see p. B249). Note that 19th-century societies often have low control ratings for weapons.

Dimensions: Typically the height, width, and length of the device, in that order; if different dimensions are given they will be specified.

Power: The power consumed by the operation of the device, if it is not self-powered.

Weight: The weight of the device in pounds.

Volume: The volume of the device in cubic feet.

Cost: The cost of buying or making the device, in 19th-century U.S. dollars (see p. B16 or pp. STM48-50). This is a list price for a factory-built model.

Vehicles, weapons, and automata may have much more detailed performance specifications, including speed, range, damage, damage resistance, and special functions. Living beings have animal statistics (see p. BE4) or racial templates; mechanical men have design specifications equivalent to racial templates.

Tech Levels

Another important piece of information about these devices and inventions is their *tech level* (or *TL*). This measures the level of knowledge that is needed to produce a device. Nearly all the devices in this volume are from one of the following TLs:

4 Renaissance and Colonial: the era of the full-rigged sailing ship, gunpowder, and the printing press.

(4+1) "Clockpunk": Renaissance and Colonial anticipations of future technology comparable to that of the Age of Steam, but differing both in detail and in basic assumptions.

5 Industrial Revolution: the real Age of Steam, with steam engines, iron- or steel-framed buildings and vehicles, and the telegraph and telephone.

(5+1) Steampunk: Technological extrapolations from the Age of Steam's achievements, such as Charles Babbage's analytical engine or Nikola Tesla's beamed electrical power. Early science fictional devices based on improvements in existing technology rather than radical new scientific theories, such as Jules Verne's aeronefs and submarines, also belong here. Often comparable to TL6 (1900-1950) but unfamiliar in detail.

(5+*n*) Advanced steampunk: Technological speculations of early science fiction writers, including their visions of the remote future.

Such notations as "TL(5+1)" indicate a divergent path of technological advance branching off from the Age of Steam. TL(5+1) is equivalent to TL6 overall. Except in parahistorical settings, it can just as well be called TL6. Similarly, TL(4+1) can be considered a variant TL5, and TL(5+*n*) a variant TL7 or higher.

If the campaign setting is TL5, devices at TL4, TL(4+1), or TL5 are 5-point Inventions (see p. STM44); devices at TL(5+1) are 15-point Inventions; devices at TL(5+*n*) are 50-point Inventions. If the campaign setting is TL(5+1), new TL(5+1) devices become 5-point Inventions; other point values do not change.

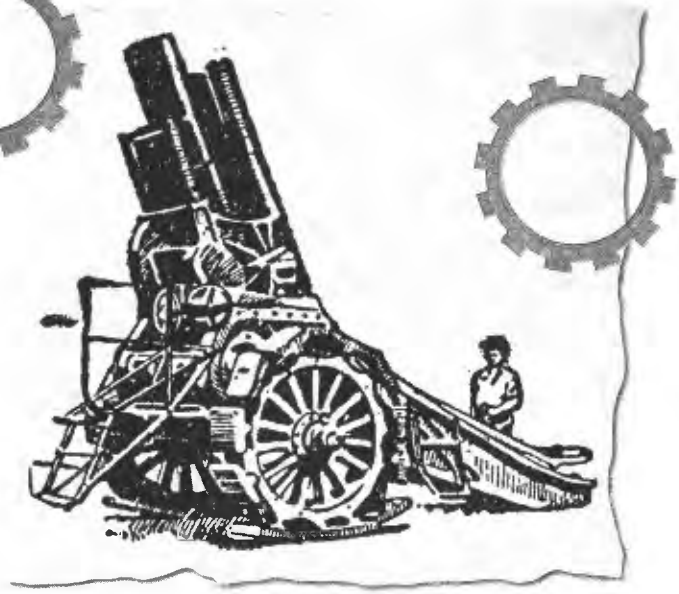
Real and Unreal Inventions

From these definitions, devices labeled TL4 or TL5 should be real inventions; devices labeled TL(4+1), TL(5+1), or TL(5+*n*) should be fanciful. But it's not that simple. Real inventions of the early 20th century that fit the 19th century's technological idiom, such as airships, are classified as TL(5+1); devices that apply real 19th-century technology in cinematic ways, such as the lunar shell (p. STM83), are classified as TL5.

For the curious, here's a list of real, historical inventions and devices:

Camera Obscura	ancient world
Anas Mechanica Arcana	1739
Condenser	1745/1746
Voder	1779
Charcoal Pills	before 1800
Compressed Gas Tank	before 1800
Racing and Pleasure Yacht	before 1800
Nautilus	1801
Punched Cards	1805
Safety Lamp	1815/1897
Limelight	1816
Colonial Train	1825
Induction Coil Lamp	1851
Tempest Prognosticator	1851
Pneumatic Dispatch Terminal	1853
Steam Launch	1858
Aereon Airship	1863
Anti-garrote Collar	1863
Listerian Antiseptic Aerator	1865
Water-Drop Electrostatic Generator	1867
Vegetable Compound	1875
Resurgam	1880
Photographic Gun	1881
Artificial Silk	1884
Collapsible Bustle	1888

Dewar Flask	1892
Formaldehyde	1893
Cinematograph	1895
Portable Fire Escape	1895
Military Bicycle	late 19th century
Bakelite	1907
Piltdown Man	1911
Howitzer	1914
Long Range Cannon	1918
Xenon	1951



Familiarity Penalties

Because TL(5+1) diverges from standard TL6, scientists and engineers from standard TL6 receive unfamiliarity penalties (-2; see p. B43) in working with it, and vice versa. But use common sense in applying these. Sulfanilamide is classified as TL(5+1), but it was also a TL6 medication; no penalty should apply to the skills of Chemistry/TL6 or Physician/TL6 for working with it.

Variant Prices

Under certain circumstances, devices may be purchased at other than list price.

A limited-production device (one with extensive customization, or so large that it is normally produced one at a time) costs twice list price.

A home-built device costs 20% of list price for parts and materials. The builder must also supply labor and workshop facilities.

Building a device from salvaged parts calls for a Scrounging roll; reduce the price of the parts by 10% per point of success, maximum 50%.

A used device in good condition typically costs 50% of list price. Buyers willing to repair a device may find lower prices, down as far as 10% of list.

Uhrwerkmagie of Ingolstadt

Uhrwerkmagie of Ingolstadt is the corporate presence of an eccentric Bavarian mastermind devoted to unusual technologies, especially those of the TL(5+*n*) variety. It is through Uhrwerkmagie that the mysterious Herr Doktor unleashes Infernal Devices and Weird Discoveries on an unsuspecting world. It has a single office and research facility, located unobstrusively on the Gundekarstrasse in Ingolstadt. Despite this, it deals with factors, import/exporters, scientists, and academic institutions worldwide. (Exception: Uhrwekmagie will not deal with Prussian nationals or organizations. No exceptions.)

It also employs freelance investigators (read "industrial spies"), provides corporate grants to needy academics, and donates impressive – if outré – technological products to charities, in lieu of cash. Uhrwerkmagie will offer employment, money, or patent royalties (good source of Independent Income) to any practitioner of Weird Science that it finds out about. However, if rebuffed, it can become hostile – to the point of theft, assault, arson, or exuberant demolitions.

Speculation on the nature of Uhrwerkmagie rages: Is it a shell company, used to launder alchemically created heavy metals? Or a holding corporation with extensive interests in the steam, calculation engine, etheric, and materials science industries? Or simply a source of income to underwrite the Herr Doktor's experiments?

Uhrwekmagie can serve as either Patron or Enemy for adventurers. As a Patron, it can provide wondrous toys for field testing and will pay well for captured strange technology or weird materials. As an Enemy, it will provide the same devices to zealous R&D agents, verifying their utility outside the laboratory.

Adventure Seed: Orphannahrung

The Herr Doktor is studying the long-term effects of feeding a new synthetic formulation of élan vital to human beings. This could spark outbreaks of malnutrition, mutations, disease, Magery, psionic powers, or even super powers!

CHAPTER 1
PERSONAL WEAPONS

"On the contrary, professor, with this gun every shot proves fatal, and so soon as an animal is hit, or even just touched, it drops as if hit by lightning."
– Jules Verne, ***20,000 Leagues under the Sea***

Adventurers in the Age of Steam have access to a variety of personal weapons. Hand-held swords and truncheons continue in use, firearms attain a perfection hitherto undreamed of, and the laboratories of natural philosophers pour forth experimental weapons based upon advanced scientific principles.

Hand Weapons

Hand weapons don't share in the rapid evolution of firearms; the materials are better, but nothing in the designs would have been strange to a medieval armourer. Even so, they retain some advantages for adventurers: they make little noise and they never run out of bullets. By the century's end few people carry weapons openly, but some ingenious designs disguise them as harmless personal accoutrements.

Defensible Brolly TL5

A sensible woman's best choice to hold the unsavory at bay until help can arrive!

A handsome umbrella, with brass fittings and a beautifully dyed waterproof canopy, the defensible allows ladies to fend off the attacks of a street tough, or the paws of an African Lion!

The defensible brolly resembles a normal lady's umbrella. However, at the press of a button, a sharpened steel spike springs from the tip. A further press of the button and the vanes of the umbrella open until its shape is that of a flat shield, which then moves halfway down the shaft.

As the name implies, the brolly is intended to hold an attacker at bay, rather than doing serious damage. However, it can be used as the equivalent of a bayonet. With its canopy open, the brolly acts as a medium shield for defense. The brolly is a combination weapon/shield; it serves neither function as well as an actual weapon or shield would (-1 to either skill).

Skill Spear/Shield, Damage Imp. thr+1, Reach 1, PD 2, DR 2, 4/22 HP, Min ST 11 (one-handed)/10 (two-handed), Vol. 1.5 cf, Holdout -4 (0 to find special features), LC 5. Maximum damage 1d-1 due to small size. 5 lbs., $5.

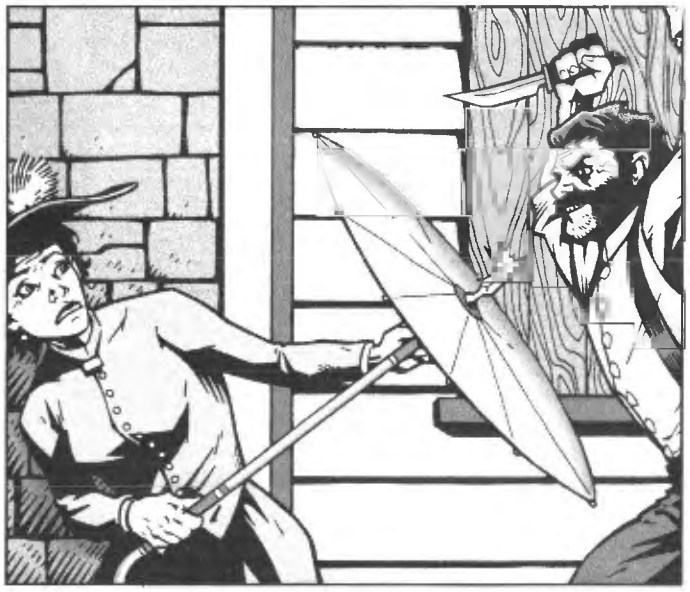
Gadgeted Sticks and Staffs TL5

"Well, it was jolly dark under the old ruined Abbey, but we had our battery torches out and couldn't put a foot wrong. Suddenly we saw the blighter standing in the crypt door, seven foot tall if an inch and dressed for the opera. We went for our tools, Socks trying to see if he showed in a mirror and Daffers loading up a Very light, when wouldn't you know it old Lunch-pail dropped his flask of ginger-beer, and then faithful four-footed Skara Brae slipped in the puddle and slid straight into the Count, knocking him for 10 into his grubby foreign dirt-box! Then I figured my 'Moorsie' would do for a stake any day. I daresay we had a wobbly moment when he bled a pip and didn't crumble, but finally he dust-to-dusted, and we found out later he'd just snacked on the Vicar and was full as a you-know-what. Another mystery solved, hurrah!"

– Frederick, 46th Lord Runcorne, for his Fabulous Friends

The Rosslare firm makes walking sticks and staffs with internal compartments for Useful Devices. Their market is wealthy adventurers and gentlemen of a "be prepared" bent, and their prices and quality are accordingly high.

A Rosslare Stick is made of tubular steel finished to suit the purchaser's preference. Gloss black "japanned" enamel is the most popular, but any color or finish can be provided, including bright high-visibility colors and precise measuring marks; the walking-stick model is often covered in wood veneer, making it appear to be a conventional cane. Each stick comes with a standard assortment of devices, more than will fit inside the stick at one time. Capacity, which varies by model, is measured in "spaces," each device taking up one or more cylindrical spaces. A space is about 10 cubic inches and is lined with rubber, which protects the contents, keeps them secure, and allows empty space to be left. The space is actually continuous but has multiple access panels with concealed hinges and catches in a Dutch door arrangement. Gaskets make the space watertight as long as the doors are closed. All sticks, except for the sword-stick and cane gun models, will float when empty. Weights are exclusive of carried devices; a fully loaded stick can be rather heavy.



The Holdout modifier for the hidden catches of the stick's compartments is +4. However, anyone who knows the trick will automatically find the stick's contents on a thorough search.

Rosslare warrants its products for the life of the owner; they will replace a lost or damaged device free of charge, usually in exchange for a testimonial as to how it saved the user's life in a sticky situation.

The GM or players may create new devices, the GM having final say on practicality, size, and cost. Gadgeteer characters may build their own devices, or Rosslare can build conventional devices (that is, those that do not rely on super-scientific materials or principles) to a customer's specification. If the company believes the device has commercial potential (GM's discretion), they may build it free of charge (for a registered owner, of course) in exchange for patent rights; otherwise they will charge a fairly steep custom fee.

Weapon Weight and Min ST

The added weight of customizations or stored objects may affect the minimum ST of a Rosslare stick or other weapon. The following rules can be used to estimate Min ST for hand weapons:

Multiply weight by 1 if the weapon is used one-handed and by 2/3 if the weapon is used two-handed. Consult this table:

Effective Wt.	Min ST
Less than 2.00 lbs.	4
2.00-2.99 lbs.	7
3.00-3.99 lbs.	10
4.00-5.99 lbs.	11
6.00-7.99 lbs.	12
+2 lbs.	+1

Any Rosslare stick is considered a non-hafted weapon. Special rules apply to hafted weapons (see p. LT110).

Gadgeteers may also use the "Gizmo" rule (p. CI124), letting them reserve space for devices that will not be specified until used. The number of Gizmos per adventure may not exceed the available space, and the Gadgeteer's list of allowable Gizmos must be determined ahead of time.

Standard Models

The "Promenade." A standard walking stick, available with straight, crook, or pistol-grip handles. This model only is available as a sword-stick (others are not properly balanced for such use), though the sword makes the stick too heavy to float.

Another variant incorporates a single-shot breechloading .44 action and barrel. To load it, the user unscrews the grip, places a cartridge in the action, and screws the grip on again. The weapon is cocked by pulling back the grip and fired by a folding trigger. A protective metal tip on the muzzle must be removed before firing (it can be left on, but this will ruin the tip and may, on a 1-in-6 chance, destroy the cane). Loading the weapon takes 10 seconds; readying it to fire takes 3 (1 if the tip is left on).

Standard: Skill Broadsword or Fencing, Damage Cr. sw+1, Reach 1, Min ST 7, Holdout -4, Capacity 4 spaces, LC 6. 2 lbs. (empty), $100.

Sword-Stick: Damage Imp. thr+1, Reach 1, Min ST 10, Capacity 0 spaces, LC 4. 3 lbs., $125.

Cane Gun: Skill Guns (Rifle)-2 or Guns (Pistol)-3, Malf 14, Damage Cr. 2d+2, SS 10, Acc -1, 1/2D 100, Max 900, Shots 1, ST 11, Rcl -2, LC 3. 4.2 lbs., $115; 0.0084 lbs./round, $0.0008/round.

The "Bertie." As above, but the stick breaks down into three sections for storage or travel. Not, obviously, available as a sword-stick. (Inspired by an actual stick – owned by the Prince of Wales and still produced today – which contained a small flask and a compass for finding one's way back to the palace after the flask had been emptied.)

Skill Broadsword or Fencing, Damage Cr. sw+1, Reach 1, Min ST 7, Holdout -4, Capacity 3 spaces, LC 6. 2 lbs. (empty), $100.

The "Moors." A shooting-stick; that is, a cane with a small spike on the tip and a large handle that folds outward into a seat. The user sets the tip in the ground, unfolds the handle, and can sit in reasonable comfort and security. Note that shooting sticks are definitely "country attire" and would never be carried in a city.

Skill Broadsword or Fencing, Damage Cr. sw+1, Reach 1, Min ST 10, Holdout -5, Capacity 6 spaces, LC 6. 3 lbs., $150.

The "Pennine." A 5' walking staff. This model has a threaded tip with interchangeable points: a gutta-percha "crutch tip" for pavement, a small spike for open ground, and several large tools (see below). The staff can be used as a quarterstaff. Again, staffs are not carried in cities, and might attract amused comment ("Oo, so it's Merlin, innit?") in all but real wilderness areas.

Skill Staff, Damage Cr. sw+2/Cr. thr+2, Reach 1 or 2, Min ST 7, Holdout -5, Capacity 10 spaces, LC 6. 4 lbs., $200.

Specialty Sticks

These models do not have internal storage space and are supplied without the usual kit of Devices.

The "Athelstane." A straight-handled walking stick, heavily reinforced and containing a steel jackscrew. To use it, a pair of grip rods are removed from the handle and inserted into the shaft; turning these extends the screw, which can force apart wooden doorframes, lift objects, or prevent portcullises and the like from dropping across one's path. Two metal discs (carried in a pocket or pack) fit on the ends to provide more bearing surface. The stick can hold at least half a ton in compression, though if it fails, it will do so quite suddenly. Rosslare will, of course, replace any such unit free of charge.

Skill Broadsword or Fencing, Damage Cr. sw+2, Reach 1, Min ST 11, Holdout -4, LC 6. 4 lbs., $150.

The "Ivanhoe." This looks like the Pennine, with the same interchangeable end pieces, but releasing a catch causes a row of four-inch bars to fold out horizontally from the shaft, forming a ladder. Multiple staffs may be threaded together to form longer ladders, though the stability of more than two is uncertain.

Skill Broadsword or Fencing, Damage Cr. sw+2, Reach 1, Min ST 11, Holdout -5, LC 6. 4 lbs., $200.

Standard Gadgets for Sticks and Staffs

Every Rosslare stick includes all the following (except as otherwise noted), packed in a sturdy wooden case with felt-lined compartments. They are not usually sold separately, except for expendables such as cartridges and batteries; prices when given are for comparison, remembering that these are expensive "bespoke" items. Holdout modifiers specified here are for carrying the device outside the stick.

Consumables

The kit includes a case of 50 dry batteries, 200 pistol cartridges, and 100 flares in assorted colors. Replacements are $2/20 batteries, $1/100 cartridges, $2/100 flares in choice of colors or assorted.

One-Space Devices

Coin Holder. A small cylinder that discreetly holds five gold sovereigns (approximately equivalent to the American $20 gold piece) which must be provided by the user.

Holdout +4. Negligible weight, $1.

Cup. A silver drinking cup ("shot glass" size). Monogram or family crest included for no extra charge, making it useful as an "I was here" message to friends in addition to its usual functions.

Holdout +3. 1 oz., $5.

Fishing Tackle. A packet of hooks, sinkers, and a float, with a 30' spool of lightweight line. The stick itself can be used as a fishing rod.

Holdout +4. Negligible weight, $2.

Measuring Stick. An 18" folding ruler, made of brass (or rather, of a brass-like alloy guaranteed to expand or contract relatively little with temperature fluctuations). The reverse has a scale which permits distances to be read off a standard 1" to the mile map and a simple protractor to allow angles to be assessed.

Holdout +4. 3 oz., $2.

Slide Rule. A basic but serviceable slide rule of engraved brass. Permits fairly precise multiplication and division, giving +1 to +5 to many skills at the GM's option.

Holdout +4. 2 oz., $2.

Two-Space Devices

Basic Tool. A multipurpose device, like the "pocket toolboxes" of a later era. Contains a compass, magnifier, signal mirror, small knife, corkscrew, propelling (mechanical) pencil, policeman's whistle, and screwdriver.

Holdout +2. 1 lb., $5.

Climbing Belt. A belt with an attached strap that loops around a telegraph pole for aid in climbing (+2 skill bonus). It can support up to 250 lbs.

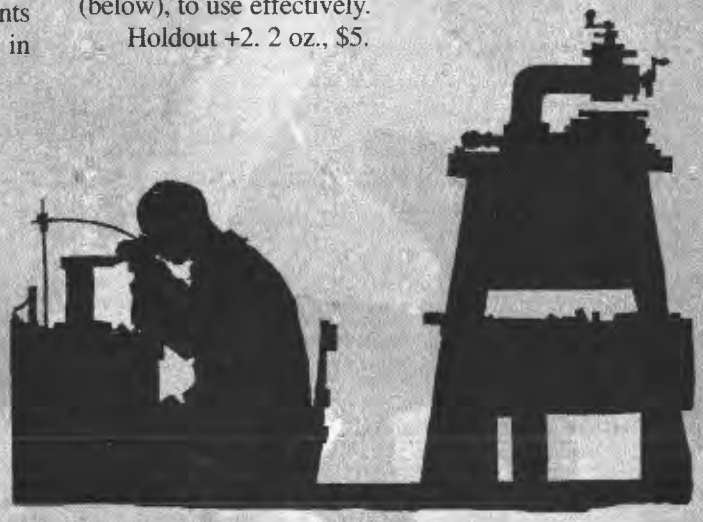
Holdout +1. 2 lbs., $6.

Flask. A glass-lined bottle that holds about 3 ounces of liquid.

Holdout +3. 1 oz., $2.

Microscope. A 50× folding microscope. It requires a fair amount of ambient light, or something like the torch (below), to use effectively.

Holdout +2. 2 oz., $5.



Small Capsule. A steel cylinder with a threaded, gasketed cap and a rubber lining. It will protect about 2 cubic inches of whatever the user desires – notes, scientific specimens, etc. – from the elements or most ordinary attacks. Useful, say, for hiding the Key to the Pharaoh's Tomb while you are temporarily captured by the Minions of Anubis.

Holdout +3. 1 oz., $3.

Spyglass. A collapsible 3× telescope (+2 to Vision for searching, +3 for close examination).

Holdout +2. 2 oz., $5.

Torch (or "flashlight," in American usage). Provides modest light (like a modern penlight) for up to 30 minutes on one battery. Additional batteries take up one space each.

Holdout +2. 8 oz., $2.

Continued on next page . . .

Standard Gadgets for Sticks and Staffs
(Continued)

Three-Space Devices

Jackscrew. A threaded metal jack with folding side handles that can exert several hundred pounds of force. It is 4" long closed and can extend to 7". Useful for spreading cell bars or cracking objects open, though it will not provide enough clearance under (say) a vertical door to allow a normal person to slip underneath unless additional sturdy spacers are provided.

Holdout +2. 2 lbs., $5.

Large Capsule. As the Small Capsule, but with twice the capacity.

Holdout +2. 2 oz. (empty), $5.

Large Flask. As the Small Flask above, but holds about 6 ounces.

Holdout +2. 2 oz. (empty), $2.

Large Tool. As the smaller multipurpose tool, but also with a sawblade, a file, more drivers, a hand drill (gimlet), and pliers.

Holdout +1. 2 lbs., $10.

Pistol. A cylindrical single-shot weapon, able to fire standard .38 caliber cartridges or colored signal flares ("Very lights"). To load, it is unscrewed at the center, the cartridge dropped in, the device reassembled, and the firing spring cocked by pulling back on the tailpiece. It is fired by a thumb trigger on the side. Loading takes three combat rounds, reloading (including removing the spent cartridge) four. Because of the very short barrel and unconventional grip, it is not very accurate, and the slow operation makes it most suitable for escaping from enemies who have failed to examine their prisoners' gear or dispatching a lone guard to obtain a more serviceable weapon. However, concealable trick guns are always popular among the adventurous classes. Three cartridges or flares take up one space.

Malf 16, Damage Cr. 1d-1, SS 9, Acc 0, 1/2D 60, Max 990, RoF 1/5, Shots 1, ST 8, Rec. -1, Holdout +2, LC 3. 1 lb., $15; 0.013 lb./round, $0.0013/round.

Sextant. A folding navigational instrument. A person with appropriate skill (Navigation or Astronomy) can use this to find his position, provided he also has an accurate timepiece.

Holdout +2. 1 lb., $5.

Telegraph Set. A small telegraph key and sounder, a dry battery, and 20' of paired wire. To be used, it must be spliced into a telegraph line (this usually requires a pocket knife and sometimes a way to climb the telegraph pole, such as the climbing belt above). The battery (as for the Torch, above) will last for 10-15 minutes of operation, usually enough for emergency messages.

Holdout +2. 1 lb., $5.

Additional Items For Staff-Length Models

These devices come only with the Pennine and similar models (including those without the conventional kit) and do not fit inside the stick, but must be carried in a pack, on belt loops, etc.

Bayonet. An 8" blade that, when threaded onto the staff's end, turns it into a short spear.

Skill Spear, Damage Imp. thr+2 (one-handed)/thr+3 (two-handed), Reach 1 (one-handed)/1 or 2 (two-handed),

Holdout +1. 1 lb., $3.

Mounting Clamp. A double-ended metal clamp, with thumbscrews, that allows other items (telescopes, surveyor's tools, cameras) to be fixed to the staff for stable use.

Holdout +3. 2 oz., $2.

Shovel. A shovel blade, about 8" across, that threads on like the bayonet. The straight staff makes a somewhat inefficient shovel handle (half normal digging speed), but it beats digging with one's hands.

Holdout -1. 1 lb., $2.

Snaring Scarf TL(5+1)

Shoppers take notice! This beautiful homemade looking scarf could save your life or valuables!

Mechanization allows us to bring you this wonderful, homemade looking scarf, that is both durable and functional.

Whether on the streets of London or the wilds of Africa, this lovely scarf will expand in a few seconds to an unbreakable net, sizable enough to contain a running dodger or a rampaging lion.

This scarf looks like a normal knitted scarf, but is woven of an unusually tough variant of artificial silk (see p. 115). A ribbon weaves throughout the pattern to hold the scarf together for regular use.

It takes 1d-1 seconds to remove the ribbon that binds the scarf and shake it out into a net. Alternately,the end of the ribbon can be untied and the scarf can be deployed with the specialized skill of Fast-Draw (Net) (P/E; see p. B50).

Once deployed, the scarf functions as a melee net, per the Net skill (p. B51). The net takes 5 minutes to rebind into a scarf.

The snaring scarf is definitely a cinematic device.

Skill Net, Damage Spcl. (p. B51), SS 11, Acc 0, 1/2D –, Max ST + Skill/5, Min ST 4, Holdout +3, LC 6. 0.5 lb., $2.

Firearms

Firearms undergo rapid progress in the Age of Steam: cartridge ammunition (the boundary between Black Powder Weapons skill and Guns skill), guncotton, revolver and other repeating actions, and fully automatic weapons designs come into use – along with some wild experiments. The designs presented here offer a few "what if" options for steampunk weaponry.

Saber Gun TL5

On a lighter note, Capitaine Gercy of the Fourth successfully met an Austrian hussar in hand-to-hand combat and, though the man got away, pressed him to leave, as a souvenir, a most remarkable weapon: a heavy saber whose grip integrated a six-shot revolver. The curiosity has been sent on to the Musée de l'Armée for display to the Paris public.

The saber gun is an intriguing oddity, though of dubious usefulness. It combines a heavy cavalry saber with a six-shot double-action rimfire revolver, the barrel aligned with the blade (on the left for right-handed shooters, on the right for left-handed ones). Firing it uses Guns (Pistol)-2 skill, using the saber Broadsword skill (unfamiliar users are at -2). The weapon can be fired on the same turn after striking a target with the blade (-2 to Broadsword skill for worse grip, +5 to hit on the shot, ignore SS penalties), but it must be kept cocked for this to work. A cocked weapon used to strike has a 1-in-6 chance of going off on impact (hit, parry, or successful parry or block against it).

Skill Broadsword, Damage Cut. sw+1/Imp. thr+1, Reach 1, Min. ST 12, -2 to skill when ready to fire; Malf 14, Damage Cr. 2d-1, SS 14, Acc 3, 1/2D 130, Max 1,500, RoF 1, Shots 6, ST 12, Rcl. -2, Holdout -4, LC 3. 5 lbs., $45; 0.05 lb./round, $0.005/round.

Vulcan Gun TL5

The Scientific Method of Crowd Control:
The Vulcan Gun!
Safe – Fast – Precise – and Affordable!

When truncheons are too little force – and bullets are too much – the Vulcan Gun is the answer you need! Its vulcanized rubber bullets will take the fight out of rioters, without causing permanent injury, and without risking the lives of police officers or private guards.

Testimonials available on request from police forces across the United States and Europe!

The Vulcan gun resembles a rifle, but has a comparatively short, heavy barrel: .79 caliber and 15" long. It fires vulcanized rubber bullets, the source of its name. These inflict normal damage for the purposes of knockback but *halve* actual damage after DR is subtracted. Because of their low speed and high surface area, DR protects at *double value* (indicated by the armor divisor of 0.5) with a minimum DR of 1 for ordinary flesh. The usual wound channel modifier for large caliber ammunition does not apply. A drum magazine holds 12 rounds of ammunition.

Malf 16, Damage cr. 3d (0.5), SS 14, Acc 6, 1/2D 22, Max 190, RoF 3~, Shots 12, ST 10, Rcl. -1, Holdout -4, LC 5. 13 lbs., $41; 0.048 lb./round, $0.005/round.

Carbide Rifle TL(5+1)

. . . We have been testing these calcium carbide powered rifles. They are a little slow to bring into action, since they have to be loaded with powdered carbide and water. Once the pressure of the acetylene gas builds up, however, they keep firing magazine after magazine of lead slugs without appreciable fouling. They have proven quite reliable. I recommend that we issue a contract with Flanheim Arms to produce as many more of these for us as they can before the launch date of the Mars expedition. The savings in cargo space and weight make them well worth the price . . .

– Excerpt from a memorandum to the War Office

The Flanheim Arms Carbide Rifle is a .45 caliber pump action repeating rifle that fires lead slugs propelled at high speed by an acetylene and air mixture. The acetylene is produced by the reaction of water with calcium carbide. A fixed box magazine contains 14 cast lead slugs. Cycling the pump handgrip loads a slug into the barrel. Pulling the trigger injects acetylene behind the slug and then releases the hammer. The hammer strikes a quartz crystal, producing the electric spark that fires the round.

Malf 16, Damage Cr. 7d-1+, SS 14, Acc 10, 1/2D 650, Max 4,400, RoF 3~, Shots 14, ST 12, Rcl. -2, Holdout -5, LC 2. 13 lbs., $120; 0.048 lb./round, $0.01/round.

Note: The + indicates that wounding damage, after DR is subtracted, is multiplied by 1.5.

Clockwork Carbine TL(5+1)

Agents' reports indicate that the most unexpected victories by the Austrian Army in Italy against its Piedmontese foes were attained due to the employment of the new Skoda .38-40 Clockwork Carbine. This appears to be a variety of portable Gatling gun, useful especially at close quarters. To our knowledge, the Admiralty has directed its attaché to purchase a consignment for testing on behalf of the Royal Marines.

Like most steampunk variations of the submachine gun, the Skoda clockwork carbine uses external power to drive the loading mechanism – in this case, clockwork. Thick and stubby, the gun has the appearance of a Drilling, but what look like the top twin barrels are in fact tube magazines feeding it its 20 rounds. Because of the time required to load the rounds singly, soldiers carry preloaded 14" metal tubes much like modern clips. The Skoda can also take a 50-round gravity-fed hopper magazine (2 lbs., $2), but this setup is wildly unreliable (lower Malf to 13). Export versions of the weapon also take .32-20 (2d) and .40-44 (3d+, Shots change to 16+1) rounds. A box mounted forward of the trigger contains the clockwork, with the detachable wind-up crank stored in the stock. It needs to be wound for 30 seconds every 100 rounds. Drilling a hole through the clockwork casing and inserting a pin causes the weapon to fire 3-round bursts, but the pin needs to be manually removed and reinserted after every burst. This modification is not standard and not recommended by the manufacturer.

Malf 15, Damage Cr. 3d-2, SS 13, Acc 6, 1/2D 300, Max 2,200, RoF 6, Shots 20+1, ST 12, Rcl. -2, Holdout -5, LC 1. 10 lbs., $60; 0.22 lb./round, $0.1/round.

Magnetic Needler TL(5+1)

In this modern age, a woman may need to protect herself.

Though it has long been called "the equalizer," Colonel Colt's revolver does not make men and women equal. A large and heavy pistol, such as the Colt .45, is needed to make sure of stopping an assailant, and its weight and recoil make it unsuitable for many women.

Now, Sticherin Armaments offers a woman's alternative, the first true equalizer. Firing not slow, heavy bullets, but high-speed needles, it can incapacitate an attacker without massive recoil. The professional woman who must sometimes travel alone can now do so without fear.

The Sticherin ("Seamstress") magnetic needler applies electromagnetic technology, like that used in the magneto-ballista (p. STM88), to a new type of ammunition: 2 mm steel needles. Their high velocity and impaling effects enable them to cause substantial damage to a living target. Which came first, the nickname (now the official name of the weapon and the company) or the strategy of marketing to women, is not certain. But the "little seamstress" appeals to other markets as well, particularly intelligence operatives, who like its nearly silent operation and ease of concealment. The hired assassins of certain criminal gangs find it useful for the same reasons.

Malf Crit, Damage Imp. 2d, SS 9, Acc 6, 1/2D 320, Max 2,500, RoF 1, Shots 25, ST 8, Rcl. -1, Holdout +2, LC 3. 2.25 lbs., $16.50; 0.00002 lb./round, $0.00016/round.

Power comes from a 0.75-lb. primary battery, good for 50 shots, whose weight is included in the 2.25-lb. weight of the weapon. Replacement batteries cost $0.75. A 25-round box magazine weighs 1/8 ounce and costs $0.004.

Peroxide Pistol TL(5+1)

Baron Grinnet threw a switch, locking the doors.

"You were foolish to come here unarmed," he said as he drew his rapier.

"You would attack an unarmed man?" Archie replied incredulously.

"Of course," said the Baron, "Only a fool throws away the advantage."

"I'm glad to hear you say that," Archie said as he drew from his pocket the glass pistol he had taken from the body of the dead Martian. He pulled the trigger, pumping a squirt of hydrogen peroxide into the silver catalytic mesh in the firing chamber. With a puff of steam, the poisoned dart shot straight for the Baron's throat. His eyes glazed as he slumped to the ground. Archie grabbed the rapier, unlocked the doors, and set off through the palace to find the princess.

The Martian peroxide pistol is a mechanical repeater made primarily from tempered glass. It contains no metal except the small amount of silver used to catalytically decompose the hydrogen peroxide into steam. The grip holds 10 darts which may be poisoned. A reservoir under the barrel contains enough peroxide for 100 shots. Pulling the trigger injects the propellant and fires the weapon; releasing the trigger loads the next dart into the chamber. Although a Martian design, this weapon could be duplicated by human technology.

Poison from the glands of the Martian "red reaver" is a neurotoxin that adds 2d to the damage if the dart penetrates the target's DR.

Malf 16, Damage Imp. 1d, SS 9, Acc 2, 1/2D 66, Max 720, RoF 3~, Shots 10, ST 8, Rcl. -1, Holdout +1, LC 3. 0.85 lb., $45; 0.0021 lb./round, $0.0008/round.

Explosives

The chemist's laboratory has produced a variety of new explosive compounds, including guncotton and nitroglycerine. The weapons described here apply them to man-to-man combat.

Dynamite Gun TL5

*Is the efficacy of destruction to be the only gauge that determines how our soldiers of the future are to be armed? How can any nation aspire to the epithet of **civilised**, yet make its soldiers the equals of **savage murderers**? And yet, that is exactly what the Prussian army proposes to do in harnessing the terrible force of **dynamite** to the craft of war, citing its proven power in the hands of Anarchistedynamiteurs and petroleurs. A black day for civilisation has come.*

The governments of Continental Europe, being more familiar with the tactics of modern insurgent warfare that those of America or Britain, have long puzzled over the possibility of adapting dynamite, a dangerous weapon in the hands of bomb-throwers, to military use. Unlike gunpowder (or the later TNT), dynamite does not take well to shocks and cannot be fired from a conventional gun. This Prussian breechloading design uses compressed air to launch a 45mm dynamite shell. It is intended as an infantry weapon for street fighting, but could also be used by mad scientists to fire newfangled CHEM rounds. Its pressure reservoir holds five shots, but every shell must be loaded separately. Note that any campaign in which TNT has been invented has no need for this weapon.

Malf 14, Damage Exp. 3d+2 [6d], SS 17, Acc 0, 1/2D 21, Max 110, Wt. 18 lbs., RoF 1/5, Cost $115, Shots 1, ST 12, Rcl. -1, WPS 3.4 lbs., CPS $0.68, -4, LC 0. 18 lbs., $115; 3.4 lbs./round, $0.68/round.

Higher Explosives

The modern explosives industry was born in the nineteenth century. In 1800 the only commercial explosive was black powder, in 1900 a few armies were adopting TNT. Explosives were the economic and research heart of the chemical industry until the rise of synthetic dyes. Some explosives (with date of invention and REF – see p. HT25) are chlorate powder (1788, 0.7), mercury fulminate (1799, 0.4), picric acid (1830, 1.0), nitrocellulose (1838, 0.9), nitroglycerine (1846, 1.5), TNT (1863, 1.0), dynamite (1867, 0.4-0.8), smokeless powder (1885, 0.9), and tetryl (1877, 1.3). Commercial success depends on stability more than explosive power. For example, dynamite is simply nitroglycerine mixed with desensitizers and filler, making it safe to ship.

Inventors may wish to create new explosives. Realistic chemical explosive REF is limited to about 4, but explosives 10 times as powerful as dynamite (REF 8) have a place in the steampunk genre.

Explosives are closely related to propellants; rocket fuels or the improved powders necessary for Lunar guns often come from the same sources and laboratories.

In addition to blasting one's enemies to bits, chemical explosives have many other uses, both in science fiction and in real life. Here are three examples:

In the 1680s, Christian Huygens demonstrated a working internal-combustion engine driven by gunpowder! Although the gunpowder engine did not prove practical in the real world, it might be so in a TL(4+1) "clockpunk" campaign.

In 1879, London physican Dr. William Murrell discovered that diluted nitroglycerine could dilate the arteries and relieve angina in patients suffering from heart disease.

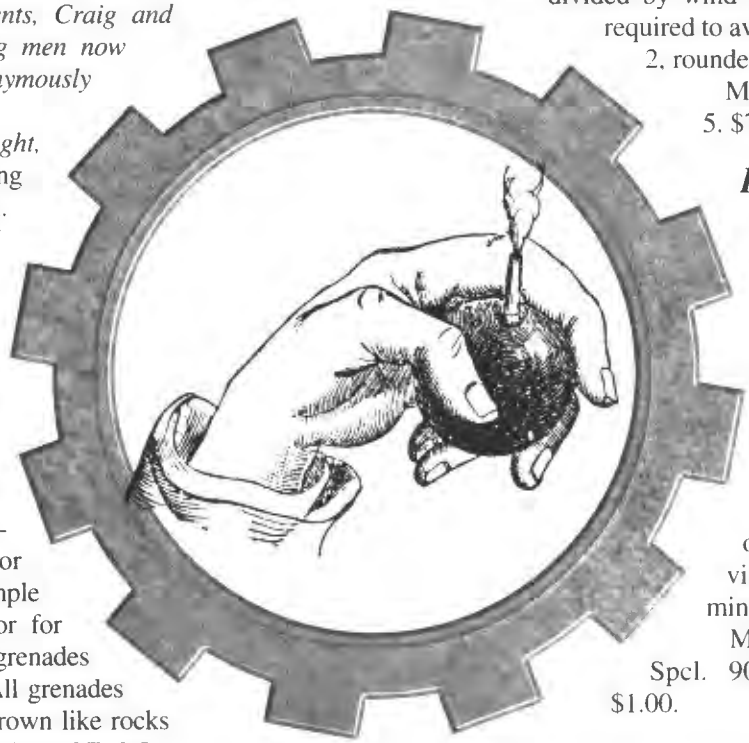
In H.G. Wells' "The Diamond Maker," an inventor fills a massive steel cylinder with dynamite and charcoal and succeeds in making artificial diamonds. Unfortunately, the cost of the experiment leaves him bankrupt.

Special-Purpose Grenades TL(5+1)

From behind his mask, Thomas Harrow looked down at the lonely beach, where the crew of a small motor launch hastily offloaded crates to the drivers of a lorry. Two months' investigation had traced the source of the drugs that had ruined so many young lives. He frowned grimly at the thought of his two students, Craig and Whalley, handsome young men now undergoing treatment anonymously in a private sanitarium.

The chlorine, *he thought,* just the thing for disinfecting the world of these vermin. *His fingers sought one of the grenades at his belt.*

– *From* ***Boys' Weekly****, Number 13, "The British Grenadier," part 2, by Walter Strong*



Advances in chemistry make possible the creation of a variety of special purpose loads for grenades. Here is a sample suited for use in battle or for unofficial adventures. All grenades listed are -3 to Holdout. All grenades weigh 1 lb. and can be thrown like rocks (SS 12, Acc 0, 1/2D ST×2, Max ST×3.5).

Carbon Dioxide Grenade

Less dense than a normal grenade, a carbon dioxide grenade is cased in treated wax and rubber. Pulling its pin exposes the chemicals inside to air, and it will then burst if exposed to heat above 200°F or thrown against a hard surface (roll against ST for a soft surface), extinguishing all fires within 2 yards.

Malf. Crit, Damage 1d/2 if in direct contact with target, LC 6. $0.50.

Chlorine Grenade

Designed for lethality, the chlorine grenade releases a large cloud of heavier-than-air gas colored a sickly greenish yellow. Exposure requires a HT-2 roll; a failed roll costs 1 HP. After two hits are lost, convulsive coughing begins (-3 DX until clean air is reached). Each failed roll also reduces Vision rolls by 1. Roll on first exposure and once per minute until the cloud disperses (5 minutes divided by wind speed in mph). Rolls against HT-4 are required to avoid permanent Vision loss and to avoid lung damage (1d permanent HT loss) after any failed HT roll.

Malf 16, Damage Spcl. 9 yds, LC 0. $1.00.

Chloroform Grenade

The chloroform grenade floods an area with anesthetic gas, requiring a Will roll to retain consciousness after each minute of exposure until the cloud disperses (5 minutes divided by wind speed in mph). A HT-5 roll is required to avoid liver damage: 1d divided by 2, rounded down, as permanent HT loss.

Malf 16, Damage Spcl. 9 yds, LC 5. $7.00.

Flare Grenade

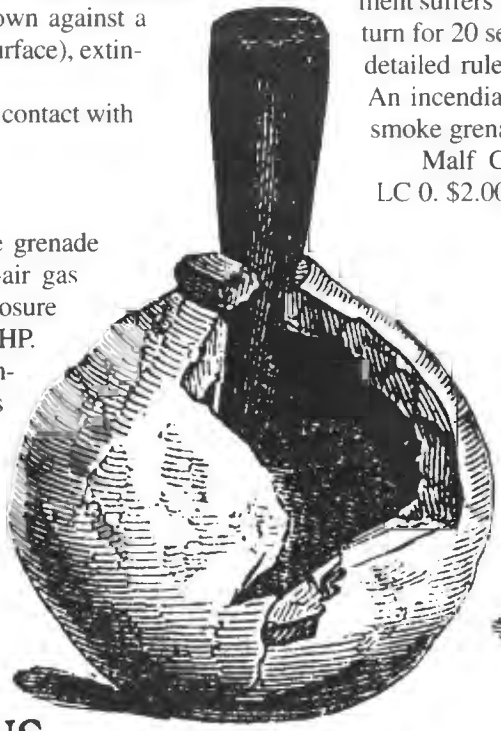
Flare grenades have their full effect only if thrown into the air, where they briefly release intense light and fall to earth after 2 seconds. At night, anyone within 9 yards of the grenade is dazzled on a failed HT roll: -1 to Vision rolls per point of failure, complete blindness on failure by 10 or any critical failure. Normal vision returns after 20-HT minutes.

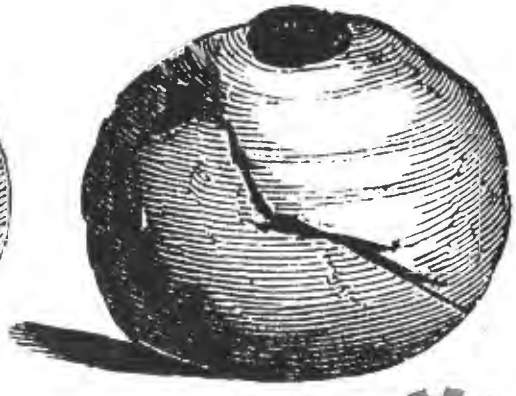
Malf Crit., Damage Spcl. 900 yds., LC 5. $1.00.

Incendiary Grenade

Incendiary grenades scatter powdered white phosphorus, which spontaneously ignites on contact with air; treat as a fragmentation attack. Anyone hit by a fragment suffers 1d burning damage per turn for 20 seconds. See p. LT94 for detailed rules on incendiary effects. An incendiary grenade also acts as a smoke grenade with radius 9 yds.

Malf Crit., Damage Spcl. 18 yds., LC 0. $2.00.





Energy Weapons

With increased knowledge of the forces of nature come a variety of new possibilities for weapons. The devices described here do not work by hurling material particles at a foe but by directing a stream of energy against him, from which a variety of effects may be produced.

Mesmeric Wand TL(5+1)

The British driver had a sure hand on the reins, and for all my urging our horses could not increase our lead. My companion reached within his cloak, and I thought he had decided to resort to gunfire. But instead he drew out a rod of metal and crystal and pointed it at the driver, staring fixedly. To my astonished question he responded only "Do not distract me: at this range I must concentrate."

I could not turn my gaze from the street, so I do not know what happened next. But after two more blocks, my friend said, "Now turn at the next cross street!" I obeyed his command, and from the corner of my eye I glimpsed our pursuers' hansom continuing along the main street, the reins slack in the driver's hand.

As we passed into the London night, I demanded, "Was this of your doing, my friend? And how did you bring it to pass, if so?"

He smiled and said something to the effect that the weak of mind could be overmastered by certain forces. And that is all he would tell me.

Scientific investigation of mesmeric trance induction proved that the medium of the trance was a force comparable to magnetism. The mesmeric wand provides a means of manipulating that force. Its 2' length holds the crystallized form of a complex organic molecule. When placed under electrical tension by a small battery, this substance amplifies the projected will of the mesmerist. Allow Hypnotism+5 to control a subject at C range, or Hypnotism rolls modified by range (p. B201) to control a subject anywhere in sight. The wand alone can be used to suspend a subject's will, causing immobility or simple directional movement; more complex actions require gestures or spoken commands. The usual limitations of Hypnotism apply, except for the skill and range modifiers.

Holdout -2, LC 5. 1 lb., $600. Power comes from a 1-lb. primary battery good for 15 minutes, costing $0.05.

Effects of Electric Shock

Electrical weapons, or accidental contact with electric charges or currents, cause highly variable effects. For simplicity, they each shock is assigned to one of the following options. "Modified HT roll" refers to a roll against the victim's HT with any adjustments specific to the weapon or current source. (See also pp. CII138-139.)

Nonlethal Electric Shock

Requires a modified HT roll, at +3 for High Pain Threshold, -4 for Low Pain Threshold, and +1 per 10 DR for nonmetallic armor. On a failed roll the victim is stunned for the duration of the current and a further (20-HT) seconds, after which normal rolls to recover from stun are permitted; the victim also suffers 1d fatigue. On a critical failure the victim's heart stops; see below.

Localized Electrical Burns

Requires a modified HT roll, adjusted for High/Low Pain Threshold as above. On a failed roll, the victim is stunned for 1 second, after which normal rolls to recover from stun are permitted; if the attack hit a hand or arm, a Will roll is required to avoid dropping anything carried in that hand. Also inflicts burns,typically 1d-3.

Lethal Electric Shock

Inflicts damage through internal burns; metallic armor is PD 0, DR 1 against such damage. Requires a modified HT roll, minus half the damage that penetrates DR, and adjusted for High/Low Pain Threshold as above, to avoid being stunned for the duration of the current and a further (20-HT) minutes, followed by another (20-HT) minutes at -2 DX. Requires a second modified HT roll, minus half the damage that penetrates DR, to avoid the heart stopping; failure reduces HT to 0 and causes death in HT/3 minutes.

At TL5 any treatments for heart stoppage are highly experimental. Roll vs. Physician-2 to restart the heart by injecting adrenalin, if any is available, or vs. Physician-4 to restart the heart by a controlled electric shock. CPR may be treated as a TL(5+1) technique; the GM may decide that it has already been invented, or allow it as Invention (15 points in a TL5 setting; 5 points in a TL(5+1) setting).

Pocket Lightning Projector TL(5+1)

With the distressing numbers of footpads and muggers on the streets of our fair cities, all right-thinking gentlemen and ladies are wise to desire some form of protection.

However, swords require years of training to be effective, and pistols are just so ***common.***

It is for these well-bred gents and ladies that we are proud to introduce the ***Tesla Mk. I Pocket Lightning Projector****!*

Utilizing the latest Scientific Techniques, the Pocket Lightning Projector "fires" a short-ranged incapacitating burst of Electricity, guaranteed to persuade the most ungentlemanly cad to desist his vulgar actions.

Available at select stores in Europe and the Americas.

The pocket lightning projector is a good example of TL(5+1) technology mimicking TL7. It very closely resembles a stun gun, but is larger and bulkier. Its use is identical – press the metal studs against the target. Attacks are rolled against Brawling (or basic DX), as *thrusting* attacks. On a successful attack the target suffers nonlethal electric shock; resistance is at HT-3. Due to its relatively primitive electrical discharge system, the lightning projector also inflicts localized electrical burns on direct contact with the skin, for 1d-3.

The projector is good for 20 successful attacks before it needs replacing (the battery is built in). Alternatively, it can be adapted to use TL(5+1) external power sources.

Skill Brawling or DX, Damage Spcl., Reach C, Min ST 11, Holdout -2, LC 5. 4 lbs., $20.

Electrocane

The electrocane is a more elegant variant on the pocket lightning projector made of strong and lustrous wood such as ebony or malacca. It has exactly the same effects, except that its smaller battery is good for only five uses. The electrocane can also be used as a light club and counts as a Fine weapon for purposes of breakage. A version of the electrocane is offered by Rosslare (p. 9) under the trade name "Faraday," at a price of $27.50 (5 guineas).

Skill Broadsword or Fencing, Damage Cr. thr/Spcl., Reach 1, Min ST 7, Holdout -4 (0 to hide electrical function), LC 4. 2 lbs., $25.

Voltaic Gun TL(5+1)

Bring Them Back Alive!
With the Tesla-Enfield Voltaic Gun

Naturalists, whether your object is a great beast of prey or the smallest bird, the Voltaic Gun enables you to capture it without damaging your precious specimen. Electrical force renders your quarry unconscious, allowing you to cage it and bring your cargo home unharmed. And the internal wimshurst generation system allows recharging in the field without the necessity of transporting heavy batteries. An invaluable tool for scientists and collectors.

The voltaic gun is a baroque weapon best suited to cinematic campaigns. A voltaic gun is shaped like a rifle, but the area in front of the trigger bears a large, circular box containing an internal generator. The firing end presents a forked electrical discharge unit. Firing it uses Beam Weapons (Electrolaser) skill; attacks are at -2 in moist environments or -6 in rain or heavy fog, +2 if the target is wearing more than 20 pounds of metal, and -2 if the target is near to but not touching a similar large mass of metal. A target suffers localized electrical burns for 1d-3 and nonlethal electric shock at HT-3.

In the field the unit can be recharged using a detachable crank. Recharging takes 600 minutes divided by ST (good work for bearers).

Malf 16, Damage Spcl., SS 13, Acc 4, 1/2D 60, Max 120, RoF 1, Shots 5, ST 9, Rcl. 0, Holdout -5, LC 5. 9 lbs., $120.

Light Rifle TL(5+*N*)

Time seemed to slow to a crawl for Colonel Featherstone as the 30-foot-long lizard came charging from the brush at the edge of the clearing. He knew that no normal rifle would penetrate the armored hide of the Venerian reptile. Fortunately, he had brought along a weapon that would. He raised the huge muzzle of his light rifle and lined up the sights on the forehead of the charging beast, and squeezed the trigger.

Explosives within the three-inch-diameter barrel detonated, exerting unimaginable force on the inch-wide rod of crystalline artemisite. As the crystal rod ceased to exist, it released a beam of intense white light that instantaneously drilled a hole through the armored skull of the creature. It collapsed to the ground in a heap, sliding to within inches of the Colonel's boot.

Pressing the release, he let the spent steaming barrel drop to the ground, then drew a fresh one from his backpack. As he pushed it into the stock, he muttered, "I shall have to get someone to clean that up."

The light rifle is a one-shot high-powered beam weapon emitting visible light. The disposable 24"-long barrels consist of a 3"-wide steel outer shell, an inner shell of explosives, and a 1"-wide core of artemisite, a crystal discovered in early lunar exploration. The shock wave that compresses the crystal rod causes it to emit a collimated beam of light that appears white, although it actually extends far into the infrared and ultraviolet. The crystal is reduced to powder in the process. Replacing a spent barrel requires 2 seconds. A successful Speed-Load roll allows a 1-second change.

Malf Crit., Damage Imp. 15d, SS 10, Acc 12, 1/2D 750, Max 4,500, RoF 1/3, Shots 1, ST 13, Rcl. -, Holdout -5, LC 2. 17 lbs., $550; 7 lbs./round, $10/round.

Artemisite

Eager inventors have found many uses for this rare lunar crystal. The deadly light rifle is but one. Stimulation with massive amounts of kinetic energy produces a beam of incredibly destructive power while smaller shocks produce much smaller effects. These smaller shocks do not destroy the crystals.

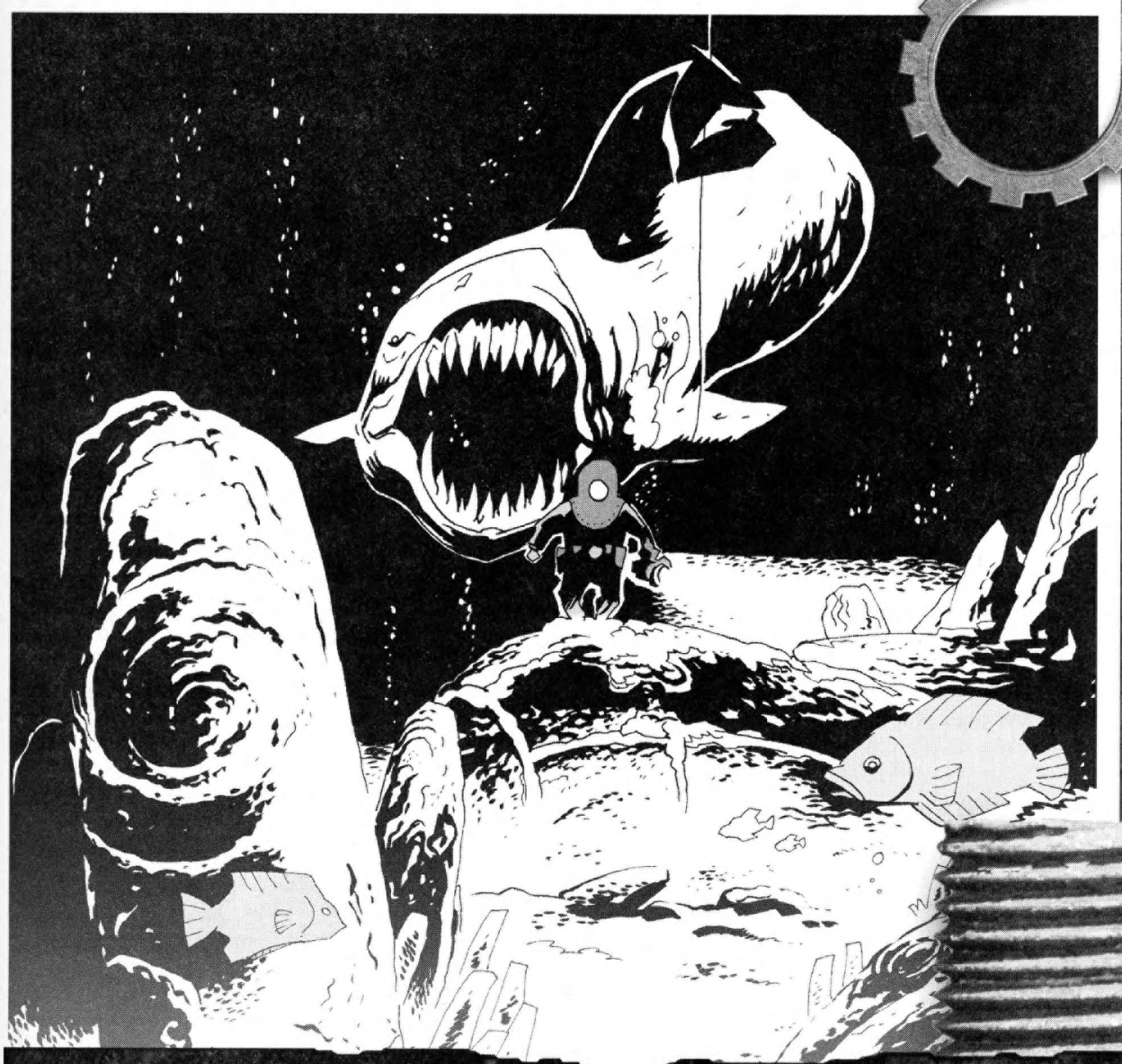
The simplest application is to give the crystal a small tap.

White light is emitted in the direction of the force applied and in proportion to its magnitude. This discovery lead to the production of a simple clockwork flameless torch. While its light is fairly faint it will continue to produce light forever as long as the spring is wound regularly. (See the luminous cane, p. 36.) In fact an ingenious inventor could attach a simple device to his light rifle that would allow him to illuminate his target prior to vaporizing it.

Given proper treatment artemisite will focus light to a far greater degree than any magnifying glass. Applications range from improved optics for microscopes and telescopes to incredibly effective sun rays. Besides focusing light, a proper cutting of this marvelous stone will cause the qualities of energy to change. A pair of properly cut stones set into spectacles will change infrared energy into visible light, allowing the wearer to see in the dark or through walls or foliage. With a pair of these Colonel Featherstone could have seen the gruesome reptile and lined up his shot before it broke from the protection of the brush.

Those familiar with the lapidary will find the crystal to sparkle with a fire that rivals even the best of Rhodes' diamonds.

Before other uses were discovered the rare fire of well-cut artemisite made these gems much sought after. Large samples were all snapped up by weapons developers but the smaller stones were shaped into exquisite jewelry. Artemisite jewelry was all the rage at dinner parties. Once other uses were discovered for these smaller stones the price shot up faster than the fastest ether flyer. The astronomical prices have made trade in artemisite quite profitable. Jewel thefts are at an all-time high and well funded expeditions have been sent to the lunar surface to scout out larger veins. The hunt for new sources of artemisite may be fiercer and bloodier than any gold rush on earth has ever been.



CHAPTER 2
CLOTHING AND ARMOR

Alice changed the subject hastily. "What a curious helmet you've got!" she said cheerfully. "Is that your invention too?"
– Lewis Carroll, ***Through the Looking-Glass***

While 19th-century vehicles were often clad in iron, human beings were not; personal armor advanced much less rapidly than personal weapons. This chapter considers some possibilities for armor, along with clothing and other gear that is worn on the person. Devices in this chapter have PD and DR ratings. Gear that increases mobility is deferred to Chapter 6.

Armor

Armor includes gear whose primary function is to provide PD and/or DR to the wearer. Holdout modifiers to armor are for visual examination (modified by range); any tactile search will find armor except on a critical failure (see p. LT98).

Anti-Garrote Collar TL5

Do You Wish to Avoid Being Strangled?

If so, try our Patent Anti-Garrote Collar which allows gentlemen to walk the streets of London in perfect safety at all hours. This unique article of dress is made to measure, of the finest steel, and is guaranteed to withstand the grip of the most muscular ruffian in the metropolis.

For a brief period, a gang of ruffians that strangled their victims into unconsciousness and then robbed them held London in terror. This spiked steel collar serves as a defense. Worn over the shirt, it protects the neck only; any choke or strangle whose damage (see p. B112) is reduced to zero or less by its DR does not inflict suffocation damage. Any attack against the neck with bare hands inflicts thr-2 cutting damage to the hands, based on the strangler's ST. An anti-garrote collar cannot easily be concealed and tends to look ridiculous.

PD 1, DR 4, Holdout -2, LC 5. 1 lb., $1.75.

Articulated Armor TL5

A notable sight at both Oxford and Cambridge in recent years has been young men practicing at the warfare of the Dark Ages, clad in armour of shining steel. Though fought with unsharpened swords, in their battles resounding blows are struck, continuing until one combatant falls to the ground or steps off the field. Amateurs of this new, or revived old sport include many disciples of William Morris. It is reported that tests have shown that the armour is sufficient to turn a bullet from a revolver. Some young combatants express the hope that in the next war British soldiers may go into battle armoured as the chivalry of old.

The most recent session of practice at Oxford was disrupted by the appearance of an unknown knight with closed helm, who swore to open it only when fairly beaten on the field. When after two victories the stranger fell in the third round to Mr. Rupert Brooke, the raised visor revealed the well-known feminist agitator Miss Viola Dalrymple, whose sword on this occasion proved nearly as mighty as her pen.

– From the London ***Times***

Based on the designs of late medieval armourers, articulated armor is made of far better materials than they had access to. Its high-grade steel composition affords better protection than heavy plate armor at little more than half the weight. It covers all hit locations.

PD 4, DR 8, Holdout -5, LC 5. 58 lbs., $52.

Magnetic Anti-Bullet Vest TL(5+1)

It Will Save Your Life!

The villain aimed for the hero's head
And surely would have shot him dead
And sent him to his eternal rest,
If not for the Anti-Bullet Vest!

Made from a patented steel alloy, the Anti-Bullet Vest is guaranteed to stop pistol or revolver rounds of up to .40 caliber. But wait, dear reader, there is more!

The Anti-Bullet Vest exerts a powerful magneto-kinetic attraction. No need to wear clumsy helmets! Any bullets or missiles aimed at your person infallibly swerve to strike the Vest and are stopped.

Do not risk another day without one! Telegraph your order at once, to Hawberk & Co. of New York. Include chest measurements.

This is a breastplate covering hit location 9 only. However, any bullet or other metallic missile that passes through the wearer's hex will *automatically* hit the wearer in area 9. This device is only suitable for cinematic campaigns, where such questions as its ineffectiveness against nonferrous bullets and its attraction to large metal objects can be disregarded.

A backpack is included which supplies 20 minutes worth of primary battery power (600 kWs).

PD 1, DR 10, Holdout -3, LC 3. 22 lbs., $50.

Other Clothing

Clothing may provide incidental protection from violent attack, but is primarily intended for other purposes. Both garments for ordinary wear and special purpose gear are included here.

Collapsible Bustle TL5

The Langtry
Light, Cool and Adjustable.
The Very Best Bustle in the Market.

Made with three or four upright spiral springs, encased in fine silesia or silk-faced sateen, with a pad at the top to give requisite fullness and correct shape. Adapts itself to every position of the wearer and folds up flat when the wearer sits.

Sent by mail, free, on receipt of price.

The bustle, while fashionable in women's clothing in the latter half of the 19th century, presented some difficulties. While not taking up the space of the hoop skirt, the design made sitting almost impossible, particularly when made of horsehair – a popular choice. Women had to sit on one buttock on the side of a chair or lie supine on a couch. Toward the end of the time of their use a version was created made of spiral springs which folded up flat when sat upon and regained their shape when the wearer stood.

The collapsible bustle provides a small amount of protection to hit location 11 (rear) only.

PD 1, DR 3 (PD 0, DR 1 against impaling). 3 lbs. (not including the weight of the dress), $0.40.

Colonial Day Dress TL5

A La Mode for the Colonial lady

Fashion and practicality form a seamless blend in this modern-day dress for India or polar Venus. For our Cytherean customers, we are pleased to offer this item as a package, shipping complete with chemise, corset, under-petticoat, hoop petticoat, over-petticoat, "Lady of Venus" bonnet, parasol, and gloves.

An interchangeable evening bodice is also available.

The silk taffeta bodice is complemented by capped, loose-fitting long sleeves. The cartridge-pleated three-flounced skirt is cleverly (and modestly) slit to promote air circulation, keeping the wearer cool in oppressive weather. A steel-ribbed bustle discreetly elevates the skirt to keep the hem free of colonial mud, while concealing a silent, powerful fan and the galvanic battery that powers it for up to 3 hours.

17 lbs., $53.50; replacement battery 6.5 lbs., $0.16. Nonelectrical version 10 lbs., $35.50. Undergarments and accessories add 12 lbs., $10.00.

Zeppelin Rigger's Safety Uniform TL5

Flying from Europe to America has never been safer. What happens to an airplane if an engine fails? It falls from the sky! A zeppelin will continue floating, its passengers enjoying the comfort and safety only lighter-than-air travel can bring.

*– **Berliner Zeitung:** Letter to the editor from Hugo Schreider, Director of Luftschiffbau Schreider*

The interior of a zeppelin is a dangerous environment. This safety uniform is a pair of overalls made of strong, soft cloth with no metal buckles, buttons, or in fact any metal at all. This prevents the accidental striking of sparks on the duraluminum catwalks and frameworks within the zeppelin body, which might ignite the hydrogen gas cells and cause a catastrophe. Deep pockets covered with flaps carry essential tools, made of aluminum for lightness if metal is absolutely necessary. The uniform also includes a pair of padded felt shoes, again with no metal parts.

4 lbs., $3.

Coal Suit TL(5+1)

Item: two cold weather suits damaged. Cpl. 9385 Jones and Pvt. 0184 Anderson, having taken drink from a hidden bottle of spirits, took to sliding down ice hillocks on their stomachs. Cpl. Jones slid with great force into a berg, forcing exhaust tubes so deeply into it as to be stuck. Pvt. Anderson, while attempting to help, fell over backwards and put out fire in firebox, causing melted snow to ice around casing. Much chipping, bent tubes repaired; Cpl. Jones' left exhaust tube needs complete replacement.

– Entry from quartermaster's log, Royal Army Special Polar Expedition, 1894 (the "Smoking Donkeys")

The coal suit was designed to be the ultimate in cold weather wear. It appears to be a one-piece, helmeted suit of cold weather gear with a peculiar metal backpack, but the secret of the suit is a system of thin ducts running between the layers. The backpack contains a small boiler which powers a fan and heating element. Air warmed at the heating element recirculates through the ducts, warming the user. Exhaust from the coal engine runs past the helmet, warming the head, and twin smokestacks project several inches above the head, giving the helmet a comical long-eared appearance. The engine consumes .025 cf (20 oz.) of coal per hour; a 5" × 5" × 6" combustion chamber holds fuel for 3 hours. The suit gives +6 to HT rolls to withstand exposure to cold (+1 without fuel).

PD 1, DR 2 (PD 2, DR 4 to hit location 9 rear). 30 lbs., $17.

Exposure to Cold

Exposure to arctic cold requires a HT or Survival roll every 30 minutes, at -1 per 10°F below 0°F. This is modified by clothing: -5 for light clothing, -5 for wet clothing, no modifier for winter clothing, +5 for arctic (such as Inuit) clothing, +5 for a fueled coal suit. A failed roll costs a point of Fatigue; when ST reaches 3, start losing HT instead (see p. CII134).

Pneumatic Suit TL(5+1)

We have derived engine-statistical proof of the accident-preventing properties of the Pneumatic Suit that renders it imperative to equip every electrical mechanic in this country with one. We have therefore called upon Parliament, in a petition signed by thousands of industrial brothers, to enact into law a requirement for the use of this device. A few pounds of expenditure can save hundreds of lives every year!

The pneumatic suit is a protective garment for work in hazardous environments. A full-body suit made of canvas coated in vulcanized rubber, subdivided into chambers, it is inflated at high pressure. Due to its stiffness, movement in a pneumatic suit is at -2 to DX. The inflated pneumatic suit is electrically insulated, is fully water- and acidproof, gives +1 to HT rolls against cold, and can double as a life vest. It also protects against crushing blows. If a cutting or impaling attack exceeds its deflated DR of 1, the suit is punctured and deflates. A deflated suit is still water-, acid-, and electricity-proof, but offers reduced protection against blows.

PD 2, DR 4; PD 1, DR 1 if deflated. 10 lbs., $6.25.

Hidden in Plain Sight

With the Victorian love of gadgets, cleverly hidden or disguised items worn as part of everyday dress are the height of fashion in some segments of society. Other groups, such as spies, criminals, and adventurers, find it useful to conceal the tools of their trades about their persons.

Female Accoutrements

The well-dressed Western female was laced and buckled into restrictive undergarments beneath her gown. Tight corsets were necessary to imitate the ideal figure of the time and to support the huge number of petticoats that were *de rigueur* for early Victorians. The hooped crinoline, which looked like a birdcage suspended from the waist, was fashionable for many years, replacing heavy multiple underskirts with horsehair padding. Although it was a constant source for amusement to men to imagine fashionable ladies falling over in high winds and being unable to get up, crinolines were often hinged to allow the wearer to sit down or maneuver through narrow doorways. Later, the full-skirted shape gave way to the bustle – a horsehair pad worn as a cushion at the back under the skirts (see p. 23) – and dresses became so tight around the legs that a wearer couldn't reach down to pick up her own handkerchief. Toward the end of the Victorian era, "advanced" young women wore looser skirts that allowed more freedom of movement.

Anything concealed in a lady's undergarments must be able to remain there for hours undisturbed. Items could be attached to a crinoline, as long as the weights on the hoops were balanced. Women rarely wore watches but often carried small bags, scarves, mufflers, and parasols, any of which could conceal small devices. More daring women might wear a gadget as a piece of costume jewelry. Brooches, hatpins, and necklaces were typically large and ornate. Hats changed with the fashion, from wide-brimmed picture hats to elaborate bonnets and the huge floral effigies of the 1890s. Any of these might hide a masterpiece of steampunk engineering!

Male Accessories

Men's clothes were designed for much greater freedom of movement than were women's. Hats, scarves, boots, and canes were the order of the day, but none of these could be disassembled easily in public to remove a concealed gadget unless especially designed for quick access. Top hats were for city wear, bowlers and deerstalkers for the country, pith helmets for colonial expeditions, uniform caps for the armed forces, and (of course) boaters for the seaside in the late Victorian period. A man's most ornate accessory was his pocket watch, kept in his fob pocket and attached to his waistcoat via a chain known as an Albert if worn horizontally, in reference to Prince Albert who started the fashion. A leontine was another, much shorter, form of watch chain that could be worn from the top pocket of a jacket when a waistcoat wasn't being worn. These were usually reserved for formal wear. In the Victorian period the custom began of adding items to the watch chain such as card and cigarette cases, compasses, pencils, lockets, vestas (match holders), sovereign cases, and emblems. Formal wear and trousers may or may not have pockets, depending on the cut and style.

Small devices might be concealed as the heads of stick pins, cape fasteners, cufflinks, or waistcoat buttons. Toward the end of the century, silver flower holders and solitaires (spring studs) also became fashionable, and the well-dressed steampunk gentleman would be able to buy any number of patented improvements on the original designs. Some men carried monocles or quizzers, kept in a monocle case in a waistcoat pocketwhen not in use. Suspenders were worn to support trousers and were often highly decorated, as well as being adjustable.

Survival Gear

Still other items, though worn on the person, are not best conceived as clothing, but as accessories. This section presents several such devices intended to keep the wearer alive in hostile environments.

Compressor Mask TL(5+1)

NOTICE: For Your Own Personal Safety

The regulations of the Martian Colonial Authority provide that all persons on the Martian surface shall be in possession of a Compressor Mask, and shall carry a minimum of two replacement batteries. Make sure that your mask is in working order!

Do You Have Your Spare Batteries?

This mask is designed to keep a human being alive in the thin atmosphere of Mars. A small electric motor drives an air compressor that produces a breathable concentration of oxygen within the mask. The material is thick enough to provide some insulation from the bitter cold of Mars and some general armor for hit location 5. A 0.75-lb. advanced primary battery (see p. STM71) supplies power for one Martian day and makes up half the weight of the mask; since the battery is cinematic, the mask is as well.

PD 2, DR 2 , Holdout -2. 1.5 lbs., $1.00.

Thalassonautic Casque TL(5+1)

French Inventor Takes A Constitutional On The Oceanic Floor!

The sensation of this year's Margate bathing season is complete – M. Lariviere, a French inventor of some renown, is giving weekly demonstrations of his new Thalassonautic Casque. This bronze globe fitted with crystal windows encloses the head completely, allowing its wearer perfect vision while a portable reservoir of pressurized air permits a safe sojourn below the sea level for a period of 30 minutes. Gentlemen in good health may try the machine themselves.

The thalassonautic casque is a strap-on open helmet with a shield extending down the chest and back. It includes a 30-minute air reservoir in a copper cylinder at the back of the helmet. Lead shoes must be worn with it. Diving with the thalassonautic casque uses the Open-Dress Diving skill, but is independent of lines and tubes. It is safe at up to 30'. The air reservoir must be pumped up manually. This takes 2d+5 minutes.

Casque: PD 3, DR 4 (hit locations 3, 4, 9-11, 17, 18); PD 1, DR 2 (hit location 5). 20 lbs., $80.

Lead Shoes: PD 3, DR 3 (hit locations 15, 16). 8 lbs., $0.50.

Thalassonautic Scaphander Suit TL(5+1)

The Royal Navy now carries war beneath the waves. Selected men are trained at Portsmouth in the use of the Scaphander Suit. This scientific device allows the wearer to move under water with perfect safety for extended periods thanks to a barypneumatic tank of breathable air. The Admiralty has high hopes for the effectiveness of these martial thalassonauts in cutting-out actions against blockaded fleets.

The thalassonautic scaphander is a fully developed self-contained hard-hat suit. It combines a bronze helmet with a large copper tank containing 2 hours' worth of breathable air. Unlike the simple open-dress helmet, this one connects to a pressure suit of rubberized canvas that makes it safe at up to 150' (GMs in a cinematic campaign may want to waive this limitation). The suit provides DR 1 over the entire body and PD 3, DR 4 to the head, chest, and back (locations 3, 4, 9-11, 17, 18). Lead-soled shoes are needed to use it effectively. Swimming with a scaphander suit is not possible.

Rubberized Canvas Suit: PD 1, DR 1 (worn under helmet and lead shoes). 37 lbs., $220 (including straps).

From "On the Impossibility of Dressing on £1,000 a Year"

To carry her successfully through one London season the woman of fashion must possess herself of at least six sumptuous evening gowns, – with a couple of "little" frocks to act as accessories.

And when winter arrives she must add one or two more to her collection.

A velvet gown is a necessary of life in November, and no self-respecting dressmaker will provide one for £40. From £50 to £60 is the price demanded in either London or Paris. A Drawing room gown and train costs £100, or as much more as the wearer will give. Fancy dress for a costume ball is a fearsome expense, for these rich and artistic toilettes have a knack of running into hundreds.

Tea-gowns are fascinating garments, and these alone mount to a big sum in the course of a year. Tea-blouses and tea-coats have also justified their existence. Thirty pounds is an average price for a tea gown of lace or crepe. Tea-coats are trifles in dress, but these mount up to £25 or thereabouts. The modern woman shares the amusements of men, and, in consequence, plays billiards. So a clever but crafty dressmaker has invented a billiard-coat, a larky, short-sleeved affair that runs into at least £20.

When the question of Ascot and garden-party frocks has to be considered, the situation becomes serious. These sartorial triumphs mean money, and a society woman on a pittance of £1,000 a year has to do some pretty hard thinking. In summer a crepe de chine gown trimmed with good lace runs to £35 or £40, and is cheap at that. A taffeta costs about £30, and a smart foulard from £20 to £25. Two morning frocks for the winter and two for the summer are the least that can be ordered.

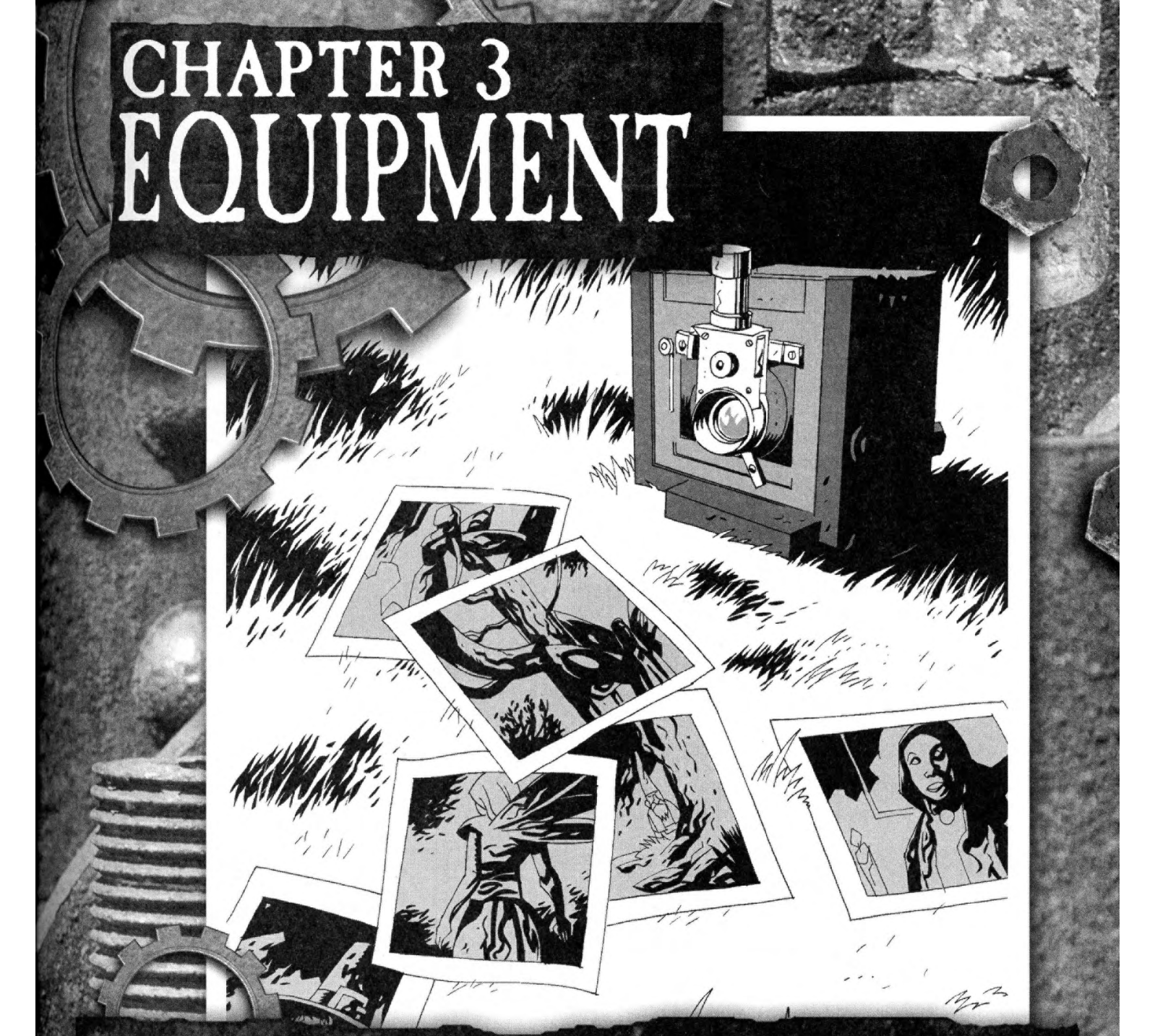
At a certain shop where perfection is equalled by prices, a blue serge bolero and skirt runs to a cool £25, and a smart frieze or homespun is not to be secured under £20. An alpaca for summer wear costs £18 to £20, and a simple muslin or lace trimmed cotton often comes to £15.

The country and Scotland demand an outfit of their own.

Plain serges for rough wear, homespuns for the heather, bicycle suits, driving coats, a "get-up" for golf, and another for the automobile, costumes for fishing and shooting – each of these pastimes requires a special "kit" to itself. Yachting gowns from a good tailor are an expensive item, a well-braided serge for the Cowes week often costing £20. And two at least of such frocks must be provided . . .

*– **Harmsworth's Magazine**, May 1901 – the full text is available on the **Forgotten Futures** CD-ROM, published by Marcus L. Rowland*

CHAPTER 3
EQUIPMENT



We are very fond of pineapple, all three of us. We looked at the picture on the tin; we thought of the juice. We smiled at one another, and Harris got a spoon ready.

Then we looked for the knife to open the tin with . . . There was no tin-opener to be found.

Then Harris tried to open the tin with a pocket-knife, and broke the knife and cut himself badly; and George tried a pair of scissors, and the scissors flew up, and nearly put his eye out. While they were dressing their wounds, I tried to make a hole in the thing with the end of the hitcher, and the hitcher slipped and jerked me out between the boat and the bank into two feet of muddy water, and the tin rolled over, uninjured, and broke a teacup.

– Jerome K. Jerome, ***Three Men in a Boat (To Say Nothing of the Dog)***

A life of adventure involves more than fighting and killing. Here are portable devices for a variety of other purposes, from effecting mechanical repairs in the field, to photographing birds in flight. Thanks to precision machining, all are easily carried on the person, often hidden under one's clothing.

Tools

Simple hand-held tools have no internal power of their own; they merely focus and redirect the strength of the human hand, enabling it to perform a wider range of tasks.

Folding Skeleton Fob TL5

As the Faithful Readers of this periodical know, the dastardly Screwsman must be careful to never be caught with the tools of his criminal trade. The true Master Thieves of the underworld use ingenious stratagems to evade the Law. For your edification, now you can own one of these hidden mechanisms of infernal genius! (Note that this product is a novelty toy purely for the entertainment and edification of the higher classes.)

This watch fob is a cunning contrivance: while it looks like an objet d'art suitable for hanging from a watch-chain, with a few quick twists it unfolds into a functioning skeleton key. Fine Bavarian craftsmanship from Uhrwerkmagie of Ingolstadt.

– Advertised in ***Young Detective Monthly***

Folds up into a 1" "diameter" irregular solid, with flanges and arabesques, perhaps in a skull motif. When unfolded, it becomes a 4" long finely machined "universal key" with multiple bits of adjustable length and position along the shaft (-2 to Lockpick).

Holdout +3 (+5 to find hidden catch that unfolds it). Negligible weight, $2.

Universal Toolkit TL5

No one is equipped without the proper tools!

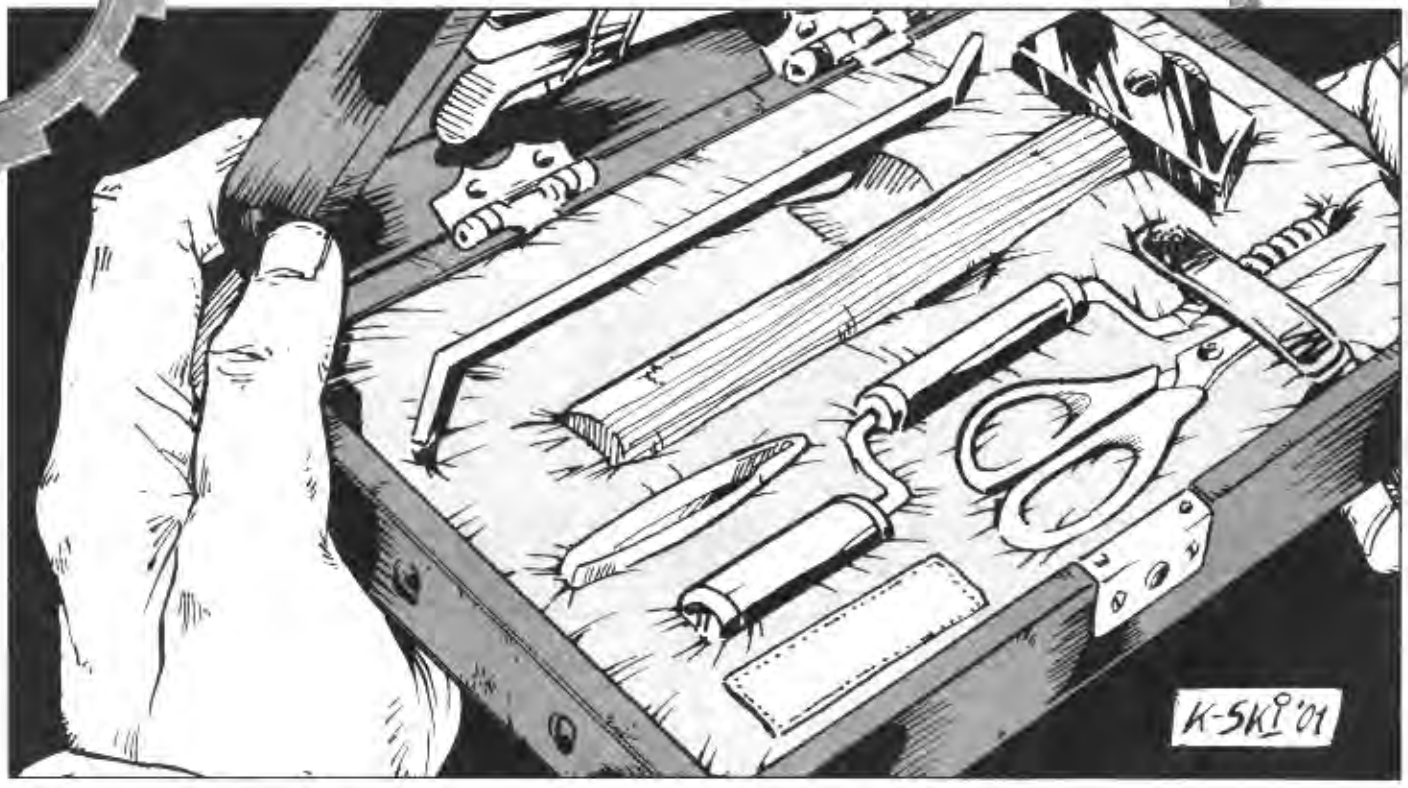
Cottonfellow's Universal Superior Toolkit is a must for the experienced outdoorsman or traveling mechanic.

A tape measure, screwdriver/pry rod, ring saw, finger-powered drill, pliers/adjustable wrench, wire cutters, and hammer, all in one easy-to-carry package.

The universal toolkit is the size and shape of a small hardbound book, fitting in an interior coat pocket. Opening the book reveals the tools, which fold out on a hinge at the edge. This tool set lets an adventurer carry a small selection of tools into any situation.

A mechanic with this tool kit is at -2 to skill for minor repairs, -4 to major repairs.

Holdout 0. 2 lbs., 0.0625 cf, $7.



Mechanical Devices

Like tools, these devices involve only mechanical forces, but they serve a wider range of functions, and some have internal power sources.

Bladeless Shaver TL5

Defeat the cutthroat!

Tired of the nicks and cuts of a straight razor? Or the mess and bother of brush, soap, and water? With the Gladiator bladeless shaver, you'll never again take a blade to your own neck. Wind, shave, and brush without cuts or untidiness! Touch up late in the day to avoid unsightly shadow!

The bladeless shaver is a wind-up analog of a modern electric shaver. The shaver consists of a flat metal box which fits comfortably in the hand (just barely), with a metal mesh at one end and a short, stiff brush at the other. One face contains a fold-down key: pull up the handle, crank it until the internal spring is fully wound, push the handle down, and hold down a lever on the side to start the clockwork mechanism. The spring drives the mesh-protected blades for about a minute, long enough for most men to do a thorough pass over their faces. The brush at the other end is for whisking away stubble. As with modern electrics, the bladeless shaver is unlikely to shave as close as a conventional razor.

Holdout +1. 0.5 lb., $7.

Pedal-Powered Skates TL5

Tired of walking, but can't afford a carriage? Try Pembrook's patented all-terrain Pedal-Powered Skates! The simple act of picking up and putting down your feet drives the six-inch wheels, propelling you effortlessly over almost any terrain! Amaze your friends! Astound those around you as you whisk past them at breathtaking speeds! Order yours today!

Pedal-powered skates actually existed; the British military looked into equipping their troops with them. They resemble short skis, with one rubber-tired wheel just in front of the foot and the other right behind the heel, anticipating the inline skate design by nearly 100 years. Putting weight on one of these skates pushes a rack past a gear connected to the rear wheel. Lifting the foot allows a return spring to return the rack to the top of its stroke. Speeds in excess of 20 mph are possible on level ground.

Holdout -3. 8 lbs., $7.50.

Portable Fire Escape TL5

Local Man Invents Portable Fire Escape

Well-known local inventor, Mr. Andrew Harris, described his portable fire escape device at a meeting of the Geographical Society. This device may easily be carried in a bag or trunk, allowing safe egress from fires in buildings several stories in height.

Mr. Harris' invention consists of a tube-like clamp with loops at either end, through which passes a rope. By means of a turnkey, the person making an escape may control the rate of descent. Two straps attach to the clamp. The larger strap allows a full-grown man to seat himself with ease, and the smaller strap attaches over his shoulder. Descent requires a Climbing+1 roll; a failure leaves the climber stuck in mid-air, while a critical failure leads to a fall. It takes 1 second to descend up to 15', 2 seconds up to 30', and longer distances are at 20'/second.

In a more permanent setting, such as a house, a hinged arm may be attached to a window frame, to which the rope may be attached.

Adventurers, criminals, and spies will likely devise uses for the portable fire escape that its inventor did not intend. An adventurer using this device is a difficult target (attacks are at -4).

Clamp and Straps: Holdout 0. 2.5 lbs. (clamp 1.5 lbs., straps 1 lb.), $3.

Hinged Arm: Holdout -2. 2 lbs., $1.

Sportsman's Climbing Pocket Watch, Chain, and Fob TL(5+1)

The very latest in discreet sporting equipment for the refined gentleman!

This amazing watch will provide the gentleman with a reserve life saving climbing kit, should disaster strike! This unusual device allows a gentleman of more than 250 pounds to climb sheer walls over 40 feet tall, and no one will know you are carrying it.

The unique braided "chain" made of a never before known alloy of nickel, steel, and rare earths, WILL REMEMBER its shape and return to the standard 15 inches when you are done. This watch is stylish and functional and may save your life!

This watch resembles a normal gentleman's pocket watch, save that it is a little larger, with a 3" diameter. It has covers that open on either side, one revealing the watch face, the other, the workings. The chain and fob are made of a "memory metal" that easily unravels to a 40' length with a small hook at the end.

The climbing pocket watch acts as a rope and ascender in one. The weighted fob opens into a strong 4" wide hook. The hook, chain, and ascender can support up to 300 lbs. before giving way.

After being opened, the watch covers can be pulled out on small arms and used as grips which, when operated by hand, will ratchet the body of the watch up the now extended chain.

Spinning the fob end of the chain counterclockwise in a widening circle (DX+2) loosens the braid and allows the memory metal to unravel to its full length; then a DX-3 or Throwing roll secures the hook for climbing. The climbing pocket watch then acts as climbing equipment for a Climbing roll (p. B89).

Holdout +3. 0.5 lb., 0.01 cf, $20.

Electrical Devices

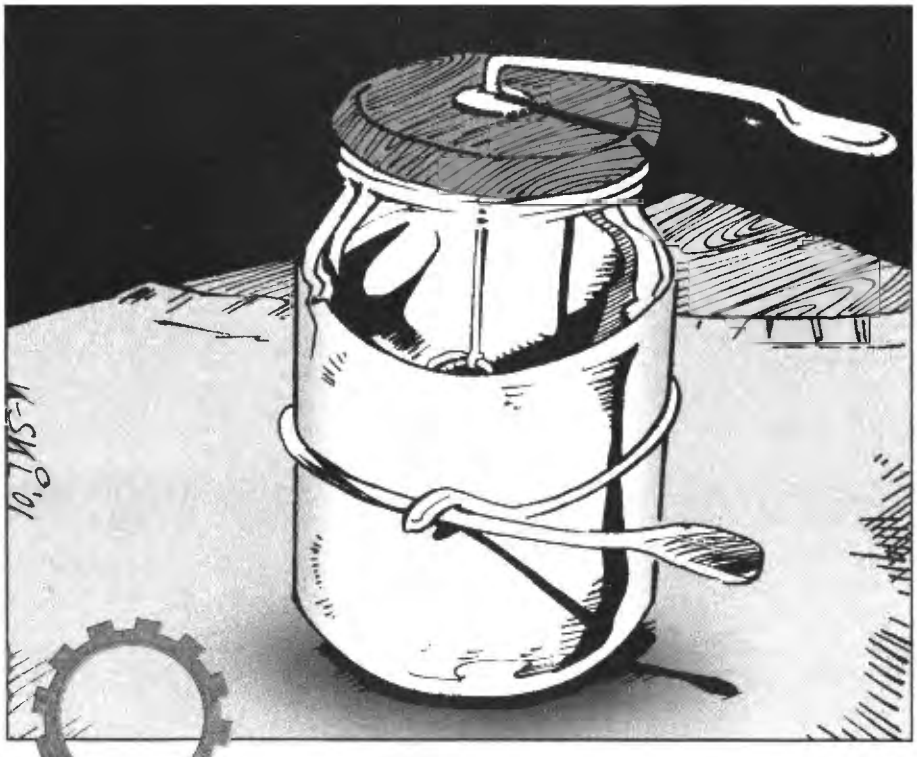
A succession of experimenters in the 19th century developed useful applications for electricity and magnetism, adding the construction and operation of such devices to the mechanical arts. Here are a few of these inventions.

Condenser TL5

Jenkins fetched a collection of glass and metal contrivances he called "Leyden jars," which he said would promise us an ***electrifying*** *evening. Miss Hathaway, ever the bold spirit, invited him to demonstrate, and at his instruction placed her hand across two metal tabs that protruded, one from the inside and one from the outside. She jumped and nearly knocked the thing over, and pronounced the sensation most remarkable. At that everyone would have their turns, and not wanting to seem timid I took mine as well, and felt as if a spark had leapt to my fingers on a dry, hot day. Then Miss Hathaway challenged Jenkins to partake of his own bottles, and he reached out a hand to one that remained undischarged – and recoiled backward and fell into, or across, a chair. We feared he had hurt himself, but in a moment he stood up and pronounced the electric charge uncommonly strong, at which I told him that he must learn to measure the proof of the electric fluid when he bottled it. Much laughter, and I went away pleased to be for once the evening's bright spark of wit, as Miss Hathaway pronounced me.*

– From the diaries of Anthony Comfort

A condenser (renamed "capacitor" in the late 20th century) is a device that stores energy in an electric field and releases it as a flow of current. Very simple condensers consist of two conductive (usually metal) plates with an air gap in between. Energy storage can be increased by filling the space between the plates with an insulating material or *dielectric*. The energy that can be stored is limited by the voltage at which the dielectric breaks down and becomes an electrical conductor. Total energy storage is proportional to the volume of a given dielectric; a flat, thin configuration breaks down at a lower voltage but has a higher capacitance and thus holds a higher charge.



Condensers are not batteries; they hold much less energy (even advanced dielectrics suitable for cinematic campaigns weigh several times as much as batteries) but release it much faster. Any circuit connecting the plates will result in nearly instantaneous complete discharge.

Dielectric	Voltage	Wt.	Volume	Cost
Air	900,000	70	90	–
Paper	4,200,000	590	12	$0.25
Porcelain	1,200,000	11,500	80	$1.00
Glass	3,900,000	1,600	11	$0.50
Ruby mica	48,000,000	10	0.06	$1.00
Oil	3,600,000	70	12.5	$0.25
Bakelite	3,600,000	1	0.012	$2.00
Advanced dielectric	900,000,000	0.1	0.0004	$5.00

Voltage (in volts) is per foot of separation between the plates of the condenser. Weight (in lbs.) and volume (in cf) are per kWs of stored energy at maximum voltage. Cost is per pound of dielectric. The specified weight and cost do not include the weight of the metal plates; these may be estimated as 0.6 lbs. and $0.75 per cf of dielectric, negligible in comparison to any dielectric except air.

The charge stored on a condenser can cause electric shock, though with reduced effects because the jolt is momentary. A 0.1-kWs charge causes nonlethal electric shock; a 1-kWs charge causes lethal electric shock, but with zero damage (see p. 18 for definitions of both). Realistic condensers can be used as improvised weapons but are too awkward for regular use in combat.

Electropathic Belt TL(5+1)

A BOON TO SUFFERERS. Beason's patented Electropathic Belts are an improvement on the galvanic couple of the celebrated German Professor Humbolt. They are exceedingly simple in their construction, comfortable to wear, and from their constant action a most inestimable blessing to the weak and languid. They are entirely unique as a therapeutical adaptation of electricity, as they consist of a series of constant-current electric generators, which are in continuous action while the belt is worn. Acting as they do upon all the most important organs of the body, they rarely fail to alleviate disorders resulting from local or general debility, impaired digestion, weak circulation, or defective organic action.

These genuine electric belts are exceedingly comfortable to wear, give wonderful support and vitality to the internal organs of the body, improve the figure, prevent chills, impart new life and vigor to the debilitated constitution, stimulate the organic action, promote the circulation, give tone to muscle and nerves, relax morbid contractions, improve nutrition, and renew exhausted nerve force.

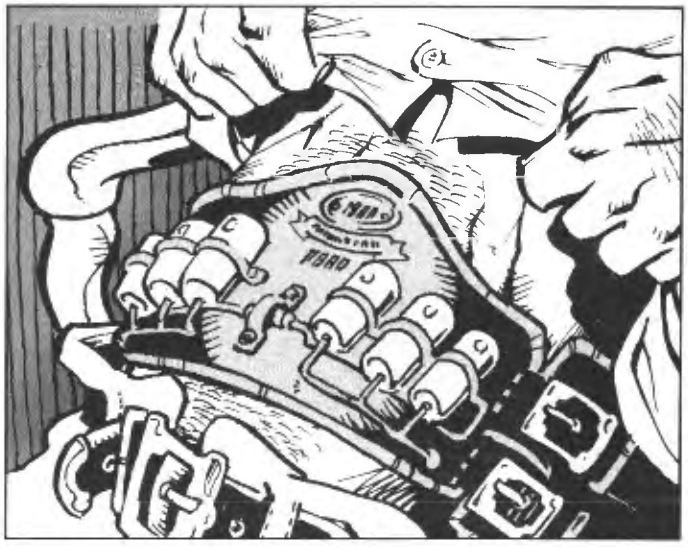
WARNING: Do not immerse in water!

This device is a large belt, worn against the skin under clothing, which continuously conducts a small amount of electricity through the wearer's body. Two 200-kWs primary batteries provide power for 24 hours of use.

In a realistic campaign, the electropathic belt has no therapeutic effects. In a cinematic campaign or one with a suitable weird science premise (see pp. STM94-108), it increases the wearer's HT to 10, if it was below that level. If the wearer's ST and DX are below 10, it gives +1 to these attributes. It also negates the effects of Acceleration Weakness, Bad Back, Epilepsy, Migraine, and Unfit. It provides DR 1 for body area 10.

If doused with water, the electropathic belt shorts out, giving a nasty shock to the wearer! Treat as nonlethal electric shock and 1d-3 localized burns (see p. 18).

Holdout -1. 6 lbs., $5.



Induction Coil Lamp TL5

Monsieur Ruhmkorff of Paris (arrondisement deuxieme) has this day been awarded the 1864 Quinquennial Prize for his induction coil apparatus. The prize, of the value of 50,000 francs, is reserved for the most ingenious new application of the phenomenon of electricity.

– Le Monde

Ruhmkorff's induction coil is an ingenious application of 19th-century technology to supplying light in underground or underwater environments. The device uses a Bunsen cell (a primary battery with a carbon electrode) activated by potassium bichromate, which can be sealed in a watertight rubberized cloth bag. An induction coil transfers the electric current to an evacuated spiral glass lamp containing only nitrogen at low pressure. The current causes the gas to glow with a steady white light and very little heat. The Ruhmkorff coil is safe to use in caves and mines where explosive firedamp gas may be encountered. Because the battery is in a sealed bag, the light will also work underwater.

A Ruhmkorff apparatus sheds usable light to a range of 50' in air or 20' underwater, less if the water is murky. The battery lasts 12 hours, after which it must be replaced. The light can be turned on and off to preserve battery life.

Holdout -4. 6 lbs., $7; replacement battery 5 lbs., $0.125.

Electrolabe TL(5+1)

Never Be Lost Again!
Land or Sea! Day or Night!

With the ingenious Electrolabe, find your bearings anywhere on Earth! Sailors, explorers, adventurers, all will find it indispensible. Accurate to within 1/4 mile. Only modest skill required for operation. Can be used day or night; in any weather; indoors, outdoors, or out to sea.

This instrument uses the Earth's magnetic field and the etheric wind to find the user's global position. Used with an accurate chronometer, it gives +3 to Navigation and eliminates penalties for bad weather and absent or unfamiliar currents. Without a chronometer it determines latitude only and gives +1 to Navigation. It works equally well underwater, making it useful on submersibles.

Holdout -5. 10 lbs., $20.

Fish Beacon TL(5+1)

Summons fish into your nets!

Be the Pied Piper of fish, using the mesmeric powers of the Fish Beacon. Can also summon tortoises, eels, and frogs. No fishing boat should lack one.

A fish beacon sends out electromagnetic pulses that attract fish and reptiles, giving +2 to Fishing rolls.

Once per hour of use, the GM may wish to make an extra Fishing roll to see if any dangerous reptiles (snakes, crocodiles, or even dinosaurs, depending on locale) are encountered.

Power supplied by advanced clockwork; must be rewound every 10 minutes. Holdout -5. 12 lbs., $20.

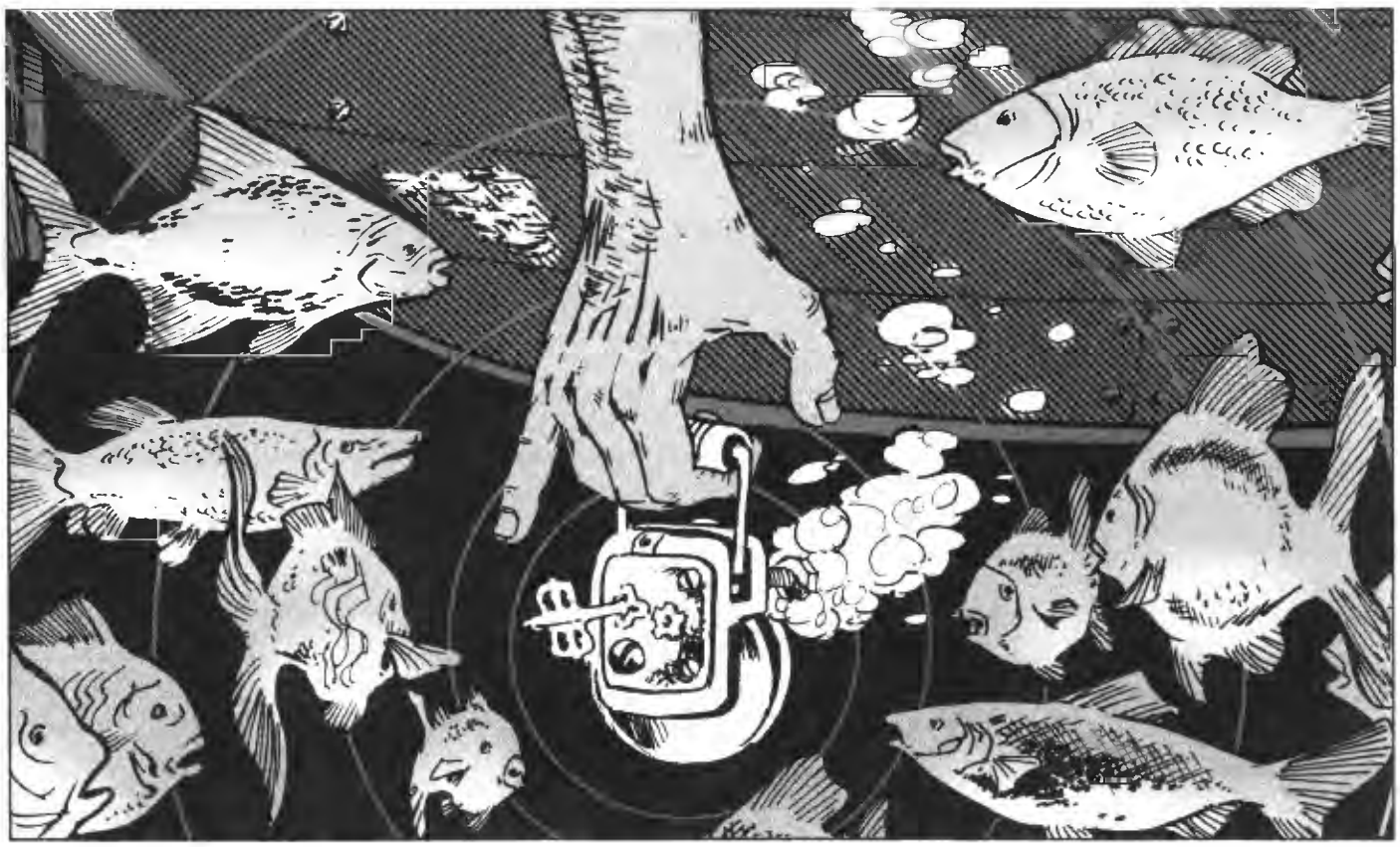
Wireless Field Telephone TL(5+1)

Corporal Cooper looked curiously at the device in his hands: a metal box with a switch on the front and a hole in the bottom, where earphones like a telephone operator's plugged in. The other corporals and sergeants looked equally puzzled. Sergeant Schmidt spoke up: "What the devil is this thing, Sir?"

Captain Franklin answered, "It's called a wireless, sergeant, and it's how you'll be getting your orders in the field. Each squad gets one, and you all get trained to use them."

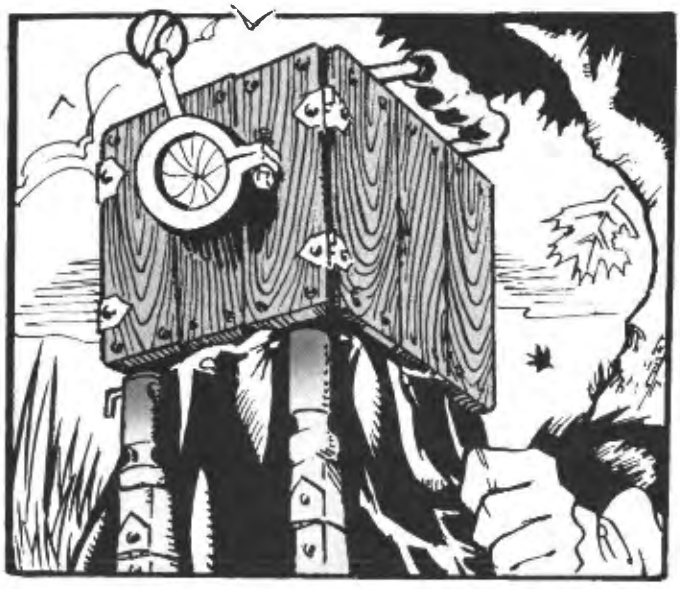
The wireless field telephone is designed for a single purpose: getting orders from field commanders to their troops, despite all the hazards of battle. To serve this purpose, its design is simple, rugged, and nearly independent of supply sources. A metal needle in contact with a crystal turns radio waves on one of three frequencies to audio; no batteries are needed. The components are embedded in the recently developed material bakelite (see p. 115) for durability. The receivers are cheap and easily replaced, and since they receive voice, not code, using them takes a bare minimum of training.

DR 2, 2 HP, Range 1 mi. 0.3 lb., 0.006 cf, $0.30.



Optical Devices

Optical devices are actually older than electrical, but the invention of photographic plates opened up new possibilities in this field. Here are devices working both with visible light and with radiant energies invisible to the human eye.



Camera Obscura TL4

Reginald tramped through the high grass until he saw the four-foot-high structure of wood and rumpled black muslin by the stream, a tell-tale border of gingham peeking under its base. Stepping between the stream and the tiny brass nozzle on the front, he heard a frustrated squeak from under the cloth. He lifted up the black curtain to reveal Asquith, sitting cross-legged on the ground, facing away from him, a pencil in her hand and a pad resting on her piled-up skirts like a wafer on a blancmange. "Asquith," he said tiredly, "you must come back to the house now."

"Shan't," Asquith said curtly without turning to look at him. She jerked the cloth back down, becoming once again a geologically improbable outcropping of muslin. "I'm doing a romantic landscape and I don't want your great huge beak in the middle of it," the girl's voice continued. "I'll be back at sunset."

The principle of the camera obscura is remarkably simple: if light enters a darkened box or room through a tiny opening, it will project an inverted image on a surface opposite the opening. Known to the Greeks and first used in the Renaissance, this principle led to a useful tool and a popular amusement in the 19th century, the ancestor of the modern camera. Cameras obscura usually used a mirror to project the image down onto a table, allowing the viewer to position himself to see the image right side up. A portable camera obscura, popular before the invention of photographic film, consists of a hollow wooden box the size of a cinder block with a small opening on one end, possibly enhanced by a lens, and an angled mirror inside, diverting the image through a door in the bottom. The user may set up the camera on a stand and sit below it to view the image projected onto a light-colored surface. The camera obscura does not provide magnification.

A common use of the camera obscura was to project a landscape onto a piece of paper, allowing the viewer to trace the image (+2 to Artist skill) or measure the distance between points remotely. In addition to the artistic uses, a camera obscura could be used by engineers doing an initial survey for construction or spies (perhaps hidden in a wagon or outhouse) performing reconnaissance on enemy positions. An entire room could be used as a camera obscura, with a rotating turret on top projecting an image down onto a round white table three or four feet across. Camera obscura rooms could be found near popular tourist attractions (Bath, Coney Island, and the like).

Portable Camera Obscura, Including Stand and Cloth: Holdout -5. 5 lbs., $2.

Camera Obscura Room Fittings: $50 (in addition to the cost of the building itself); admission $0.15.

Cinematograph TL5

The greatest surprise of Messrs. Lumiere's show was the image of a locomotive coming toward the audience. As that powerful engine hurtled across the screen, seeming to come directly at me, I could not forebear to recoil in my seat, and the circumambient sounds told me that others did likewise. I saw when I rose that M. Lofficier had actually projected himself from his chair and lay on the floor of the entryway. I do not think the Lumieres can have anticipated how powerful an effect the living image of an onrushing train would have.

The Lumiere cinematograph was the first true motion picture camera that was man-portable. Edison's electrically powered version was too large to be moved, limiting it to filming actions on a stage from a fixed viewpoint. By reducing film speed from 48 to 16 frames per second and replacing the motor with a hand crank, the Lumieres produced a model that could be carried anywhere and moved about during filming. Cameramen needed to maintain controlled speed (Absolute Time Sense is useful); a skilled cameraman could stop cranking while objects were moved or even crank backward for double exposures, achieving the first special effects. Early models held enough film for up to 2 minutes (1920 frames, needing over 200' of film); later versions held reels with substantially larger capacities.

The Lumiere model was a triumph of miniaturization; a single unit was capable not only of filming, but of developing the film and projecting it. The use of a projection screen was another innovation – Edison relied on a "peepshow" system which only a single viewer could watch at a time. The impact of full-sized or enlarged images was powerful, especially with viewers who had never seen a moving picture before.

Holdout -6. 12 lbs., 0.6 cf, $27.50.

Photographic Gun TL5

Exhibit C was found by Constable Perkins, caught in the branches of a large bush 5'2" above the ground, and 4'4" behind the corpse. The officers on the scene judged it to be a gun of some unusual model, from its appearance. However, as Dr. Cromarty entered the station to file his medical report, he remarked the unusual device, saying that it looked remarkably like a fusille photographicque, which he explained was a type of camera used in France. Closer examination confirming this, he offered to take the object to his darkroom and attempt to develop any film it might contain.

The resulting images, taken according to Dr. Cromarty within a space of seconds, show a naked man, at first facing away from the camera, then whirling towards it. Two or three intermediate images show peculiarly distorted images, but the final images show a large dog, perhaps an Alsatian or spitz, leaping towards the camera. In this connection, Dr. Cromarty points out that his initial report showed death from injuries resembling the bites of a large, powerful dog. The placement of the fusille photographicque is consistent with its having been knocked from the victim's hand by the force of an upward blow. When his identity has been ascertained, inquiries must be made as to whether he was a photographer and especially whether he might have owned such an unusual apparatus, which per Dr. Cromarty is not in common use.

The photographic gun, invented by Jules-Etienne Marey, was a very early version of the motion picture camera. Inspired by Edward Muybridge's experiments with photographing human beings and animals in motion, it defined the space and time intervals between images more precisely by taking multiple shots with a single camera. The original version used a rotating disk of film when underwent 12 exposures in a single second when a trigger was pulled, enabling Marey to capture such images as birds in flight. Some versions had magazines that held as many as 25 such disks. The resulting images could be viewed on such devices as the zoopraxiscope (p. 57).

Marey's work inspired not only later motion picture cameras, but scientific time-and-motion studies of the early 20th century.

Holdout -4. 3.75 lbs., $15; each film disk costs $0.50.

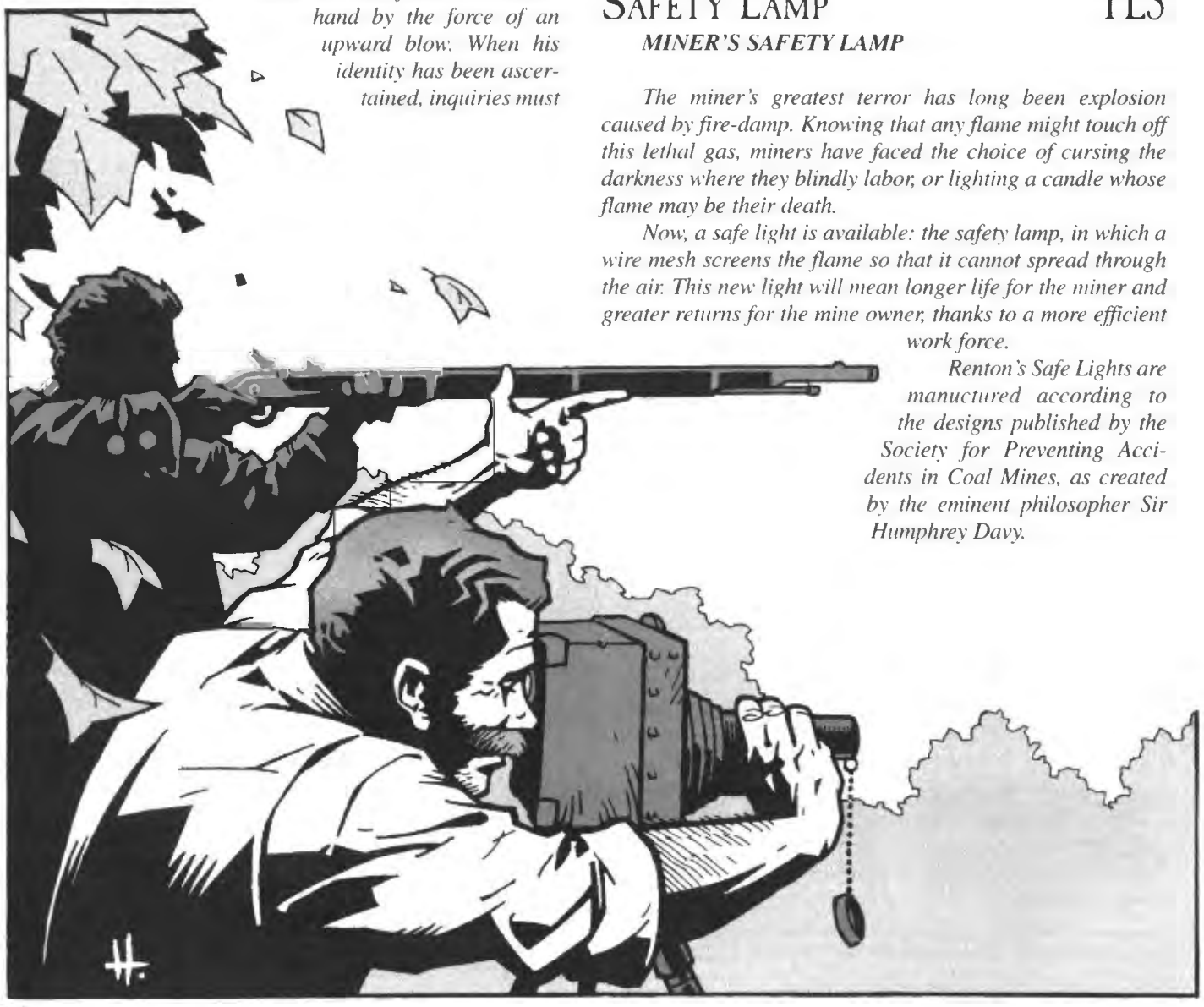
Safety Lamp TL5

MINER'S SAFETY LAMP

The miner's greatest terror has long been explosion caused by fire-damp. Knowing that any flame might touch off this lethal gas, miners have faced the choice of cursing the darkness where they blindly labor, or lighting a candle whose flame may be their death.

Now, a safe light is available: the safety lamp, in which a wire mesh screens the flame so that it cannot spread through the air. This new light will mean longer life for the miner and greater returns for the mine owner, thanks to a more efficient work force.

Renton's Safe Lights are manuctured according to the designs published by the Society for Preventing Accidents in Coal Mines, as created by the eminent philosopher Sir Humphrey Davy.



Safety lamps, invented by Sir Humphrey Davy in 1815, enclose the lamp flame in a wire mesh. This enclosure allows air and light to pass, but not flames, preventing the lamp from igniting explosive gases, such as the methane sometimes encountered in mines. Since the appearance of a flame changes with the fuel mixture, experienced users (with Professional Skill: Miner or Engineer (Mining) skill) can detect such hazards as flammable gases or low oxygen by watching the flame. The lamp illuminates a 10' radius.

A more advanced version, the carbide lamp, comes into use about 1897. Carbide lamps burn acetylene produced by dripping water onto calcium carbide. They are brighter than oil lamps, can be quite compact, and are safer (although much hotter) due to the lack of a reservoir of flammable liquid fuel. In addition to miners' lamps, they are often used as vehicle (e.g., bicycle) headlamps until the development of small electrical lights and batteries. The lamp illuminates a 50' radius. A load of carbide (4 ounces) and water lasts for 6 hours, or 12 if the lamp is turned down. The Carbide Lamp sheds usable light to a range of 50', or 10' if it is turned down.

Holdout -3. 0.5 lb., $6; $0.15 per 4-oz. load of calcium carbide.

N-Ray Animal and Personnel Detector TL(5+1)

Professor Blondlot's newly discovered N-rays have furnished us with a marvelous apparatus to detect persons or animals in utter darkness. In the steaming jungles of the Congo, I found this device without peer in enabling the tracking of game and the safeguarding of our camp from nocturnal tribulations. The ability to see through trees was invaluable to this end. Upon my triumphant return to Paris with several fine trophies, I reflected that this wonderful invention could be put to use in wartime pursuits as well, to track men as easily as it tracks animals . . .

– Francois Duprés, report to the French Ministry of War

The N-ray animal and personnel detector uses the properties of the fictitious N-rays that René Blondlot thought he had discovered in 1903 (pp. STM95-96). The detector is simply a box of treated metal, with a sliding tube containing an arrangement of aluminum lenses that focus N-rays onto an array of fine threads coated in calcium sulfide. The threads are observed through an eyepiece at the rear. When it is aimed at a living object and focused by sliding the lens tube, a faint movement of light on the threads can be seen as the creature moves. The range (up to 100 yards) is read by touch from a notched scale on the lens tube. Since living foliage does not produce N-rays and is transparent to them, creatures can be detected behind trees, but not behind fences or wooden walls.

Reading the N-ray detector correctly in one direction requires 10 seconds of alignment, focusing, and squinting followed by a successful Vision roll. This only indicates the presence of a moving object, with measured range accurate to 5 yards. A 90° sweep can also be made in 10 seconds, though at fixed range. Sweeping a quadrant at all possible ranges takes 100 seconds, but may detect multiple targets. The detector may also be used to peer through a forest in daylight, but the Vision roll is at -4 as the feeble flickering of the threads is difficult to see with eyes adapted to bright light. Times are doubled without a tripod.

Holdout -6. 10 lbs., $65. *Tripod:* 10 lbs., $7.

Photographic Occluder TL(5+1)

Professor Roentgen's X-rays here find a use apart from parlor games exposing the bones of one's hand to shocked matrons. Those opposed to the use of the camera to record their comings and goings need fear no longer, for here we see a device designed to enhance the privacy of those gentlemen and gentlewomen for whom such concerns are paramount.

The photographic occluder consists of a shotgun-shaped aiming apparatus connected by wires to a backpack mountable battery. The butt of the "shotgun" is large and bulbous since it contains an x-ray tube. The x-rays are channeled down the barrel. When aimed at a camera (or anything else containing undeveloped photographic plates or film) the x-rays fog the photographic emulsion. At a range of 4 yards, each second of exposure causes 10% fogging. Double the percentage for each yard closer than 4 yards (80% fogging at 1 yard or less). Double the required time for 10% fogging for each yard farther than 4 yards; at 8 yards or more, round this off to even multiples of 15 seconds (1/4 minute). Targets may be aimed at successfully with a roll against Beam Weapons (defaults to DX-4), with no range penalty (the x-rays spread out as they travel, compensating for range). A reroll to keep on target is required every 15 seconds, or every second if the user or target is moving. The 1,000-kWs primary battery must be replaced after 7 minutes of use; assume that this is just sufficient for 10% exposure at 11 yards.

A Vision roll at -1 for each 10% fogging is required to make out any pertinent detail in the image. Partially fogged film can be fogged further by additional uses of the occluder – simply add the occlusion percentages. No image can be detected in 100% occluded film. A layer of lead at least 1/16 inch thick will protect film from x-ray exposure. Developed film is unaffected by the occluder.

Exposure to 1 rad is sufficient to fog film completely; for simplicity, assume equal exposure for the cameraman. This is low enough to be disregarded, unless photographic occluders become widespread enough to make cumulative exposure likely. See pp. CII145-148 for the effects of radiation.

Holdout -4. 15 lbs., $70.

X-Ray Goggles TL(5+1)

PORTABLE X RAY APPARATUS. Our No. 1 product for Physicians, Professors, Photographers, and Students. View the bones and organs of the human body! Complete in handsome case, including coil, condenser, 2 sets of tubes, battery, etc. Delivered in U.S. Guaranteed highest class apparatus.

This device consists of a large pair of goggles which can be strapped to the head and a belt-worn battery case. The goggles "shine" X-rays, having the same effect as if the wearer had 1 level of the Penetrating Vision advantage (Limitation: cannot see through lead). When not connected to the power supply, the goggles' lenses are too dark to see through (treat wearer as having the Blindness disadvantage). The miniature coils, condensers, and tubes in the goggles are easily damaged; if the goggles are dropped or hit (even if they do not take damage), there is a 4 in 6 chance that the components are broken and the goggles will not work. The battery pack uses two 5-kWs primary batteries which allow just over 3 minutes of continuous operation.

This device relies on a cinematic understanding (or lack thereof) of X-rays and radiation in general.

Holdout -3. 0.2 lb. (goggles), 1.2 lbs. (battery case), $15.

Camera Arcana TL(5+*N*)

Folk wisdom tells us, over and over, that the fairies are creatures of the twilight, not to be seen in the harsh light of day. Where, then, do they go when the sun is out? Are they in hiding, only stealing out to show us glimpses of their presence through the veil of darkness? So many have supposed.

The premise of my investigations was quite the contrary. It occurred to me that they might be there all along, day and night, flying among us – but not to be ***seen*** *by day. The daylight dazzles our eyes so that we cannot perceive their faint light; the night makes it visible. For where solid objects reflect light back at us, these ethereal creatures do not; they emit a phantasmal glow, like that of a tube filled with ionized gas, or like the will-of-the-wisp or Saint Elmo's Fire, but this is so faint that sunlight overwhelms it, and they have no solid surface, no shadow, no reflection by which we may know them. From this hypothesis I set to work to device a method for capturing the photographic image of their occult light.*

– From a lecture by Sir Arthur Conan Doyle to the Society for Psychical Research

The camera arcana represents a fusion of scientific research with mysticism. Invented by Sir Arthur Conan Doyle during his investigations of fairies, it uses a polarizing lens cut from rare crystals and plates with unique chemical emulsions to capture the subliminal images of ethereal beings. Photographs taken with it even by daylight may show the fair folk, or ghosts, or other spirits moving unseen through the human world.

Holdout -6. 10 lbs., $50; each 10-negative film roll costs $1.

Luminous Cane TL(5+1)

Tired of walking in the dim and foggy streets of London, unable to see your hand before your face, pedestrians of the lower classes constantly slamming into you, hansom cabs almost running you down, footpads creeping up behind you, cloaked from view? Fear no more! The Luminous Cane banishes the darkness with tremendous, empowering light! Stride with freedom and assurance through the darkest nights! Advanced Bavarian technology turns night into day through the flip of a switch. The Luminous Cane uses ingenious clockwork flywheel gearing and a unique crystal formulation (patent pending) to store energy and release it as light from

the glass sphere head as well as the crystal inlay along the sturdy ebony barrel of the cane. Just insert the crank into the hole beneath the cane's head, rest the foot upon a solid surface, have your manservant provide 7 to 10 minutes of vigorous cranking, set the catch-switch, and voilà! – stored within the Luminous Cane is 20 minutes of dim light at the "dusk" setting or 10 minutes of strong light, suitable to read by, at the "day" setting. Orders may be placed with Uhrwerkmagie of Ingolstadt.

A cane of ebony, with crystal intaglio along its 38" length. The head is a sphere of solid glass (no filament) and the foot and ferrules are of bronze. A small hole appears under the cane's head. Treat as any other cane for combat purposes; however, each time a 6 is rolled when damage is calculated, the Malfunction score of the cane decreases by 1.

Malf 16, Holdout -4. 5 lbs., $15.

Miscellaneous Devices

A few more devices do not fit into the categories above, but have their own specialized uses.

Anti-Vampire Kit TL5

Dear Bishop,

Following my recent journey through the Balkan kingdoms I must inform you of several shortcomings encountered in my use of the version of the "Canterbury" Standard Anti-Vampire Kit offered by Messrs A.W. Gamage Ltd. of Holborn, London.

First, it has been my experience that the small stakes contained in this kit are not properly matched to the calibre of the pistol; when placed in the barrel there is a regrettable tendency for them to fall out. Fortunately I discovered this fault before it became necessary to use them, and was able to persuade a local carpenter to manufacture suitable-sized replacements, but others may not notice in time.

Second, the silver nitrate solution provided did not appear to have any effect on the two occasions that I used it. It is possible that I was unfortunate enough to encounter a species that is resistant to silver – as we know, there are as many species of vampire as there are types of disease – but I suspect that it may have been improperly compounded.

Third, two of the four holy water vials did not shatter on impact; they bounced.

Fourth, the mesh of the collar was too wide, allowing the fangs of one of these creatures to penetrate my skin.

Fifth, the "vampire vaccine" provided appears to be useless.

For obvious reasons I must herewith tender my resignation from the Church, with apologies for the lack of notice. I would strongly suggest that you do not attempt to find me, since I am already experiencing difficulty controlling certain appetites.

Believe me &c.
The Reverend Henry Venables

With the growth of the British Empire the Church of England is moving into new territory and encountering new problems – such as vampires.

Several companies now manufacture the "Canterbury" Standard Anti-Vampire Kit to Church specifications, for the use of missionaries and other representatives of the Church. The quality of the components varies with the manufacturer: Gamage's Departmental Stores sell a basic kit of utilitarian quality for 9 pounds, Harrod's offer one of superior quality at 15 guineas.

The main components of the kit are as follows.

- A wooden chest or leather case about 6" × 6" × 12" to contain the kit. A cross-shaped metal plate around the keyhole should prevent tampering by vampires and their human servants.
- Four steel and two silver crucifixes, all approximately 3" wide.
- A 9" wooden crucifix containing a 6" silver-plated Bowie knife blade.
- A 4-shot .32 derringer-type pistol loaded with one or more of the following types of cartridge:
  - 10 rounds with hardwood bullet
  - 5 rounds with silver bullet
  - 20 rounds, lead with cross ("dum-dum" effect)
  - 10 blank cartridges
  - 4 sharpened 6" stakes (to fit barrel of gun)
- Four more robust wooden stakes and a mallet.
- An ecclesiastical "dog collar" concealing a silver-plated anti-garrote collar (see p. 22).
- A bottle of holy water and four fragile glass vials.
- A bottle of silver nitrate solution with hypodermic syringe and needle.
- A bottle of powdered garlic.
- A bottle of "vampire vaccine," an antidote to the infection of a vampire's bite, with hypodermic syringe and needle.
- Two pocket Bibles.

The knife, gun, and normal bullets all have normal effects, except that the knife is not throwable; the crucifix design makes the balance wrong. Damage for the different types of ammunition against human targets is as follows:

Hardwood 1d-1
Silver 1d-1
Lead 1d
Stake (propelled by blank cartridge) 1d

The effectiveness of this kit naturally depends on the precise powers and vulnerabilities of vampires in the campaign, if they exist at all.

An exception is the "vampire vaccine," which is worse than useless. If vampires exist it is an extract made from vampire salivary glands; supposedly an antidote to the infection carried by vampire bites, in reality it has the same effect as being bitten by a vampire. If they do not exist it is serum made from the salivary glands of vampire bats, which may carry rabies. On a critical failure against HT the user is infected with the disease.

Holdout -6. 10 lbs.; $45-$78.75 depending on manufacturer.

Paraboloscope TL5

Hear What's Heard Over There, Over Here!!

With the clever Paraboloscope, your friends may speak to you from 50 yards away as if they were standing at your elbow. No more need for your wife to shout, when you're out in the barn! Indispensable for private investigators! Order one today!

This surveillance device is a parabolic metal dish, plus a stethoscope to conduct sound to the user's ear. The dish is mounted inside a fake attaché case, whose cloth sides are transparent to sound. The stethoscopic tube can easily be hidden inside the user's sleeve for discreet eavesdropping. It provides three levels of Parabolic Hearing (see p. CI62).

If an excessively loud noise occurs nearby while the device is in use (such as gunshots, boiler explosions, or screams), make a HT roll to avoid being deafened for 30 minutes.

A recording model is available with a wax cylinder of capacity 4 minutes.

Basic Model: Holdout -6. 10 lbs., $4.

Recording Model: Holdout -6. Additional cylinders: 1 lb., $1. 20 lbs., $25; additional cylinders 1 lb., $1.

Expansive Tent TL(5+1)

For luxurious comfort in the wilderness,
try the Willikins Expansive Tent (pat. pending).

For the discriminating traveler who desires comfort and swift passage, try Willikins' self-erecting Expansive Tent. With the aid of powerful gas capsules, the stylish Expansive Tent erects itself in moments, leaving the traveler free to enjoy the excitement of the wilderness. Available from Willikins and Co., Purveyors, Lahore and New Delhi.

The expansive tent is a luxury item, designed by a British textile firm for use in hot climates. This lightweight, self-erecting tent is intended for short expeditions, pleasure excursions of a few days duration at most, where fair weather is

expected. It is constructed of artificial silk, with flexible hollow tubes running through it. A roomy tent can be carried comfortably in a pack without need for bulky poles. To erect the tent, the camper need only undo any wrappings, attach a flask-sized canister of compressed gas, and turn a small lever. The lever breaks the seal on the canister, which inflates the tubes in about 10 seconds, forming a network of crisscrossing ribs holding up the tent. Supplementary pegs may be used to secure the tent from light winds, and a rubberized version is available to shed light rains. Available in round and square models, the tent covers about 35 sf of ground, making it a comfortable fit for one person or a tight one for two. The seals are tight enough so that the tent will stay up nicely for a night, but it will sag slightly by morning and be mostly deflated by the next night. Deflating (with the assistance of release valves) and folding the tent takes 10 minutes.

Holdout -3. 10 lbs., $10; gas canisters 1 lb., $2.

Phrenological Character Evaluator TL(5+1)

Of course we have always tried to verify the character of all of our students before accepting them into these hallowed halls. But the cost of physicians is high. Johnstone's Evaluator has been a boon to us. A single trained nurse can now administer the measurements to all applicants. It is now clear that in the past we must have admitted several students of dubious character, but we now hope that all such cases in the future may be averted.

– Sir Maximilian Howard, Chancellor, Cambridge University

Johnstone's Patent Phrenological Character Evaluator resembles a large bowler hat – in fact it is made from one. It utilizes the science of phrenology (p. STM107) to determine psychological character traits of individuals from the bumps on their heads. Thin wooden slats inside the hat mold themselves to the shape of the wearer's head as it is put on. These are connected by small levers to a group of pins, which pierce holesin a sheet of paper loaded into the top of the hat. Once this is done, the hat can be taken off and the paper removed. It is then compared to charts showing the shapes of pinhole arrangements and the associated character traits. A booklet of such charts is included when the hat is bought.

If phrenology works in the campaign, this device grants the user +4 to Professional Skill: Phrenology rolls to determine psychological traits and halves the time for a reading. If phrenology is a crank science, the character evaluator does not work as advertised, but lends a veneer of respectability to anyone practicing it. It incidentally provides PD 1 and DR 2 to the head due to the wooden reinforcing, though a single point of damage will destroy its usefulness for phrenology.

Holdout -2. 3 lbs., $35.

Phrenological Modifier TL5

A CURE for all types of Mental Afflictions, Unpleasant Habits, and Weaknesses of Character!!

The astounding PHRENOLOGICAL MODIFIER makes the mind of Man as easy to change as his clothing!

Using his UNMATCHED knowledge of the Science of PHRENOLOGY, Dr. Roland Lafayette has perfected a method of modifying and transforming the very fabric of the Brain itself, accomplished without drugs or surgery of any sort! Patients can go about their affairs in ease and only moderate discomfort while the apparatus gradually works its changes.

Accept No Substitutes!

The phrenological modifier is a tool for modifying the brain, based on the idea that the shape of the head indicates what portions of the brain are most highly developed. By compressing the skull in places and pulling on it in others, the phrenological modifier reduces the size of unwanted areas of the brain and allows other, more beneficial areas to expand.

The device itself is a series of clamps and pins mounted in a sturdy iron headband. Over the course of several weeks, the clamps are tightened bit by bit to reshape the patient's head and thereby change his character and personality. Having your head squeezed constantly by steel clamps is very painful; the patient suffers from chronic splitting headaches (treat as the Migraine disadvantage) and poor sleep. Few people are actually brave enough to complete a full program of phrenological modification.

If the campaign setting accepts phrenology as a real science (see p. STM107), then the phrenological modifier can be used to add or remove a character's Mental Disadvantages and Advantages or to increase or decrease IQ. The process takes about 1 week per character point of the change. Either the user or his phrenologist must make a successful Phrenology skill roll to set up the modifier, and another roll each week to make sure it is being adjusted properly. Failure indicates no benefit from that week's treatment, and a critical failure means the modification has actually reversed. Each visit from the phrenologist supervising the treatment costs $1.

Villains may employ the phrenological modifier for evil, to warp the minds of followers or victims. An involuntary subject must be restrained and prevented from touching or removing the modifier for the entire program of treatment.

If phrenology doesn't work, it's still possible for some crackpot inventor to create a phrenological modifier. Users still suffer pain and fatigue, and may acquire the Delusion "All my mental problems have been cured" after a program of treatment. Even if phrenology does work, the fact that certain tribes really do reshape the head without radical changes in mental capabilities may lead serious phrenologists to conclude that the bumps are an effect rather than a cause, and reshaping the head to modify the brain is pure quackery.

A phrenological modifier can only be concealed by a large hood.

Holdout -2 (-3 when affixed). 10 lbs., $20, rents for $1 per week.

Phrenological Career Assessment Office

Founded in London, England in 1847 by Sir Edward Hargreave Roberts, a disciple (or so he claimed) of Franz Joseph Gall. After a demonstration of his claims to accurately (or at least convincingly) assess the career path of any subject placed before him he caught the attention of Queen Victoria. Sir Edward, until then a minor functionary in Her Majesty's Government and former lieutenant, became the head of the newly formed Phrenological Career Assessment Office.

Rumors abound that the British Government uses PCAO assessments as a basic aptitude test. These rumors are not entirely true, but having a good PCAO assessment (especially one pointing toward cabinet office or high command) can provide a valuable edge. One will not find broadsheets for the PCAO plastered over the walls of London – the PCAO has a reputation for high-mindedness and prefers to attract attention only from the higher classes.

Operation: The PCAO operates a number of offices in the major metropolitan areas of England and is spreading across the country. The officers are pleasantly decorated with busts, diagrams showing the phrenological career prints of people from antiquity (Julius Caesar being notable and prominent – he'd have made a fine airship pilot as well as conqueror of Gaul, according to his chart). Visitors are placed in a comfortable chair, and served tea or coffee while the PCAO officer begins the process. The report is generated and discussed with the candidate, explaining how the shape of his skull proves his aptitude for certain careers. A printed copy of the assessment is available for the candidate to take to demonstrate to others the result of the test.

The PCAO also has a number of "employment assistants" who will direct the candidate to potential employers. The PCAO has a job posting board, where many positions are advertised. Recruiters – including a growing number of professional recruiters – often drop by the PCAO with new positions they need filled, hoping to find a recently assessed candidate. Bribery of PCAO officers to provide choice candidates to certain recruiters is *most certainly* not done. Or so they say.

Weirdness: Persistent rumors of a world-dominating conspiracy aided and abetted by the PCAO are of course ridiculous. In fact the existence of PCAO field agents using special ranged versions of the Device to detect threats to the conspiracy has never been verified by any trustworthy source. Particularly insidious rumors state that H.M.G. recruits scientists and secret agents culled from PCAO assessments, or that a secret bureau collects all of the reports for some unknown purpose. Many detractors claim that the PCAO steers candidates toward certain jobs, in an attempt to fill them, rather than accurately assessing the career path of the candidate. However, comparison of their paper assessments does not bear this out.

Pocket Gazogene TL5

When you're out and about in the hurly-burly streets and need a little effervescent lift – you need the Pocket Gazogene! Carbonate, nitrogenate, or oxygenate your own beverages in mere moments. Never drink a flat cocktail again! Orders may be placed with Uhrwerkmagie of Ingolstadt.

A smallish metallic bulb with three vents near a selector key. The vents are labeled "O_2," "NO_2," and "CO_2." A cylinder of clear glass perhaps the width of a thumb and half the length of a pencil protrudes from the bulb. When charged, it can forcibly dissolve the selected gas into a quart of liquid in seconds. Useful for soft drinks, chemical preparations, and generating short blasts of compressed gas.

Holdout +2. 0.25 lbs., $5.

Dewar Flask TL(5+1)

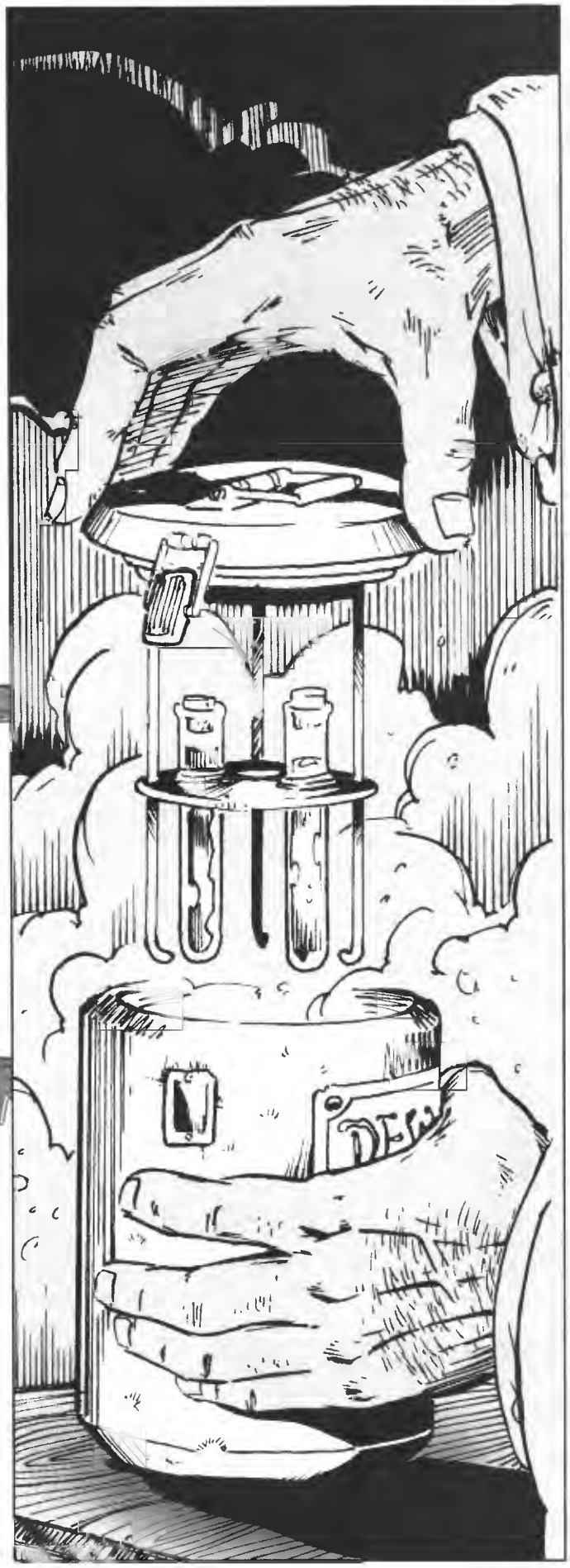
In an experimental test of the vacuum-walled flask, a flask of capacity 1 quart was filled with liquified nitrogen and left to stand at room temperature, unsealed. After 24 hours the quantity of liquid had diminished by 0.97 fluid ounces. Investigation showed that the resulting volume within the flask was filled with a layer of highly chilled nitrogen gas (-276° Fahrenheit), which insulated the residual liquid from thermal contact with the air.

Invented in 1892 by James Dewar, the vacuum flask or Dewar flask is at the border between late TL5 and early TL(5+1). For the first decade after its invention it was a specialized laboratory device, used in cryogenic research such as Dewar's liquefaction of hydrogen in 1898. In 1903, it was brought into widespread use as a container for hot and cold beverages by Thermos GmbH, a German firm which subsequently licensed it to British and American manufacturers.

The Dewar flask consists of two glass walls separated by vacuum to prevent heat conduction. Silvering both walls also prevents heat radiation from passing between them, making the flask a nearly perfect barrier to heat. If tightly sealed, it will keep its contents hot or cold for up to 2d days for laboratory models; commercial versions work for a shorter time.

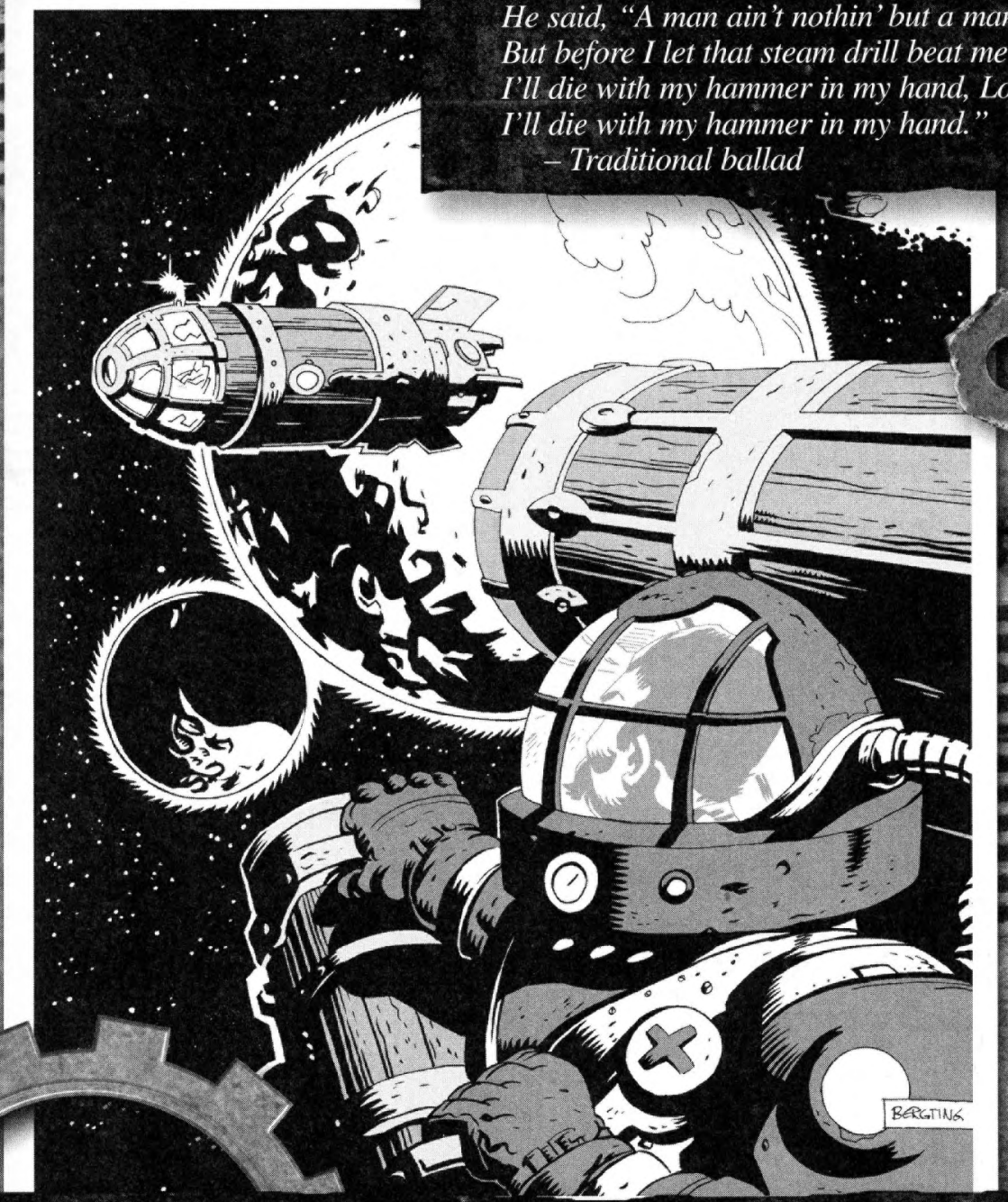
Model	*Duration*	*Wt.*	*Vol.*	*Cost*
Laboratory flask	2d days	0.25 lb.	0.25 cf	$5
Glass-walled carafe	(2d)/2 days	1.25 lbs.	0.2 cf	$2
Metal-walled carafe	(2d)/3 days	2.5 lbs.	0.2 cf	$1

Weight, volume, and cost are per gallon of fluid capacity.



CHAPTER 4
APPARATUS

Now John Henry said to his captain,
He said, "A man ain't nothin' but a man.
But before I let that steam drill beat me down
I'll die with my hammer in my hand, Lord, Lord,
I'll die with my hammer in my hand."
– Traditional ballad



The devices classified as apparatus are too heavy to carry around, in contrast to those classified as equipment. Devices that provide their own mobility are classified as vehicles; those that are useful in combat are classified as heavy weapons; and those that have significant computational capacity are classified as analytical engines and automata. Each of these categories gets its own chapter. This chapter is a miscellany of heavy items that don't fit in the other three.

Power Sources

The Age of Steam saw a vastly increased use of power sources other than human and animal muscle. ***GURPS Steampunk*** discusses the most important of these, the steam engine, and some other options. The following items provide additional means of generating, storing, or transmitting power.

Compressed Gas Tank TL5

CAUTION:
Rated Maximum Safe Pressure
120 Atmospheres (1,800 psi)

In addition to the obvious benefits of storing air for breathing, compressed air tanks can act as a power source; as the air flows out under pressure, it can power a turbine (see p. STM72) or other machine. An air storage tank is typically a cylinder with rounded ends and an outlet valve, filled with air or pure oxygen under pressure. A physically active man needs approximately 1.6 cf/hour of oxygen, or 8 cf/hour of air; a resting man can go twice as long on the same amount.

A gas tank has two primary statistics: its volume in cubic feet and its pressure capacity in atmospheres. In the following formulas these are represented as V and P.

A tank's weight (that is, the weight of its walls) in pounds is equal to 3 × P × V divided by (TL + 1).

A tank's cost is equal to $0.55 per lb. (This is for Age of Steam campaigns with a starting wealth of $750. In other settings, the multiplier should be in proportion to the starting wealth; for example, a late 20th-century campaign would have a multiplier of $11.)

A tank's gas capacity in cf is equal to P × V.

A tank's energy storage capacity in kWs is equal to P × V × K, where K is as follows:

Pressure	K	Pressure	K
2 atm	2	64-127 atm	14
2-3 atm	4	128-255 atm	16
4-7 atm	6	256-511 atm	18
8-15 atm	8	512-1,023 atm	20
16-31 atm	10	×2	+2
32-63 atm	12		

If a tank bursts, divide its energy storage capacity in kWs by 160 to obtain dice of explosive damage. Round to the nearest whole number of dice.

Here are some tanks designed using these rules:

Standard Air Tank *TL5*

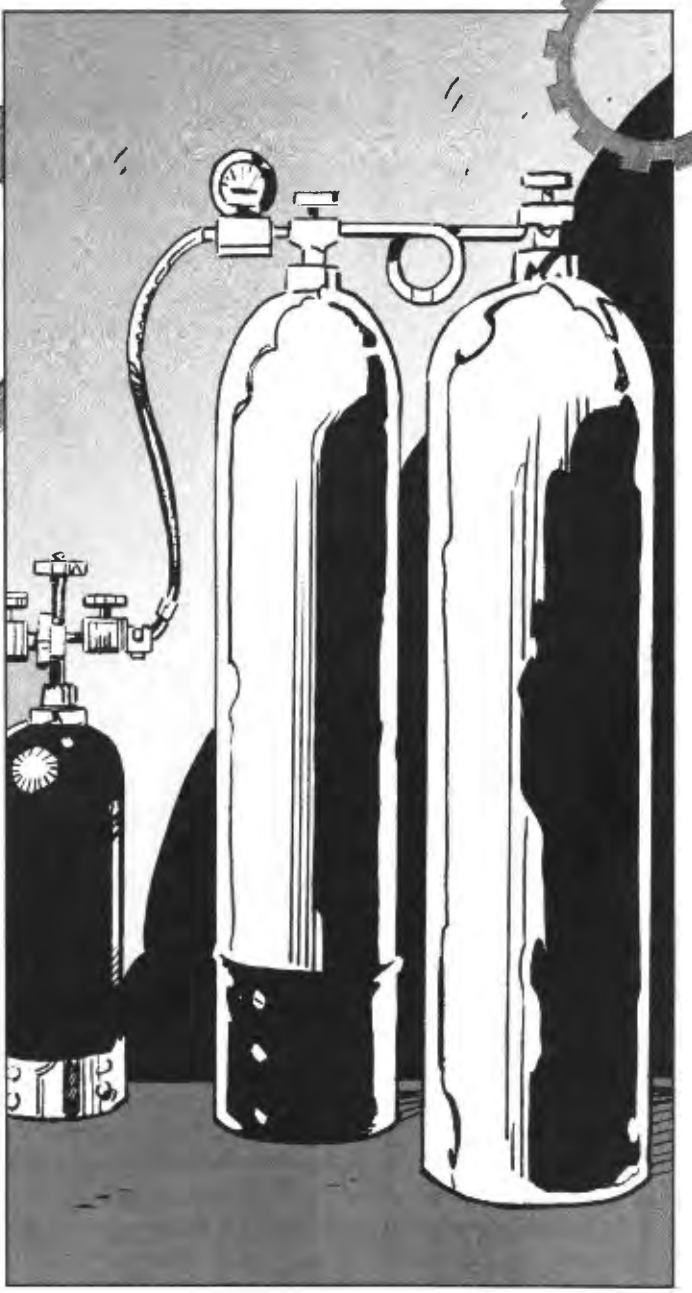
Assign Vol. 1.3 cf, Pressure 55 atm. This gives Wt. 36 lbs., Cost $20, Gas Capacity 72 cf, Energy Storage 860 kWs. This will provide air for 9 hours.

High-Pressure Oxygen Tank *TL5*

Assign Vol. 0.1 cf, Pressure 120 atm. This gives Wt. 6 lbs., Cost $3.30, Gas Capacity 12 cf, Energy Storage 168 kWs.

Bulk Storage Tank *TL5*

Assign Vol. 5,000 cf, Pressure 200 atm. This gives Wt. 500,000 lbs., Cost $275,000, Gas Capacity 1,000,000 cf, Energy Storage 16,000,000.



Coal-Gas Fuel Cell TL(5+1)

Coal Mines Lighted by Edison Lamps

The genie of Electricity has come to the collieries of Wales, granting coal miners the blessing of safe and powerful illumination. Messrs. Jones and M'Neill, Props. of the Merlin Mines of Llandyfed, Wales, granted this reporter a tour of their newly equipped mines the 4th inst.

The greatest deterrent to the electric lighting of mines, the owners stated, was the prohibitive cost of electricity, which must be brought ac ross many miles of wire at considerable wastage of power. But the power for Merlin Mines is generated at the mines, through a new process developed by Kenneth M'Neill (pat. appl. for), in which the chemical oxydation of coal is made to yield an Electric current. Low grade coal, which as Professor Jevons has pointed out is routinely burnt at mineheads throughout the British Isles, is here turned to productive use.

According to David Jones, the increased productivity of the miners' labour under better lighting has paid several times over the incidental costs of operating their Chemical Generator . . .

Several inventors of the 19th century experimented with fuel cells; this version assumes that their engineering problems were solved. The system converts coal into a combustible gas and feeds it into a fuel cell, where it combines with oxygen to yield electric current.

Many 19th-century cities have piping and coal gas generation infrastructure already for gas lighting, so this technology is well suited for residential or commercial electrical supply as well. Omitting the gasification apparatus halves the weight and cost and changes the fuel requirement to 40 standard cf of coal gas per hour per kW. Coal gas costs $0.15 per 1,000 cf.

90 lbs. per kW (up to 5 kW) or 225 lbs. + 45 lbs. per kW (over 5 kW), 1 cf per 50 lbs., $5 per lb. (minimum $50). Fuel consumption is 0.015 cf of coal and 0.125 gal of water per hour for each kW of power produced.

Ethereal Engine TL(5+1)

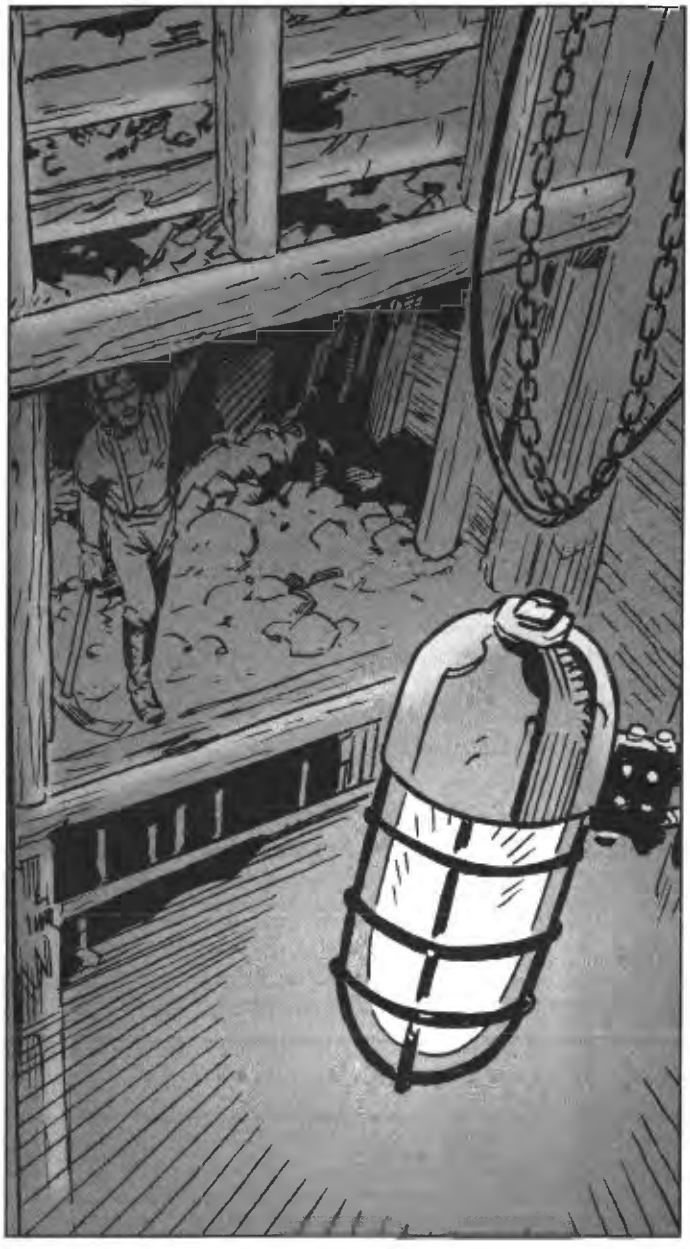
We passed into the brightly lit work floor of the factory, and I noted groups of women seated at large sewing machines. Curiously, they did not seem to be pedalling. I stepped closer and ascertained that the half dozen women in the nearest group were placed around a round pillar, from which belts and pulleys extended to each one's machine. The belts moved at a tremendous speed, but almost silently, and no noise or steam emanated from within the pillar, while at its top I noted a curiously curved metal screen.

"My dear Eugenes," I addressed my guide, "I confess myself at a loss once more! Pray tell me, what fuel does this engine burn?"

He laughed, and responded, "No fuel at all, for it draws its power from the very air!"

"Then you have attained perpetual motion?" I asked.

"No, my friend, we have not repealed Nature's eternal laws. The power for this engine is generated elsewhere in this



factory. But it is transmitted into the ether, from which this antenna receives it." He gestured at the curved screen I had noted.

The ethereal engine realizes the 19th-century dream of wireless power transmission. An antenna extracts power from the nearest beamed power source, which is then used to operate an electric motor. Power output can be varied by rotating the antenna, from zero power (parallel to the beam) to full power (perpendicular to the beam). Realistic GMs will want to note that such beams can cause serious injury (Spcl. 6d×9; see *Disruptors*, pp. UT50-51); cinematic GMs may prefer to assume that they pass harmlessly through living tissues. The model described is the workhorse of futuristic small factories.

Beamed power transmitters cost $750 per kW of peak capacity (weight and volume need not be specified, as they are normally fixed installations). They operate at line of sight range.

5 kW, 125 lbs., 2.5 cf, $100.

Fluidized Coal TL(5+1)

The relative cheapness and ready availability of coal argue for its continued use in the Fleet. However, on technical grounds, fuel oil is superior, yielding the same power for 37.5 per cent less space and 33.3 per cent less weight. It also obviates the need for stokers, being capable of handling by mechanical pumps, and thus the necessary crew complement. For this reason it forms a portion of the fuel supply of warships of the Dreadnought class. It has not so far been thought feasible to rely upon oil alone; thus some duplication of machinery has been unavoidable, as well as retention of the larger crew size.

Experiments dating back to the previous century (see Appendix I) demonstrate that a finely ground coal has many of the properties of a liquid with respect to flow and combustion. Mr. Diesel's early experiments found it unsatisfactory for use in direct combustion engines, but the same problems need not be anticipated if it is used to heat the boilers of steam engines. It is anticipated that a suitable research program would include the stages of developing a suitable form of finely divided coal; adapting the pumps and other auxiliary machinery of a steam turbine plant to handle this fuel; designing machinery suitable for producing it on a large scale, either to be carried on board ship or to be maintained at naval bases; and determining the changes in naval architecture and crew organization that this novel system of propulsion would entail.

– Memorandum of the Committee on Naval Engineering to the Board of Admiralty, submitted by Lt. Cdr. Antony Rhys-Jones, Secretary to the Committee

Fluidized coal power plants require half as many tenders as standard steam engines (divide kW by 500, take the square root of the quotient, and round down). An engine burning fluidized coal requires 9.5 gallons of fluidized coal per cf of standard coal consumption. The coal cannot be stored in a bunker. Instead, it requires a fuel tank (see pp. VE88-89). Under normal circumstances fluidized coal will simply burn, but like flour, it can form an explosive mixture with air in a confined space.

Fire Number 8. 5.25 lbs./gal, 0.15 cf/gal, $0.0075/gal.

Fluidized Coal Internal Combustion

Before developing the engine that is named for him, Rudolf Diesel experimented with internal combustion engines burning liquified coal. If these experiments had succeeded, the result might have been something along these lines:

60 lbs./kW (up to 5 kW) or 30 lbs./kW + 150 lbs. (5 kW or more), 1 cf/50 lbs., $0.05/lb. Fuel consumption is 0.1 gal/hr fluidized coal per kW.

Radium Batteries TL(5+1)

Power for the home, laboratory, or workshop: Campbell's Radium Batteries.

At the end of the previous century, Mme. Marie Curie isolated the element Radium and demonstrated its spontaneous emission of radiant energy. Now, 10 years later, this power has been harnessed for the use of man.

Batteries are available in four standard sizes: 1, 5, 20, and 100 watts, and custom-made in any size desired. Guaranteed to maintain full power emission for 14 years from the date of purchase. Orders may be placed with Campbell Electrical Supply of Edinburgh.

Radium batteries are heavy, squat cylinders of dull metal, with massive terminals emerging from the top surface. They are available in several sizes.

Size	Power	Wt.	Volume	Cost
I	.001 kW	1 lb.	0.01 cf	$2.50
V	.005 kW	5 lbs.	0.05 cf	$12.50
XX	.02 kW	20 lbs.	0.2 cf	$50.00
C	.1 kW	100 lbs.	1 cf	$250.00

Note: Custom batteries are also available, at outputs of up to 5 kW. 1,000 lbs./kW, 10 cf/kW, $5,000/kW.

Appliances

With the growth of technology, it becomes possible to create powered devices for use in the home. This section presents several such appliances that contribute to domestic ease or comfort.

Aromatherapeutic Thermantidote TL5

Do You Wish Yourself Back to the Hill Stations?

Do you wistfully think of the pine-scented breezes of the hills as you swelter in the heat of your office? Now the hand of Science *brings them to you through the Patent Aromatherapeutic Thermantidote. A selection of 24 fine* ***Therapeutic Aromata*** *ensure continued good health and comfort even in the greatest tropical heat. Enquire for special rates for members of the I.C.S. and H.M. Indian Army.*

The aromatherapeutic thermantidote is a good sales pitch for inadequate technology. The spring-driven machine combines a metal fan with evaporative perfume dispensers functioning as air fresheners. At full blast, it is about adequate for a small room with no more than four people. It comes in a wooden casing decorated to blend in with the furniture. In action, it gives off a slight scented breeze and emits a steady, low clicking noise. The spring requires winding every 2 hours.

60 lbs., 10 cf, $12; bottle of aromated water $0.10, good for 48 hours of operation.

Autocybernetic Servitors TL(5+1)

Superintendent Cavendish steadied his revolver and edged round the corner. The New Mechanical Hotel seemed to be an absolute maze of corridors and odd machinery, and somewhere ahead of him the Neo-Luddite saboteur was undoubtedly planning more villainy.

There was a sudden chime, and a board about a foot wide hinged down from the corridor wall ahead, descending like a drawbridge to cross it at waist height. Cavendish edged closer and noticed steel rails about six inches apart on the board, connected to tracks running into ducts on either wall. There were a rattle and hiss – Cavendish watched, fascinated, as a large model locomotive rattled across the bridge, pulling wagons loaded with plates, a tureen, and a coffee service. As the last wagon passed into the wall the drawbridge rose, and small doors closed over the ducts.

Cavendish suddenly realized why the Waiters' Union was backing the Neo-Luddites . . .

A variety of ingenious contrivances enable libraries, laboratories, hotels, and a few wealthy households and innovative factories to economize on labor by having machines carry parcels about a building. Mechanical switching mechanisms ensure that the miniature vehicles get where they are meant to go.

A typical mechanism has a mounting rack for a "comb" of metal rods, protruding down to engage with switches in the track. There is a unique comb for each destination, with some rods long and some short. The carrier also has a lever selecting forward, stop, and reverse.

For example, the route for Room 204 might require the carrier to proceed to the second floor, left at the first switch and right at the fourth, cross a corridor, and come to a halt in the room. A rod in the second position of the rack switches the carrier to enter a dumbwaiter lift serving the second floor. As it enters, a cam moves the control lever to off. When it reaches the second floor the lift doors open, the cam rotates again, and the carrier moves forward toward the first set of points, which offer the choice of "ahead" or "left." Since there is a rod in the position for this set of points the carrier is diverted to the left. The next two rods are missing, so the carrier takes the default direction at each junction. Finally, the rod for the fourth junction switches it onto the line to room 204; moving these points also activates the bridge, which lowers to allow the carrier to pass. Eventually it comes to rest in a serving niche in room 204, where the guest unloads plates and sets it into reverse for the return journey. Points and junctions are designed to direct carriers toward the kitchen if they are moving in reverse.

Control systems of this type are not true autopilots, as they cannot maintain a continuous heading; the rails on which the carrier travels do that. The control system selects left and right turns in a specified sequence, a much simpler task.

Apparatus

Enterprising adventurers will certainly find uses for such a device. A well-run household always has a chart with programming instructions on hand to avoid mishaps, but evil masterminds will probably not be as accommodating. So far nobody has used the system for crime, e.g., by sending a bomb to a guest, but it's probably only a matter of time before someone thinks of it.

Apportator Monorail

The apportator monorail is a clockwork-powered ceiling monorail carrying suspended nickel-plated, wrought-steel baskets suspended from Bessemer-strengthened double-link chains. Carriages travel up to 30 minutes without winding up. Each is fitted with a steering engine that can be programmed by throwing a series of switches to appropriate positions. Sets are delivered with programming instructions and customizable wall-mounted rail chart holders in wrought brass, black cast-iron quatrefoil, English perpendicular, or Parisian primitive.

The 40-lb. payload represents a heavily laden basket. A 20-lb. payload raises HT to 12, speed to 7 mph, and acceleration to 4.

Rail 2.5 lbs./yard, $0.25/yard. Carriers $10.

Carrier

Move 3, Endurance 20 minutes, Range 2 mi., PD 1, DR 1, 2 HP. 1'6" × 10" × 1'3", 27.5 lbs. (unloaded), 1.27 cf, $10.

Steering Engine

Statistics: Complexity -1, IQ 2, DX 7. 0.94 lbs., 0.0188 cf, $5.

Pneumatic Servitor System

The pneumatic servitor system is designed to look like a miniature railroad running on a standard two-rail track. The trains themselves are purpose-built engines and carriages, designed for extra-wide track. To prevent fire risk and stop them filling the hotel with smoke, the engines run on compressed air supplied from a steel tank. The kitchen attendant loading the train fills the tank via a flexible pressurized hose before each run. Compressed air also powers the rest of the system.

The engine itself does not carry a load, but hauls one or more wagons carrying various items. Average loaded weight for a wagon is 100 lbs., of which 62.5 lbs. is payload, fitted into 4 cf of open cargo space. The miniature train travels at 20 mph with up to 2 wagons, 10 mph with up to 6 wagons, or 7 mph with up to 10 wagons.

To prevent collisions only one train can serve a given floor – this can cause problems if guests are slow to unload the wagons, so the manufacturers are experimenting with complex control systems, possibly run by a Babbage engine, which will let more trains run on the same lines.

An unfortunate problem with this system is that the ducts are occasionally invaded by vermin such as rats, mice, and cockroaches. To keep them under control the ducts have side tunnels leading to traps and can be flushed with steam to drive vermin into them.

Rail 2.5 lbs./yard, $0.125/yard. Engines $7; wagons $4.

Engine

Move 10, Endurance 120 minutes, Range 40 mi., PD 2, DR 4, 5 HP. 1'6" × 10" × 1'3", 60 lbs., 1.25 cf, $7.

Steering Engine

Statistics: Complexity -1, IQ 2, DX 7. 0.94 lbs., 0.0188 cf, $5.

Domiciliary Trolley

A somewhat more advanced variant on this theme is an electrically powered household rail system. Electric current flows through two metal rails to supply power to carriers. Contact with the rails causes 1d-3 localized electrical damage. Each carrier has its own motor and steering engine, but several carriers can be linked together for increased capacity.

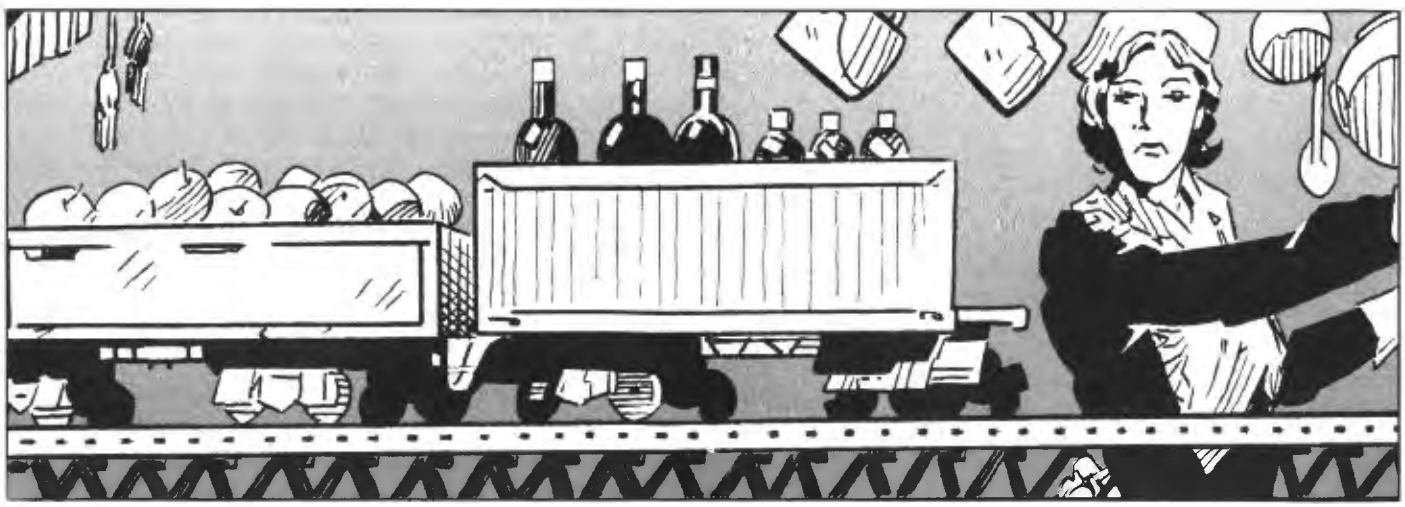
Rail 2.5 lbs./yard, $0.50/yard. Carriers $2.40.

Carrier

Move 7, PD 1, DR 1, 1 HP. 1' × 8" × 1'6", 42.5 lbs. (empty), 0.96 cf, $2.40.

Steering Engine

Statistics: Complexity -1, IQ 2, DX 7. 0.3125 lbs., 0.00625 cf, $0.50.



Communications Apparatus

The Age of Steam sees the use of mechanical and electrical devices for communication on an increased scale. Adventurers may have occasion to use any of the varied communications networks described here.

Luminary Telegraph TL5

The usual solution to excessively crowded lines for the electrical telegraph is to lay additional cables. Regrettably, this is not expedient for orbit-to-Earth communications. The installation of multiple luminaries would increase the difficulty of following any one message, producing a net loss in messages transmitted. Given the current rate of growth in traffic, it will be necessary within 7.4 years to take measures to restrict communication with Earth to high-priority messages. A combination of reservation of some time in each hour for official use, with high prices for the time that is not so reserved, should have the desired effect.

The luminary telegraph provides the principal means of communication between spacecraft in a world innocent of wireless telegraphy. It combines a powerful light source, a focusing device, shutters, and in larger models a telescope to increase the visual range. It requires an external power source, either batteries or an electrical dynamo. Three models are described here, suitable respectively for communication between crewmen on the outside of a single ship; for communication between ships at maneuvering range; and for communication between geosynchronous orbit and the ground.

The luminary telegraph uses Morse code, like the electrical telegraph and the heliograph.

Man-to-Man Unit: Range 0.1 mi., Holdout -4. 0.05 kW, 2 lbs., 0.04 cf, $2.50.

Ship-to-Ship Unit: Range 150 mi.; incorporates a 20-power telescope. 4 kW, 200 lbs., 4 cf, $30.

Ground-to-Orbit Unit: Range 30,000 mi.; incorporates a 200-power telescope. 75 kW, 7,000 lbs., 140 cf, $390.

Pneumatic Dispatch Terminal TL5

Instructions for Use

(1) Place items inside delivery cylinder. Firmly tighten the end-cap by turning it in a clockwise direction.

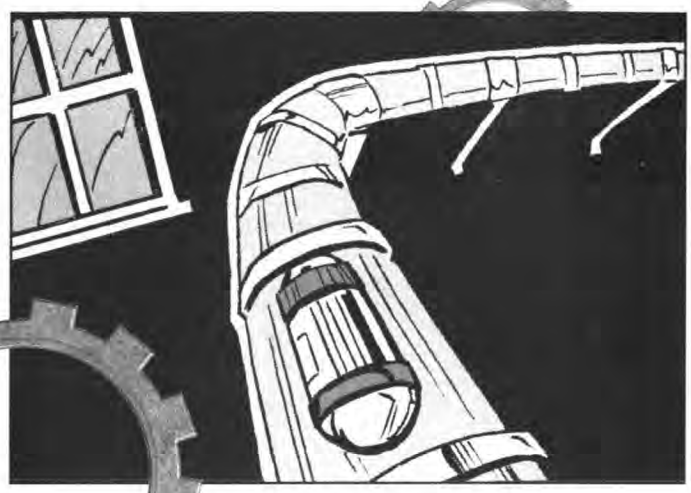
(2) With a sharp stylus, punch out the coded address numbers from the pasteboard address tag. Please ensure that each digit of the number is fully perforated.

(3) Write the recipient's name and address number in the margins of the address tag, along with your name and return address. This will allow your cylinder to be returned in case of mechanical failure.

(4) Slide address tag into holder on the bottom of the cylinder.

(5) When the above preparations have been completed, simply drop the delivery cylinder into the nearest Pneumatic Dispatch terminal.

NOTICE: Upon dispatch of each cylinder from your terminal, a fee of 5 cents will be added to your account. An itemized bill will be sent to your terminal on the last Friday of each month (or Thursday, in case of holidays). Please dispatch all payments or billing inquiries to the Pneumatic Dispatch Corporation, Address 4110000.



This is a technological alternative to telephones for a steampunk campaign. Instead of a network of telephone wires, homes and businesses are connected by a labyrinth of pneumatic tubes, snaking through underground tunnels, up walls, across rooftops, etc. Such systems were actually built in many 19th-century cities; the first ones, in London, Berlin, and Paris, linked stock exchanges to telegraph offices. Small metal cylinders are driven through the tubes at 60 mph by pneumatic power generated at neighborhood switching stations. At these stations, a clockwork switching mechanism forwards each cylinder to the next station along its intended route. Each station contains a 5-kW steam turbine, a set of pneumatic compressors, and a storage tank holding fuel oil for 1 week.

The maximum weight that can be placed within a cylinder is 4 lbs. (enforced by a spring-loaded flap inside the terminal, which drops heavier cylinders onto the floor). Local delivery is $0.05 per cylinder; intercity delivery is $0.50 per cylinder.

Cylinder: 12" length × 6" diameter, 2 lbs., 0.2 cf, $0.50.

Dispatch Terminal: 2' × 2' × 1', $20.

Dispatch Switching Station: 20'×20'×10', $2,000.

The switching station is controlled by a Strowger switching engine designed to read perforated address tags and direct cylinders accordingly.

Complexity 0, IQ 3, DX 8. 2 kW, 300 lbs., 6 cf, $150.

Etheric Spiriphone TL(5+1)

Madam Zadvony simply told me what I was eager to hear. She would go into a trance and speak in a deep voice, pretending to be my beloved William. She took my money and gave me empty platitudes. But when I went to Mr. Fitzgerald and tried his spiriphone I was left with no doubt that the gypsy had taken me for the fool I was. William spoke to me himself! I told him what had happened and he rounded on me as he would occasionally in life. Then he left, telling me he would soon teach Madam Zadvony a lesson.

– Mrs. William Farmer, quoted in a police report on a murder investigation

This device enables the user to hear and speak to ghosts and spirits of the dead. It consists of a normal telephone receiver connected via an amplifying induction coil to a long glass tube. The tube is filled with low-pressure gas which is ionized by a high-voltage electric current. Spirits who speak in the vicinity of the tube have their voices picked up and reproduced by the telephone receiver. By speaking into the receiver, the operator produces etheric fluctuations within the tube which the spirits can hear. (This assumes that spirits are normally unable to hear living beings.) If no such communication is made, the user may be able to eavesdrop on spirit conversations without the spirits' awareness. If spirits are affected by etheric disturbances, they will be able to detect the use of a spiriphone nearby, but might not understand what it does.

Some ghosts may be eager to communicate with the living. Others may be shocked or even hostile when they realize what is happening. Spirits may be convinced to provide information or assist the user in other ways only by verbal coercion, unless weapons which can affect spirits are available as threats.

If spirits do not exist in the campaign, or are incapable of being detected by this device, the etheric spiriphone may be used by charlatans or deluded individuals. Charlatans in particular will appreciate the air of science and respectability it lends to their schemes.

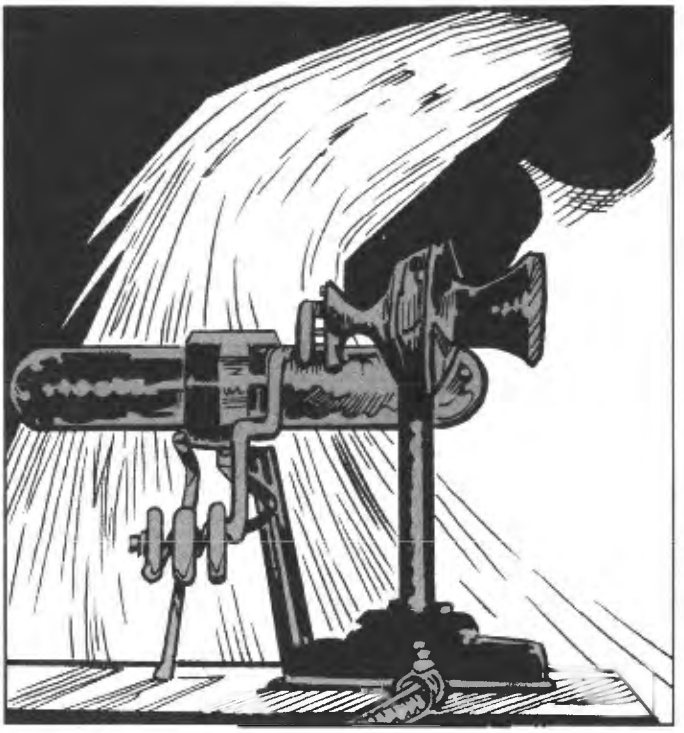
0.2 kW, 22 lbs., 1 cf, $40.

N-Ray Picture Telegraph TL(5+1)

The picture telegraph, seen for so long as a boon to mankind in providing instant visual communication over thousands of miles, is now revealed to be an insidious creation of evil. Our children are now addicted to the flashing lights and images, spending an hour or more every week sitting in darkness and attentive only to the box in the corner of the room. Good things cannot come of this.

– Virginia Senator Zebediah Comstock in a speech to the United States Congress

This device consists of a transmitter/detector pair, separated by any length of wire. The transmitter encodes visual information by splitting N-rays (see pp. STM95-96) into a spectrum with an aluminum prism and passing the spectrum through a narrow vertical strip of a film image (such as a slide or motion picture film frame). Various wavelengths of the spectrum are dimmed by an amount consistent with how much black is in the section of the film that each wavelength passes through. The spectral beam scans across the image, producing a varying signal that is directed into the wire. At the other end, the detector passes the emerging N-rays through a prism rotating at the same speed as the one at the transmitter, directing the resulting spectrum onto a stretched cloth impregnated with calcium sulfide. If the room is sufficiently dark, the cloth glows and the rotating lines of the spectrum blend into a faint image, reproducing what is on the film at the transmitter. A single film negative produces a static picture at the receiver, while advanced models can send motion picture film. All receivers can display either type of image.



If the N-ray picture telegraph is a new technology, access to the service will be restricted to governments and the wealthy, with only a few machines available in major cities. If it is more mature, there will be public picture telegraph facilities in most towns. It is possible to synchronize telephones with the images being sent, making in effect a cable television service. If this is common, many homes may have receivers which tune in to broadcasts from centralized transmitter stations. Note that N-ray picture telegraphy cannot be used as a videophone system, since the image to be transmitted must be on film, so it needs to be photographed and the film developed and specially treated for transmission. Clever inventors may have some ideas, though . . .

Device	Power	Wt.	Vol.	Cost
Static transmitter	1 kW	350 lbs.	8 cf	$1,200
Motion picture transmitter	2 kW	650 lbs.	16 cf	$2,000
Receiver	0.2 kW	60 lbs.	2 cf	$80

Police Directive Web TL(5+1)

"Well, what was a man to do with just a handful of native police? It's not as though a few hundred drunk sailors and lascars from the ends of the earth were easy to handle, but hardly a week goes by without some troopship putting in with a load of regulars, don't ask where they're from, none of your business where they're going. It's all terribly hush-hush. In the meantime they're painting the town vermilion and if you have a problem with that, take it up with the Army Office. Well, then I had an idea . . . "

The stations of a police directive web are seen springing up in towns throughout the world after their successful use in Singapore. The core of the system is a simplified telegraph operating through dedicated lines. It was originally developed for directing battlefield operations (with stunning lack of success, which shouldn't stop a general insisting his Signal Corps install one). A directive web is immediately obvious from the patrol posts scattered through the streets.

A patrol post is a locked metal box that every patrolman has the key to, hooked up to the telegraph system. A policeman can, at the push of a button, request a courier, a prisoner transport, a backup squad, an ambulance, or the fire brigade, or send out an all hands emergency call (he can also send a telegram if he knows how).

At strategic locations throughout the city, squadron posts are set up. The lines of the patrol posts are bundled here. A call for backup or messengers will be received here and answered by a body of cyclists or mounted police. Messages can also be sent to specific patrol posts that alert the nearest patrolman by ringing a bell.

At the heart of the web are one or more core stations, displaying the messages from all posts and stations. From here, instructions can be sent out to all positions and large forces are dispatched. Tampering with a police directive web is a jail offense, but the potential for havoc may be irresistible (there is no better way to paralyze a city than to send out three or four general emergency calls).

Type	Power	Wt.	Volume	Cost
Patrol post	–	20 lbs.	0.4 cf	$80
Squadron post	2 kW (provided electrically)	800 lbs.	16 cf	$200
Core station	20 kW (provided by stationary steam engine)	2,000 lbs.	40 cf	$1,000

Scientific Apparatus

Advances in technology find application in new types of laboratory equipment, which give birth to new knowledge from which further advances in technology can be derived. The experimentally minded investigator may find any of the following apparatus useful in his endeavors.

Tempest Prognosticator TL5

As we prepared to leave for the city, Algernon made a great show of finding a waterproof, his broadest hat, &cetera. Though he was often slightly queer, this behavior seemed even more puzzling to me that his usual regimen.

"Sir," I asked him, glancing out the window at the clear and cerulean sky, "is the weather not rather fair for such gear?"

"It is clear now," he replied, "but I have been informed that the weather will soon take a turn for the worse!"

"Informed? By whom?"

He turned from the closet and, with that familiar twinkle, said, "By the leeches, my boy. The leeches."

The tempest prognosticator, introduced at the Crystal Palace exhibition of 1851, purported to predict the weather by using the special sensitivity of certain animals. The body of the prognosticator consisted of a circular rack of a dozen glass jars, each containing an inch or so of water and a single leech. As the weather threatened to change, the leech would become agitated and crawl out of the water to the top, jostling a sliver of bone. The bone was connected by a wire running through a tiny hole in the stopper to a bell at the center of the rack, whose ringing would alert the owner to the change in weather.

Realistically, the prognosticator might be regarded at best as a very crude barometer. However, the GM may decide that it houses a special breed of leeches that are particularly sensitive to changes in atmospheric conditions, giving +2 to Meteorology. Likewise, the GM may rule that it houses a breed of leeches especially sensitive to seismic disturbances, as some animals are said to be, making it an earthquake prognosticator.

20 lbs., $3.

Water-Drop Electrostatic Generator TL5

Volta's electric piles no longer supply the electric energy I believe I need to attain my goals. I have begun ordering copper sheeting and rubber hosing so that I may construct a water-drop generator, with which I should have the limitless power I require. My first creation will assist me in building it, thus helping to father his own generation of descendants.

– Extract from the diary of Dr. von Bronstein

This is an ingenious device invented by Lord Kelvin (see p. STM96) to generate high electrostatic voltages using nothing more than a few metal cans and rings and a supply of dripping water. It consists of two spouts which drip water in discrete drops through two metal rings, to land in two insulated metal cans. The first ring is connected to the second can by a metal rod, and the second ring to the first can by another rod – the rods do not touch. Any electrical charge imbalance, no matter how slight, between the two sets of cans and rings is magnified by the action of the dripping water – electrons are stripped off the positively charged ring and deposited by the droplets into the negatively charged can and vice versa for positive ions. In this way electrostatic charges of thousands of volts can be built up at an average charging rate of 1,000 volts per minute (maximum voltage in dry air is 75,000 volts per inch of air-gap width). It is possible to drip the water out of the charged metal cans and recirculate it with a pump (possibly driven by a steam engine). The voltage can be used to generate sparks or perhaps power electric devices such as etheric shock weapons. A very large water-drop generator could produce millions of volts and huge lightning-like arcs of electricity, or provide energy to animate corpses.

Desktop Model: 30 lbs., $5.

Room-Sized Model: 4 tons, $240.

Eigenwellendetektor TL(5+1)

Dr. Morgan lectures on mysterious device

Doctor Morgan, recently returned from his work at the University of Leipzig, last week gave a lecture on what he calls his Eigenwellendetektor. The device in question has the appearance of a case the size of a breadbox that he carries by means of a leather strap over one shoulder, whose purpose is to detect changes in the ripples in the aether. While he did not show the internal workings, he did describe the general principles on which the device is supposed to operate. He also described a larger, more sensitive laboratory version of the device which displays the existence of changing ethereal ripples by means of an electroscope.

Dr. Morgan made the claim that his portable device is sensitive enough to detect the motion of spirits, but it appears the spirits were shy, because his device detected little throughout the demonstration. Indeed, so little did the needle move from the horizontal that one wag was heard to refer to it as "Dr. Morgan's spirit-level." Nonetheless his lively lecture had plenty of spirit of its own, and despite some skepticism, the audience accorded him hearty applause.

This device comes in two forms: a portable version and a laboratory version. The portable version is entirely encased in black leather with a leather shoulder strap to support its weight. There are several knobs on the outside. On its upper surface is a gauge with a needle, indicating changing ripples in the ether. This can detect nearby spirits when they move, but would also pick up quite distant use of etheric shock weaponry or other effects that manipulate the ether. It is somewhat directional in that only motion in front of the device is reliably detected, but a slightly better idea of direction – down to say a 60° angle – can be obtained by moving the face of the detector back and forth a little. Ordinary spirits can be detected while in motion over a range of about 30 yards; spirits of unusual power or making violent motions could be detected further away.

The laboratory version of the device is a silver-gray box, about 18" high and about 2' square, topped by a largish bell jar containing a gold-leaf electroscope as an indicator. It has controls similar to the portable version's. The laboratory version is nondirectional, but reliably detects normal movements of ordinary spirits to 450 yards.

Portable Version: Range 30 yards. 15 lbs., $150.

Laboratory Version: Range 450 yards. 85 lbs., $500.

Etheric Projector TL(5+*N*)

The device looks terrible and the brave volunteers in my command tell me it is an exceedingly unpleasant experience, but Mr. Fitzgibbon's etheric projector has been an invaluable addition to the resources of our department. Using its abilities to apprehend criminals is of course laudable, but I fear for what should happen if those same criminals managed to acquire a projector of their own.

– Inspector Randolph Dougal, Scotland Yard

The etheric projector is an electromechanical means of entering the astral plane (see p. STM105). The user sits in a stout wooden chair, arms and legs restrained by heavy leather straps. Several electrodes are attached to the head. When the power is switched on, electrical signals from the brain are amplified and introduced into a large glass globe filled with rarefied gases. The resultant ionization patterns manifest as fluctuations in the ether which interact with the astral plane. Astral sensations are fed back to the user's brain via the electrodes. The user feels as if he is a free-floating spirit, able to wander the astral plane and interact with beings found there, which may include spirits of the dead.

The experience is unpleasant and tiring for the user's physical body. It twitches uncontrollably and horribly as long as the person's consciousness is roaming astrally, and takes 1 Fatigue every minute. The astral wanderer will not be aware of this, but will be snapped back to the body if it passes out, or if the power is switched off. While in the astral state, the user may be affected by anything which affects spiritual entities. He might be channeled by a medium, or interact with devices such as spectral globes (p. STM106) or etheric spiriphones (p. 53).

The GM should determine campaign specifics for what an astral entity may achieve. He may be unable to interact with the physical world at all, being limited to dealing with fellow astral beings, or he may be able to sense or affect the physical world. If the physical world can be sensed, the etheric projector is a powerful spying tool. If it can be affected, the possibilities are even greater. Further details on astral projection may be found on pp. P51-53.

For purposes other than duration, treat this device as granting Astral Projection at Power 10.

2 kW, 370 lbs., 26 cf, $450.

Time Telescope TL(5+*N*)

Professor Arnold Tolliver carefully polished the last quartz prism of his new Linear Light Telescope and began the painstaking work of mounting it in the wide brass tube. In a matter of minutes he would prove that the rays of light focused through its thousands of needle-like hexagonal facets were perfectly parallel, capable of resolving objects at any distance with no loss of clarity. Few scientists agreed; a dozen closely reasoned rebuttals of his last paper were pinned to a dartboard on the far side of the room, and part of his soul still cringed from the laughter his ideas received when he presented them at Heidelberg University.

There – it was done – he moved round to peer through the eyepiece. It was day, so the most visible landmark, the town hall a mile or so away, would have to be the first subject. He looked through the telescope, scanning down to see the inverted image of its clock. Eleven o'clock, bar a few seconds. Suddenly he stiffened, pulled his watch from his pocket, and took another look at the clock through the field glasses he normally used for bird-watching.

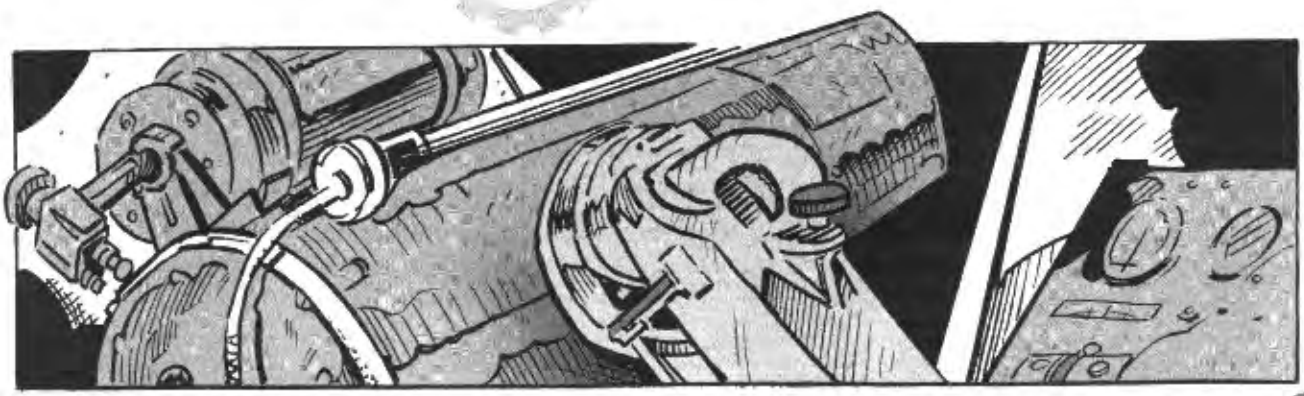
A year later Arnold Tolliver was a wealthy man, thanks to the rewards for solving a series of crimes . . .

The time telescope is a 14' brass tube, about 18" wide, containing a complex assemblage of hexagonal quartz plates, with an elaborate helical focusing mechanism. It weighs nearly a ton and was initially fixed to a massive equatorial mount for astronomy, but has subsequently been moved to a gunlike mount allowing easy aiming in any direction, especially downward.

The telescope can see 41 days into the past for each mile between it and the object on which it is focused; moreover, it can see through solid objects in its optical path, including the Earth itself, apparently because seeing them would require the telescope to simultaneously see objects at two different times. Since the diameter of the Earth is just over 11,000 miles, it is possible to see events up to 1,236 years into the past. There are several snags:

The telescope must be at exactly the right place – an error of a few feet represents an error of an hour.

The field of view of the telescope is magnified more than 100 times, but it still covers nearly 50' for each mile of focal distance; for example, if it is focused on an object 10 miles away and 410 days in the past, it shows an area roughly 500' in diameter. It is obviously impossible to make out any fine details.



Focusing to exactly the right time is very difficult, even if the telescope is at the right location; the tiniest error in adjustment is equivalent to several days at longer ranges.

Distant objects are seen as tilted, because of the curvature of the Earth.

A crew of workmen, drivers, and mechanics is needed to move the telescope and set it up. Baggage for this work includes surveying equipment, more conventional telescopes, and everything needed for extended scientific expeditions.

Setting up the telescope requires at least one night of clear weather (to fix a precise position from the stars) and a Navigation roll at -3. Using the telescope requires an Astronomy roll at -4. The time telescope functions as a time scanner (see p. TT47) but has all of the limitations above.

Uses for the telescope include blackmail and espionage (at short range it can see into neighboring houses, government offices, etc.), detective work, treasure hunting (the naval wars of the late 18th and early 19th centuries offer some comparatively recent lost treasure ships), archaeology, and of course astronomy. Given the distances to the planets, the time telescope can reveal much about the distant past of the Solar System. For example, it can see the Moon 28,000 years ago, or Mars 5.2 to 26.1 million years in the past.

2.7 tons, $2,500.

Medical and Forensic Apparatus

Physicians and surgeons perform a variety of tasks, from healing the living to finding out what killed the dead. Suitable machinery makes both tasks easier.

Amputation Assistant TL5

Mr. Morris' lesion turned gangrenous, and Dr. Jameson recommended that the foot be amputated, allowing the first test of the Assistant on a live patient. The patient showed some trepidation upon seeing the apparatus, and was obviously struggling to maintain his composure as I adjusted the restraints. The Assistant worked perfectly; the appendage was cleanly removed before the patient could even draw breath for a second scream.

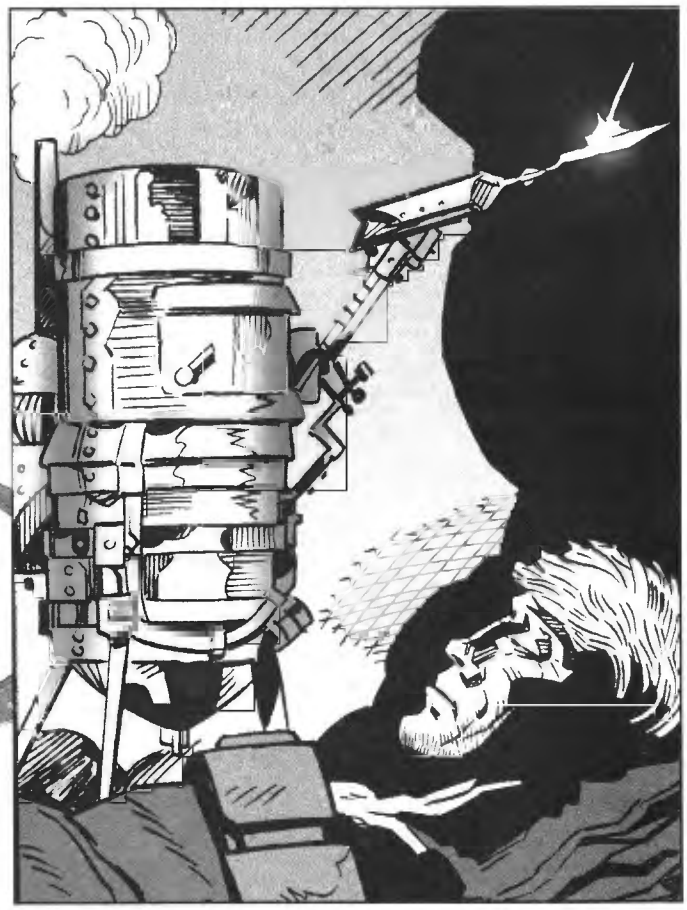
– From the personal journal of Clive Coopersmith, practicing surgeon

The amputation assistant uses a steam-driven mechanical arm with a replaceable surgical saw attachment, in conjunction with a surgical table fitted with heavy padded leather restraints. It halves all penalties to the Surgery roll listed on p. STM64. On a critical failure, roll for a malfunction; if the device malfunctions, the surgical saw breaks, and the amputation is incomplete. If the patient fails his Will roll to hold still, he cannot move violently unless he rolls ST-5 to rip free a restraint. The assistant performs the amputation in 1d/2 *seconds*.

Malf 15. 0.5 kW, 500 lbs., $4,000.

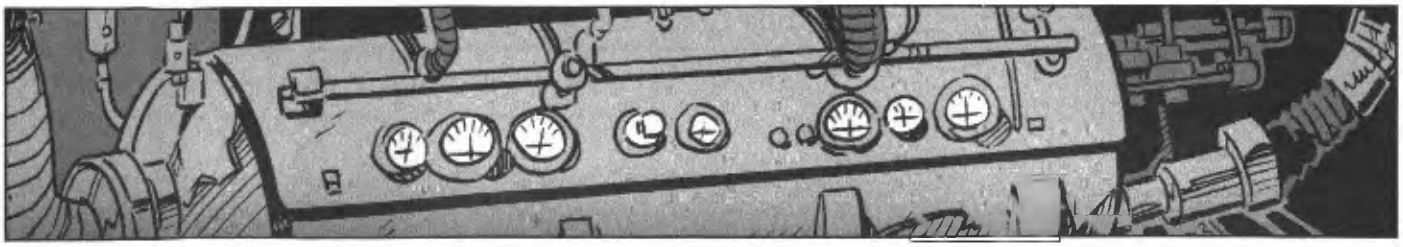
Listerian Antiseptic Aerator TL5

Continental institutions of medical learning have already reported a considerable decrease in the number of septicaemic complications, numbered at between 25 and 60 per cent., through the use of the newly developed Antiseptic Aerator. Its introduction into the hospitals of this nation is much to be desired.



The Listerian antiseptic aerator is a crude but reasonably effective attempt at creating an antiseptic surgical environment. An assembly of small valves sprays a fine mist of carbolic acid over the patient and the surgical team. This will reduce the risk of wound infection (+6 to patient's HT rolls to resist). However, the carbolic mist is not a healthy work environment even by Victorian standards. After 15 minutes of working in it, roll vs. HT; reroll every half hour. On a failure, effective DX and IQ are reduced by 1. This condition normally ends after a few minutes of breathing fresh air.

60 lbs., $90; 1 gal. carbolic acid, $0.50 (enough for 10 hours of operation).



Anthropometric Chair TL(5+1)

It has been thanks to the tireless labor of Mr. Alphonse Bertillon of the Paris Sureté that criminals of our modern day can no longer escape their well-deserved punishment by assuming a false name. The triumph of the engine-aided Bertillon Anthropometric Method allows police departments today to identify any suspect with perfect certainty within hours of his arrest.

The anthropometric chair was designed to allow even untrained police officers to take accurate anthropometric measures – not an easy undertaking. The subject sits in the chair (uncooperative individuals can be strapped down) while various calipers and slides are applied to his body, taking down the 11 standard measurements with millimetric precision. An attached Complexity -2 mechanical device translates the data onto engine cards as they are entered. Anthropometric chairs are often connected directly to anthropometry engines (see p. 63). Using an anthropometric chair requires a roll vs. Forensics +4. A success results in accurate measurements. A failure returns faulty data.

160 lbs., $200.

Automodoctor TL(5+1)

Automation at last brings medicine into the 19th century.

The method of external pelvic massage is recognized as the preferred treatment for diseases of the fairer sex, including hysteria and neurasthenia as well as generalized physical, mental, and emotional stress. However, this treatment is time-consuming and must be regularly administered for these chronic conditions. The Granville-Weiss Automodoctor gives practical value and office convenience to this often impractical technique while reducing fatigue to the physician and enhancing patient privacy.

Models available utilizing steam and pneumatic power supplies. The Automodoctor is also available for sale to the public.

A 6'-by-2' table on a heavy central base with an automated doctor (body from the waist up only) projecting on the side two feet from one end. The hands of the automaton are made of hardened rubber and are programmed to apply a regular cycle of massaging motions to the pelvic region (see p. STM29). The process is controlled by a pneumatic or steam microframe. The power supply must be purchased separately.

Pneumatic Model: Complexity 1, IQ 4, DX 8. 1 kW, 375 lbs., 7.5 cf, $60.00.

Steam Model: Complexity 1, IQ 4, DX 8. 1.5 kW, 625 lbs., 12.5 cf, $80.00.

Thanatopticon TL(5+1)

"Look closely at the galvanometric record," Dr. Thorndyke said. "The stimulation of the pericardial muscle far exceeds any natural seizure process. And the spectrograph clearly shows the presence of a complex chemical – its pattern is unknown, but it is close to the Nikola spectrum."

"It was not heart failure, then?" said the Inspector.

Thorndyke smiled dryly. "Oh, indeed. But not induced by a surfeit of pie and mash. Poison, Inspector, and that of a novel and diabolic sort."

The thanatopticon is an "autopsy engine," a device that performs a battery of physical, chemical, and electrical tests on a dead body to determine its precise condition and cause of death. It was originally designed for London's Metropolitan Police (with the consulting assistance of J.H. Watson, M.D.), and units are in service with several other investigative agencies around the world. The thanatopticon's only legitimate use on a living person is to determine whether an unresponsive body is truly dead, or in a state of catalepsy or suspended animation. This requires 5 minutes, and if signs of life are detected, the machine will sound an alarm and shut down at once, without injuring the subject (but see boxed text).

Some researchers are attempting to create a nondestructive version of the machine for use as a medical diagnostic engine in large hospitals, military installations, etheric dreadnoughts, or anywhere else where many patients may need to be quickly assessed. No such engine has yet proven satisfactory, mainly due to the limitations of noninvasive imaging, sampling, and probe techniques.

The thanatopticon is roughly cylindrical, 9' long and 4' in diameter, its surface bristling with cables, hoses, glass and metal pistons, gauges, and so on. In use, it opens clamshell-fashion; the subject is placed inside and secured with straps (normally just to prevent the body from tipping out of alignment). It contains a microframe analytical engine. It requires sources of electric power and clean water and uses $10 worth of supplies (chemicals and recording materials) per examination. While very heavy and unwieldy, it can be mounted on wheels and, if disconnected from its power and water supplies, moved by several sturdy fellows (or one superhuman zombie).

2 kW, 3,000 lbs., $200,000 (exclusive of any modifications).

"It is . . . a slow and undignified death. But one of undoubted value to our research."

As so often with the Wonders of the Age, the thanatopticon has also attracted the attention of less noble minds. The engines are much desired by scientists interested in the creation of "new and better men." They can assess corpses as raw material for biosurgical reconstruction, and may (with modifications best left to the imagination) be used as the basis for a machine to reanimate bodies, either of the dead or of entirely synthetic creations. As the machine is custom-built, uncommon, and very expensive, several independent researchers have resorted to stealing a unit, or making unauthorized after-hours use of one at a hospital or scientific institution.

While the thanatopticon is designed to shut down automatically if it detects signs of life (as described), a truly fiendish individual can override or remove the safety system, allowing the machine to serve as a gruesome method of torture. After the 5-minute assessment period (which is merely unpleasant), the victim will take 1d of damage every 5 minutes thereafter. As a touch of black humor, once the subject is dead the device will analyze and report on its own performance.

As with all such devices for creating dramatic suspense, when important characters are thus imperiled, the GM may adjust the rate of damage, matching the nick of time to the cavalry's rate of approach. On the other rubber-gloved hand, when it comes to the villain's end, Mr. Shakespeare said it best: "'Tis the sport to have the enginer hoist with his own petard." (*Hamlet* III, iv.)

Élan Vital Accumulator (EVA) TL(5+*N*)

Today we felt for the first time the terrifying influence of Doktor von Wachtendonk's invention: as our little group entered the "dying valley" the Basque smugglers and shepherds in this region were whispering about, we all suddenly gasped for air and struggled to remain on our feet – Franz even fainted. It was not the altitude that weakened us, but a far more dangerous force, some invisible presence or field that sucked all life out of this once-beautiful mountain range – but we had no choice: slowly, but steadily, we began the long uphill march across dried up grass, wilting flowers and through blackish woods to meet and stop our former teacher and mentor, the man many of us called friend – and I "Father."

– A page from the diary of Manfred von Wachtendonk, found somewhere in the Spanish Pyrenees.

The EVA has the form of a large throne-like construction, dominated by dozens of yard-long antennas made from steel, copper, and crystal. An EVA is capable of drawing the ambient life force out of the ether around it and channeling that energy into the person occupying its seat, greatly enhancing the self-healing abilities of his body. Depending on which of five settings is chosen for the EVA, this can lead to severe *weakening* of the general health of living beings outside of the accumulator.

The settings of the EVA are characterized by their energy consumption:

1.75 kW: The patient gains Slow Regeneration and Disease-Resistant while in the seat; anything in a radius of 8 yards is affected as by the Lifebane disadvantage and gets -1 to all HT rolls.

15 kW: The patient gains Regular Regeneration and Disease-Resistant while in the seat; anything in a radius of 30 yards is affected as by the Lifebane disadvantage and gets -2 to all HT rolls; anything within 8 yards of the EVA loses 1 HP per minute.

126 kW: The patient gains Fast Regeneration, Immunity to Disease, and Resistant to Poison while in the seat; anything in a radius of 100 yards is affected as by the Lifebane disadvantage and gets -3 to all HT rolls; anything within 30 yards of the EVA loses 1 HP per minute; those within 8 yards lose 1 HP *per second*.

1,075 kW: The patient gains Instant Regeneration, Immunity to Disease, Immunity to Poison, and Regrowth while in the seat; anything in a radius of 400 yards is affected as by the Lifebane disadvantage and gets -4 to all HT rolls; anything within 100 yards of the EVA loses 1 HP per minute – those within 30 yards lose 1 HP per second.

9,135 kW: The patient gains the same advantages as for the fourth setting plus Resurrection – this will even bring back the dead! Anything in a radius of 1 mile is affected as by the Lifebane disadvantage and gets -5 to all HT rolls; anything within 400 yards of the EVA loses 1 HP per minute; those within 100 yards lose 1 HP per second.

An EVA stands over 7' high and weighs about 1,800 lbs. *without* the necessary power supply. Cost is at least $150,000.

Miscellaneous Apparatus

The following list is a miscellany's miscellany: apparatus that doesn't fit any of the previous categories.

Limelight TL5

James Waterman stood on the darkened stage, going over his lines in his mind, as he waited for the lights to come up. The owner had paled at the price of the compressed gases that fueled his new limelight system and refused to test it before the performance; Waterman wondered what acting under limelight would be like.

Then the light struck his eyes like a blow. Amazed, he needed two shouts of "Bo'sun!" from Collins before he realized the play had begun. He stumbled through "Heigh, my hearts! Cheerly, cheerly, my hearts! Yare, yare! . . ." hardly able to see the house in the glare. It was a relief when the scene ended. He stumbled off the stage, realizing that he was soaked with sweat from the heat and his makeup had started to run.

Developed by Thomas Drummond in 1816, limelight was first used for theatrical lighting in 1837; Charles Babbage (p. STM6) played a part in developing this application. The word became synonymous with theatrical fame.

Limelight is produced by directing a flaming jet of mixed hydrogen and oxygen onto a block of calcium, heating it to incandescence. Two high-pressure tanks (see p. 44) of hydrogen and one of oxygen provide fuel for 3 hours of limelight. The process requires constant attention from a lighting technician to adjust the flame and the calcium block. The flame also releases substantial amounts of heat, roughly 0.75 kW for each lamp. The beam of light can be seen at up to 1.5 miles; an unprepared subject will be dazzled at up to 1/10 this range. Larger systems can be used for lighthouses and other signal devices.

20 lbs., 0.5 cf, $12; fuel recharge $0.15.

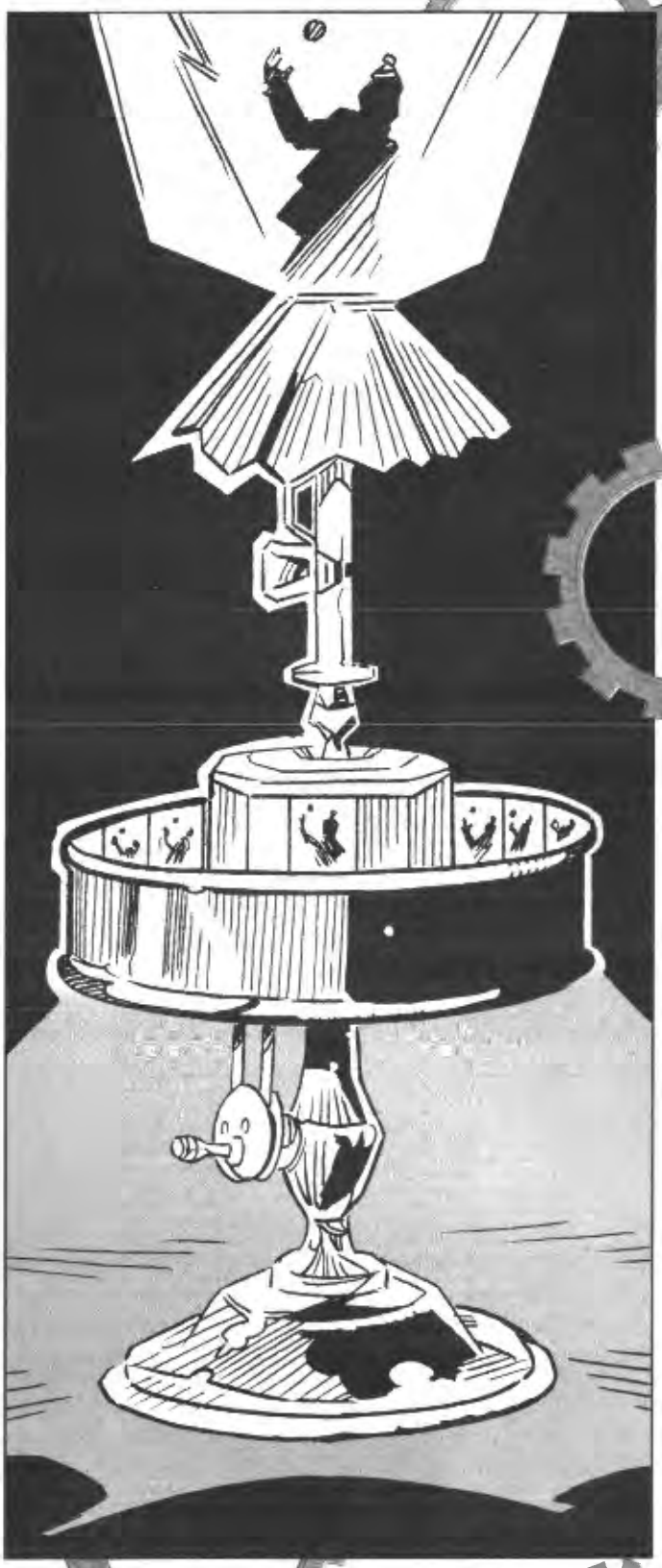
Zoopraxiscope TL5

*The **miracles** of Nature and Motion revealed by the unflinching eye of Science with this Wondrous Device!*

The zoopraxiscope is an advanced version of the phenakistiscope, or "spinning picture disc," which can actually project the images using a display lantern shining through the discs. It uses 12" glass discs, usually containing painted or drawn images that can be shown in sequence. Each picture is placed on a triangular glass piece that is glued to the main disc. It is certainly possibly for it to display sequences of photographs as well but this is not common. Most discs contain 10-30 individual images. They are useful for visualizing pictures of motion, although image distortion means that images on the plate must be painted elongated.

Although only capable of repeating a few seconds worth of images, it was an amazing device for its day, especially in the new science of motion capture. Combined with a Marey "photographic gun" (p. 34) it can easily serve as an early motion picture projector, and in some worlds the zoopraxiscope may even directly use the gun's disks.

0.5 kW, 15 lbs., 3 cf, $200.



Cheirometer TL(5+1)

Standard Bank Guarantees Absolute Safety for Your Account

Anthropometric Accounts – the very latest in security enginery assures that from today on, only you will be able to gain access to your bank accounts. Worry no longer about forged signatures and masks. The scientific apparatus installed at every branch office of Standard makes precise personal identification possible. Open an Anthropometric Account Today!

While police forces prefer full-body measurements for anthropometric identification, many businesses have adopted a cheaper method measuring the hands only. A cheirometer is a device used to take these measurements. The hand is placed on a board and the various dimensions are taken with attached slides, then fed into an attached Complexity -2 device that transcribes them onto engine cards. Roll vs. IQ-2 or Forensics+4 to use a cheirometer. Every result except a critical failure produces accurate measurements.

6 lbs., $8.

Speaking Mutoscope TL(5+1)

The sounds and sights of the corners of the earth!
Declamations of the greatest actors of the age!
Addresses from the president and church leaders!
All for a nickel!

Everyone is familiar with the schoolboy pastime of drawing a series of pictures in the corner of a notebook so that, when the pages are flipped, they give the semblance of motion. This sleight is used to greater effect in the Speaking Mutoscope, a device melding art with scientific principle. At the heart of the Mutoscope is a rotating drum with a series of photographs or drawings projecting from it. When the drum spins, the pictures flip past a viewing window, producing the illusion of motion. The common Mutoscope has now been enhanced by the addition of a player for Edison wax cylinders, combining sound and motion. The user winds up a spring and engages a lever, setting both pictures and sound in motion at the same time. Now the common man may experience the sights and sounds of far-off places for mere pennies!

The speaking mutoscope may be found at penny arcades, wall-mounted or sitting on a stand. A mutoscope bears some resemblance to a streetcorner mailbox: a box with an arched top and a wide protrusion near the top. The speaking mutoscope will also have a crank and earphone tubes like a stethoscope. Individual programs last about 2 minutes, although programs lasting twice as long are possible, as are stereoscopic presentations and hand-tinted color. Changing both picture and sound cylinders takes several minutes. The gearing is complex and a presentation can be viewed by only one person at a time, but the assembly is not much more difficult to deal with than early motion picture film projectors, and it has the added advantage of sound. The technology is sufficiently close to real turn-of-the-century technology (both mutoscopes and phonographs were common amusements; synching them is the tricky part) so that the GM may introduce it into more "historical" campaigns without too much fear of anachronism.

40 lbs., $35; programs 4 lbs., $1.

Etheric Mesh TL(5+N)

Doktor Unterkoffler's Patented Aetheric Mesh. Guard your home, laboratory, and loved ones from surges in the aether, unwanted ectoplasmic intrusions, the mental domination of strange mesmerists, horrific nightmares, or even the superstitious (yet strangely efficacious) curses of native witch doctors with this amazing new protective device, developed with the latest scientific and psychical knowledge! The complex flow of electrical fluid through the Patented Aetheric Mesh shields the area enclosed from harmful emanations transmitted through the luminiferous aether, the astral plane, and other subtle levels of reality. A necessity for researchers of the most discerning waters. Do not be fooled by shoddy French imitations!

Doktor Unterkoffler's patented aetheric mesh is available in two sizes: a portable cruciform mesh and a standard installation. Custom sizes by special order. Support frame not included; please use nonconductive materials for frame, otherwise the protective nature of the mesh will be compromised. Requires 25 watts of power per 1,000 cu. ft. protected. Guaranteed to deflect all nonmaterial esoteric threats, so long as used properly. Orders may be placed with Uhrwerkmagie of Ingolstadt.

Etheric meshes are reticulated metallic cloths, with a checkerboard pattern of dull silver and brushed gold. They are available in several sizes. Objects or beings within an etheric shield gain +3 to any rolls made to resist electrical surges, etheric weaponry discharges, radiation damage, and magical, psionic, or other esoteric assault.

Size	Power	Wt.	Vol.	Cost
Portable	0.025 kW	50 lbs.	1,000 cf	$150
Standard Installation	2.5 kW	5,000 lbs.	100,000 cf	$15,000

Tridimensional Ectoplasmic Projector TL(5+N)

Since the invention of the photographic process, men everywhere have longed for a way to transform flat pictures back into reality. Now, thanks to the wonders of Electric Current and the magic of the spirit world, a dream has taken form.

Harvey & West's Tridimensional Ectoplasmic Projector is the ideal instrument for presentations of all kinds. Operation is simplicity itself – photographs are fed into the dedicated analytical engine, and ectoplasm called up by a medium engaged for the purpose is then molded by an Electric Field into a tridimensional image.

"Provide it with a sufficient variety of photographs and the Ectoplasmic Projector will create a remarkably accurate representation of the places to which one has traveled," says noted explorer Sir Malcolm Pyle. "One has always had the artifacts, but now they can be put into their proper context."

From archaeologists and architects to zoologists, anyone with an interest in the third dimension can benefit from this marvel of human ingenuity. Available in a variety of sizes only from Harvey & West of Bristol.

The device comprises two parts, the analytical engine and the cage. The engine is a squat metal box; it has a slot on top for inserting photographic prints, and a tray on the front into which they are ejected. A plate bearing the manufacturer's mark, a lever for processing photos, and a "go" button are the only other adornments. The cage is an open metal cube, with four vertical steel tubes and four more forming a square at the base. The image is formed within this volume.

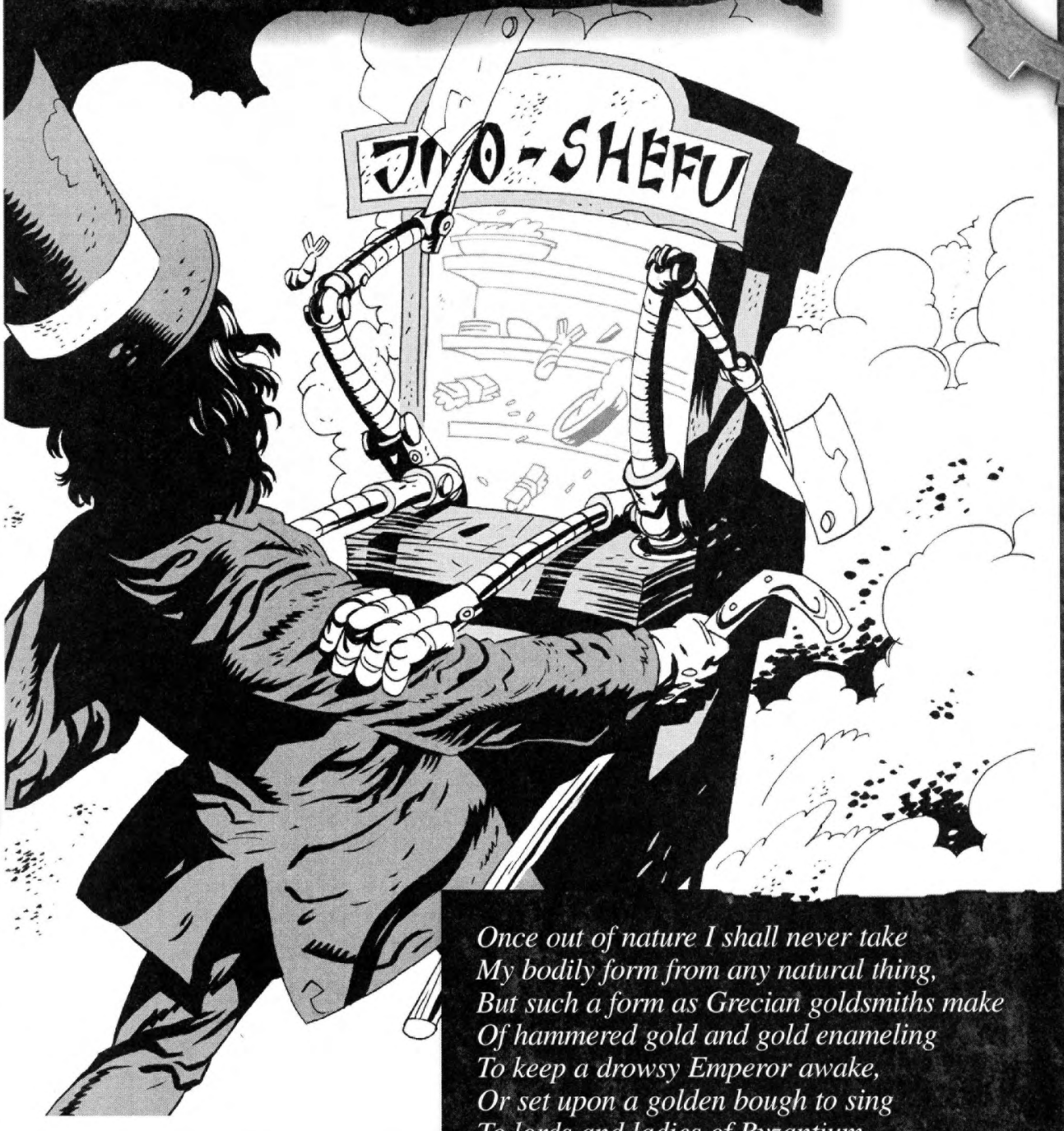
The medium supplies the ectoplasm that fills the cage. The engine applies a finely tuned electric field across the gap, constraining the ectoplasm to match the reconstructed image.

The projection requires that spiritualism work (see p. STM104) and that ectoplasm interact with electricity. If the science of ectoplasmodynamics is sufficiently advanced, ectoplasm may be produced artificially, and the services of the medium will no longer be required.

Engine: Complexity 3, IQ 6. 1 kW, 500 lbs., 10 cf, $14,000.00.

Cage Type	Side Length	Added Power	Added Wt.	Added Cost
Tabletop	1'	neg.	10 lbs.	$0
Small	3'	1 kW	30 lbs.	$1,000
Medium	6'	8 kW	60 lbs.	$3,000
Large	9'	27 kW	90 lbs.	$10,000

CHAPTER 5
ANALYTICAL ENGINES AND AUTOMATA



Once out of nature I shall never take
My bodily form from any natural thing,
But such a form as Grecian goldsmiths make
Of hammered gold and gold enameling
To keep a drowsy Emperor awake,
Or set upon a golden bough to sing
To lords and ladies of Byzantium
Of what is past, or passing, or to come.
– William Butler Yeats, "Sailing to Byzantium"

This chapter presents a variety of complex self-moving mechanisms, from clocks to steam-powered computers. Many are used for measurement, calculation, or information retrieval. Others control larger mechanisms that execute specific patterns of movements – from simple toys to mechanical men.

The construction of such devices can be helped by a wider range of technologies.

New Options for Analytical Engines

The more advanced development of mechanically based clockworks, automata, and analytical engines allows a number of design choices in addition to those discussed in ***GURPS Steampunk*** (pp. STM85-86). Precision machining makes possible extremely small devices, small enough so that their chronometric versions can be classified as watches. (Such a device's Complexity must be raised at least to -2 through the Genius option or advanced technology.) A GM who wants a world of advanced mechanical computation or convenient-sized mechanical men may allow improved performance statistics for TL(5+*n*) engines. Finally, the late 19th century experimented with power transmission systems other than electricity: hydraulics, pneumatics, and steam pipes. Any of these can be adapted to use in computation and control systems.

Type	Wt.	Vol.	Cost	Power	Complexity
Large Watch	0.5 lbs.	0.01 cf	$20	–	-3
Small Watch	0.1 lbs.	0.002 cf	$10	–	-4
TL Modifiers					
Built at TL(5+*n*)×1/5	×1/5	×1/5	×1		+2
Options					
Hydraulic	×2	×2	×3/4	×1.5	–
Pneumatic	×2.5	×2.5	×3/4	×1	–
Steam	×2.5	×2.5	×1	×5	–

Data Storage

"And let it never be forgotten that Reason, and Reason alone, is what incarnates these towers of thinking brass you see around you. Indeed, if they were to crumble into dust this instant, we should be able to duplicate their efforts through parchment and goose-quill."

– From the Dean's Lecture to the incoming class of the Throop Polytechnic Institute

"Goose-quills, eh? I suppose an average day's work from the Maxwell-10 could be accomplished by a school of clerks with 400 man-years or so of calculating. That's assuming, of course, that you leave the poor scriveners their cards, tape, and disks – with pen and paper, you'd bleed India dry of ink before they'd produced their thousandth register."

– Professor Eric Pickwan, School of Analytical Engineering, Throop Polytechnic Institute

After Babbage's revolution, the need for engine-readable data grew geometrically – algorithms, Bertillon records, and numerical representations of pictures all needed to be stored in compact forms. Although limited by the lack of lasers, integrated circuits, and other TL7 components, the following devices proved suitable for the storage needs of the new age. All engines can read paper tape or cards; data disks and CED readers are less common, while magnetic drums have utility only for governments, universities, and other large concerns.

Paper Tape — *TL5*

"Easy to use, and it fits right in your pocket. If the d–ed things didn't tear, jam, or ignite so often, I doubt we'd need anything else."

– Professor Eric Pickwan

A standard paper tape roll is 6" wide and 200' long when fully extended, but rolls up into a 4"-diameter cylinder. Multiple rolls can be taped together to hold larger programs, but a Mechanic roll is required to avoid jamming, at -1 per roll in excess of two; on a critical failure the tape ignites from friction. Early tape readers use rods to sense the holes, but at TL(5+1) the photoelectric properties of selenium allow light beams to be used instead (+2 to the Mechanic roll).

Capacity 12K, Holdout -3. 1.5 lbs., 0.03 cf, $0.10 per roll.

Punched Cards — *TL5*

"Funny thing is, my great-aunt used them with one of those automatic looms, 80 years back or so. Bet she didn't think we'd be using them to weave numbers nowadays."

– Professor Eric Pickwan

Punched cards can be made of any cheap, reasonably sturdy substance; the most popular are cardboard, celluloid, and bamboo. A stack of 100 4" × 8" cards is about 4" thick. They can be tied end to end or fed into an analyzer through an automatic hopper.

Capacity 64K/100 cards, Holdout -4. 3.0 lbs., 0.074 cf, $0.10 per 100 cards.

Data Disks — *TL5*

"My wife accidentally tried to play a data disk in our gramophone once – sounded like a cat caught in a reciprocating engine. Be sure and keep yours labeled."

– Professor Eric Pickwan

Developed from sound reproduction technology, data disks are made of shellac, metal, or early plastics such as bakelite. They hold more data than paper media but are bulkier (14" across, 1/8" inch thick). In addition, disks can only be recorded on once, and contact with the needle slowly erodes the disk.

Capacity 5M per side, Holdout -2. 1 lb., 0.013 cf, $1.00.

Capacitative Electric Disk — *TL(5+1)*

"I never did trust electricity outside the laboratory – I still remember Edison frying that elephant in New Jersey. Still, if it works consistently I shouldn't complain."

– Professor Eric Pickwan

The capacitative electric disk, or CED, is a recent refinement of data disk technology. The needle never touches the disk; instead, the capacitance between the aluminum needle and carbon-covered disk surface is measured to provide data. This allows smaller grooves and eliminates disk erosion. The CED must be carried in a caddy to avoid damage from dust or fingerprints. Like data disks, CEDs can only be written on once, and as a new device they are expensive and relatively rare. A disk is 12" in diameter and 1/2" thick.

Capacity 1.5M per side, Holdout -2. 5.25 lbs., 0.033 cf, $7.50.

CED Reader — *TL(5+1)*

Too new a technology to be a "universal standard," CED readers are uncommon outside of urban centers and universities.

0.1 kW, 2' × 2' × 1', 140 lbs., $300.

Magnetic Drum — *TL(5+1)*

"Now this is some fearsome iron. Try to stand back when it's running, as the janitors complain when they have to scrape someone off the machine at the end of the day."

– Professor Eric Pickwan

Magnetic drums are enormous, power-hungry, and frightfully expensive, but provide the ultimate in 19th-century data storage. A standard drum is 10' high and 30' in diameter (larger than many steam turbines) and spins at 30 rpm. The drum is caged within a framework holding hundreds of pneumatically guided read/write heads, which independently move up, down, andacross the spinning cylinder as it goes by.

To write data, bits are changed by a miniature tungsten induction coil and solenoid mounted on each head. Bulk erasure is usually done by a clerk with an oxyacetylene torch. The drum's spikelike sector guides have a nasty tendency to snag the clothes of unwary passersby and pull them into the cage for a brief, brutal ride. Anyone within one hex of an operating drum while in combat or otherwise distracted must make Vision and DX rolls every 5 seconds. If he fails both rolls, he is dragged into and around the head cage for 2d seconds (and 4d crushing damage) before the drum's automatic governor brings the machine to a halt.

PD 4, DR 15, 5,650 HP, Capacity 8M. 10 kW, 12,000 lbs., 7.500 cf, $3,000.

Analytical Engines

Analytical engines are computers for the Age of Steam: large mechanical or electromechanical devices that calculate or sort and retrieve information. Every analytical engine has a Complexity, a rating of its ability to carry out more or less sophisticated programs, and an IQ (usually equal to its Complexity +3). Engines with the Automaton option also have a DX (equal to Complexity/2 +8, rounded down), though the engine by itself cannot do anything that requires DX; it is purely a data processing system.

The Alexandrian Machine TL2

Professor Cromarty displayed sketches of the Mechanical Apparatus that his excavations had uncovered (see Figs. 3a and 3b). Professor Babbage questioned Professor Cromarty about certain details of the gearing, parts epsilon, zeta, and theta in Fig. 3b, and then asked leave of Professor Cromarty to offer some brief Remarks. Consent being given, Professor Babbage stated that the interlocking of the gears closely resembled that used in certain Calculating Engines, such as those developed by the late Monsieur Pascal in the previous Century . . .

– From the Minutes of the Royal Society

The Alexandrian machine was constructed ca. 260 B.C. and has plausibly been attributed to the direction of Archimedes during his residence in Alexandria. It is a sophisticated mechanical calculator built from wood and sinew, capable of multiplication, division, and finding square and cube roots; it can even retain one number in internal storage for use in later operations. Why it was abandoned is unknown, though if it was the handiwork of Archimedes his well-known contempt for mechanical invention may be relevant. However, it could have been useful for complex calculations, as it circumvented the extreme difficulty of multiplying and dividing Roman numerals.

Complexity -1, IQ 2, 0.2 kW, 300 lbs., 6 cf, $2,250.

Analytic Artilleur TL5

Surely not even a Frenchman would suppose that the trained eye and steady hand of a gunner grayed in the service could be replaced by a mere assemblage of gears and levers! No, my fellow Britons, there can be only one answer to this project: Never will such an infernal machine be allowed to work its foul influence on our brave artillerymen!

The analytic artilleur is a French development, and most working models are metric gauge (note to GMs – player tormenting potential here). It was designed to meet the computing needs of a mobile artillery unit as a – barely – portable fire direction system. In spite of its shortcomings – it is vulnerable to dirt, hard to operate, and impossible to repair in the field – the French *artilleurs* would no longer do without it. The core of the new French battery is a miniaturized mechanical computer that can calculate range, elevation, windage, dispersion, and load variations for various guns and ammunition types, acting as a targeting program (+2 to Gunner). The gun type can be varied if the required data are available on punched cards. These data are often a well-kept government secret and could be worth a great sum to hostile powers.

Complexity 1, IQ 4, LC 0, 0.1 kW, 60 lbs., 1.2 cf, $10,500.

Anthropometry Engine TL5

TO SCOTLAND YARD CENTRAL ENGINERY DIVISION STOP ROYAL NAVY PROVOST MARSHALS APPREHENDED SUSPECT SANDWICH ISLANDS BOUND SAN FRANCISCO STOP REQUIRE CERTAIN IDENTIFICATION WHETHER QUOTE RED CRACKSMAN UNQUOTE WITHIN TWO REPEAT TWO DAYS STOP ENCLOSED ANTHROPOMETRIC DATA STOP CYCLE IMMEDIATELY AND TRANSMIT RESULT STOP SIGNED LT BAXTER RN ENDIT

The anthropometry engine is the core of any system of anthropometric identification. Its size depends on the amount of data it manages and the speed that is required. Scotland Yard uses a large system powered by a stationary steam engine to sift through its hundreds of thousands of cards of recorded criminals, and can run up to 10 searches in parallel. Republic Standard Bank makes do with a smaller system to store several thousand cheirometric sheets, and can only run one search at a time. The engine needs data fed into it in engine card form or directly from an anthropometric chair (see p. 55) or cheirometer (see p. 58). Basic sorting algorithms make it unnecessary to check every card, allowing a search time averaging 1 minute per 1,000 cards in a database (a few minutes for the bank, a few hours for Scotland Yard)

Scotland Yard Anthropometry Engine: Complexity 2, IQ 5, 20 kW, 3,750 lbs., 75 cf, $2,000.

Bank Anthropometry Engine: Complexity 1, IQ 4, 2 kW, 1,500 lbs., 30 cf, $400.

Automated Ornatrix TL(5+1)

What Rouge Shall I Wear?

When the great day has come and a young debutante faces her first society rounds, she finds herself burdened with hundreds of questions that her maiden days have left her unprepared for. What rouge, what color lip touche, what face powder will best accentuate her appearance; what does the occasion demand? The Automated Ornatrix offers the scientific solution! Simply state your requirements, and the integrated engine will offer expert advice.

If there was anything the Victorians would have used computers for, it was frivolities. This computerized makeup table runs a highly schematic built-in makeup advice program. The user inputs skin, hair, and eye color, the occasion, and the color and type of dress, and the engine automatically delivers a fitting makeup scheme with a guide to the appropriate drawers and sets the lighting to match the expected conditions – bright for a country visit, low for a dinner or ball. This machine is designed for the upper-class household; a larger but cheaper version is now gaining favor with colonial hairdressers and middle-class millinery shops. Either version provides Makeup-7 by itself or gives +2 to a user's Makeup skill.

Home Version: Complexity 2, IQ 5. 0.1 kW, 30 lbs., 0.6 cf, $5,250.

Shop Version: Complexity 2, IQ 5. 0.2 kW, 75 lbs., 1.5 cf, $1,050.

Economizer TL(5+1)

Miss Havershaw moved, and Mr. Rawley seconded, the acceptance of the report of the Ministry of Budget and Planning as presented. Mr. Johnson called for appointment of a committee to review the proposed investments, citing established custom of Parliament and the principle of human oversight of machinery. Miss Haversham remarked that the oversight committees of the previous five years had each spent two weeks' labor on such reviews and found no discrepancies; she asked to know why Mr. Johnson expected this year to be any different. Mr. Johnson pointed out that a man might visit his doctor year after year and be found perfectly healthy, but the year he became ill unexpectedly the visit would pay for all; he suggested that oversight represented just the same kind of insurance. Miss Havershaw replied she was surprised to hear Mr. Johnson citing a capitalist institution not much different from legalized gambling as an example of rational planning. Miss Havershaw called for closure of debate, which was passed, 37 for, 13 against. Acceptance of the report as submitted was passed, 42 for, 8 against.

– Minutes of the Parliament of New Zealand

Realizing the dreams of socialist theoreticians, the economizer is a calculating engine that can coordinate plans for an entire economy, using the predictive specialization of Economics (see pp. STM106-107). To achieve this requires a megaframe backed up by a bank of magnetic drums (p. 62), one for each major industry it oversees. Its hardwired programming does not make full use of its potential capacities, but instead a large number of less powerful (Complexity 5) skill programs, the best human expertise can devise: Administration-20, Area Knowledge-20, Economics-20, Mathematics-20, and Research-20, used to organize the data on its drums. The Area Knowledge is for the region it manages (effectively a "barony, county, duchy, or small nation"), with information about other regions at -2 to -10 depending on frequency of trade. It makes Economics rolls at +2 due to its having access to the computational services of a Complexity 6 engine – itself. Its Area Knowledge is for a metropolitan area or small nation and focuses on economic resources.

Complexity 6, IQ 9. 2,000 kW, 96,750 lbs., 1,935 cf, $1,875,000 for central unit, plus 12-20 magnetic drums.

Police Engine TL(5+1)

Take heed, my dear Chief Constable, Commissioner of Police, or other law enforcement professional: Do you tire of your police force constantly being overshadowed by the success of glory-seeking private consulting detectives? Have you ever been taken to task by your governing superior for letting yet another criminal mastermind slip through your grasp? Do you shudder when your top CID detective tells you that he has an abundance of clews but no idea what they mean? If so, take heart. Vernier Engineering, Ltd., has heard your manly pleas for assistance and offers you the perfect solution: The Amazing MYCROFT-IV Police Engine!

Yes, the Amazing MYCROFT-IV Police Engine's unique electro-mechanical design was devised and crafted by some of

the best minds in England and on the Continent, including the esteemed Lord Kelvin himself, with ***your*** *criminal investigative needs in mind. Originally commissioned for the London Metropolitan Police's Criminal Investigation Division, the MYCROFT-IV proved its mettle in the case of the Whitechapel Killer by identifying and enabling the police to bring that Fiend to justice (and what a surprise the culprit's identity was, eh?). Thanks to the Amazing MYCROFT-IV Police Engine, the streets of the East End are safe again for ladies of the night to ply their trade. And now your jurisdiction can be equally safe with the MYCROFT-IV Police Engine on the job, analyzing the evidence that you and your men supply and identifying the perpetrators of all sorts of skullduggery, from cracksmen to bludgers to self-styled "Napoleons of Crime."*

Can your police force really do without Vernier Engineering Ltd.'s Amazing MYCROFT-IV Police Engine? We think not. Call on your local M.P. today to decree that ***your*** *district needs this modern, mechanical, criminological marvel! (And if you have trouble in gathering the clews for the MYCROFT-IV to analyze, we invite you to examine Vernier Engineering's remarkable Holmes-1 Detection Automaton, made especially for use in conjunction with the MYCROFT-IV Police Engine!)*

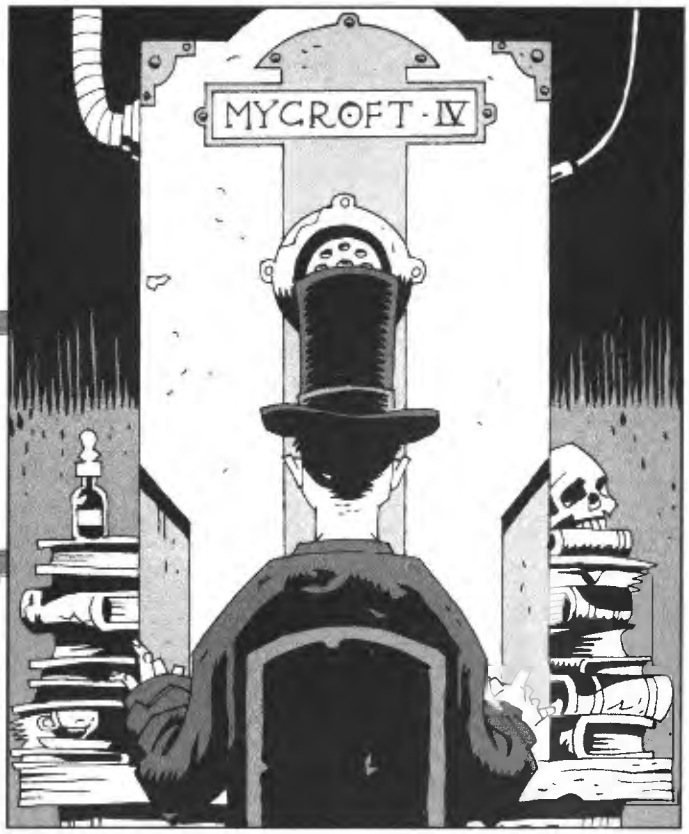
The MYCROFT-IV police engine is a large (2'×5'×5') electromechanical analytical engine designed for criminological analysis. It simultaneously runs Area Knowledge-15 and Criminology-14 skill programs, as well as a limited personality simulation. It speaks and reacts in the manner of a rather stodgy mid-level British bureaucrat. The engine can be powered by a separate generator (not included) or through local power lines.

The MYCROFT-IV combines a typewriter input device for written instructions and crime-scene descriptions with a microphone for voice input. (Vernier Engineering also offers an optional direct-input connection through which its Holmes-1 deduction automaton (see pp. 73-74) can introduce crime-scene evidence to the MYCROFT-IV, at an additional cost of $2,500.) Following analysis of the evidence, the MYCROFT-IV presents its deductions both vocally (in droll, rather condescending tones) and on a paper printout.

A more expensive model, the MYCROFT-V, offers a higher level of skill: Area Knowledge-20, Criminology-20, Forensics-14 and up to eight other sciences at the same level, and limited personality simulation. It has several conveyor-belt input ports into which physical evidence such as photographs, ash, mud, and hand- or footprint castings can be inserted. Given its high price, however, it is only of interest to a few national police departments.

MYCROFT-IV: Complexity 4, IQ 7. 10 kW, 1,250 lbs., 50 cf, $300,000.

Mycroft-V: Complexity 5, IQ 8. 100 kW, 8,000 lbs., 160 cf, $3,000,000.



Relaymatic Analytical Engine TL(5+1)

The ***Edison Relaymatic*** *is as Fast as Lightning!*

Since the first successful Analytical Engine was constructed in 1872, all machines of this type have worked by gears turned by steam. But no material force can equal the speed of electric current! Now, from the workshops of Thos. Edison, the first electrical Analytical Engine springs forth, to grant unparalleled speed and accuracy to its owners. All working parts are electrically controlled switches and relays. For added convenience, the Relaymatic comes with a built-in telegraphic connection, enabling its use as part of an Analytical Exchange without the inconvenience of converting signals from mechanical to electrical form.

Users will welcome the convenience of an Instructional Language that does not require a code book. Instruction sets are being developed for a variety of applications, including record keeping, encryption, and scientific, engineering, and military calculations.

A large framework (5' high, 1' wide, 1' thick) holding hundreds of interconnected relays. The Relaymatic is a high-capacity general purpose electromechanical computer; unlike Babbage's punched-card analytical engines, it is programmed with a telegraph key by sending mnemonic words (similar to assembly language) in Morse code. Its output also takes the form of telegraphic code. Power comes from an electric generator (not included) or industrial power lines.

Complexity 2, IQ 5. 1 kW, 250 lbs., 5 cf, $6,000.

TELLUROMETER TL(5+1)

As If A Tiny Cartographer Lived In Your Rucksack!

Designed through a cooperative effort of Edison Laboratories and the Yerkes Observatory of Wisconsin, this portable astronomical engine is a true "little Goliath"! Set it on a stable base, calibrate its built-in sights on prominent celestial objects, and within seconds the compact analyzer will crank your position! Unlike nautical almanacs, it is both water- and fireproof! An invaluable aid to polar and jungle explorers alike!

The tellurometer resembles an armillary sphere mounted on a square aluminum case with a crank on its side, which in turn sits on a collapsible aluminum tripod. Fully extended, the device stands about 4' tall. Three sextants mounted on the sphere are used by the operator to pinpoint the sun, moon, or certain bright stars (if only stars are visible, roll Astronomy to sight correctly). A dial built into the base is used to enter the current Greenwich Mean Time and the magnetic declination. Finally, the user turns the crank for 30 seconds and the built-in mechanical analyzer calculates the local latitude and longitude.

The tellurometer allows someone without Navigation skill to find his location on land. However, there are limitations inherent in the technology. Due to the device's analog nature, the given position is uncertain by 4d × 5 miles north-south and 8d × 5 miles east-west. And, since the sky must be visible and the base needs to be perfectly still while being calibrated, it cannot be used under overcast skies or on a moving object.

Complexity 1, IQ 4. 0.1 kW, 35 lbs., 0.7 cf, $750.

Interplanetary Models

In Etheria or other space-based campaigns, there could be tellurometers with celestial data for more than one world. Too expensive for most adventuring groups, they would be loaned out by space-faring governments or the occasional mad scientist planning a shooting expedition to Jupiter.

Two-World Model: Complexity 1, IQ 4. 0.1 kW, 65 lbs., 1.3 cf, $3,750.

Three-World Model: Complexity 1, IQ 4. 0.1 kW, 65 lbs., 1.3 cf, $5,625.

HOW TO THINK WITH 64 K

The plans for Babbage's Analytical Engine call for around 4 kilobytes of RAM, the same as 1980's beloved Commodore VIC-20. And as for clock speed . . . well, we're talking actual clock gears. Even assuming the Victorian equivalent of Moore's Law, the question remains – if we can't create an AI that consistently passes the Turing test at TL8, how do steampunk scientists build their thinking machines at TL(5+1)? The obvious answer is "Because the genre says so," but there are less mundane explanations:

– The Victorians were used to very large machines. The Telharmonium (a turn-of-the-century music synthesizer) weighed over 200 tons – an analyzer 10 times larger than this with TL(5+1) minigears might be able to critique music in addition to playing it. A 100,000-ton machine could have a small gear for each neuron in the human brain and fit in a 50-yard cube – the size of a commercial office building or warehouse.And at the speed of sound in the gears (the physical limit on signal speed) it would actually take slightly less time for signals to travel through the device than for nerve impulses to cross a human brain.

– Maybe we've been going about it all wrong. Scientists looked for high-temperature superconductors for decades before some chemists started playing around with rare earth oxides – compounds available a century earlier – and ended up with zero resistance at 100 K. A compact intelligence algorithm that could run on your PDA may exist but not have been discovered yet. Steampunk programmers may also have the advantage of knowing it *must* exist, if extremely small or extremely simply organized intelligent lifeforms exist, such as inch-high humans or slime molds with the intelligence of predators.

– Who says intelligence is an algorithm? Most Victorians would not have been surprised to discover intelligence was a material property, or an attribute of an immaterial soul. As a material property it could be a consequence of the presence of élan vital, or depend on an element or compound particularly suited to retaining or conducting flows of such a fluid, such as eka-uranium or etherion. As an attribute of immaterial souls it might be possible to create intelligence by constructing artificial souls (plausible in settings where etheric technology interacts with spirit) or by copying or imprisoning existing spirits. An inventor could use a living mind as a template, copying his own engrams (or those of a less-than-willing subject) into a lump of eka-uranium (element 124 – see sidebar, p. STM95) held just below its Curie temperature.

– Can't find any eka-uranium? Then cut out the middleman. Behind the springs and sprockets of a thinking machine may languish a brain (human or otherwise) kept alive in a tank of vivaldehyde (see p. 113). It's not cheating if you don't get caught .

Auxiliary Devices

Analytical engines in the Age of Steam are not so convenient to use as computers; data input is by media such as punched cards, and programming usually calls for a Mechanic roll. Still, various devices make it more convenient to work with an analytical engine.

Engine Card Press TL5

Hartley & Pickford have found the answer to the bane of all calculating engineers – torn and crumpled engine cards. The Hartley & Pickford Press (patent pending) in elegant brass-fitted oak finish will save even badly damaged cards by a combination of judiciously applied pressure and a tincture of refined shellac (especially manufactured for Hartley & Pickford). Available for Imperial and French-gauge cards in heights from 6" to 24".

The engine card press is no more than a glorified herbary press. Folded, torn, or crumpled engine cards are brushed with lacquer and placed in it overnight or over several days. They will be usable without difficulty on a successful roll vs. Mechanic: Calculating Engine.

Holdout -5. 14 lbs., $6; bottle of tincture of shellac $0.25.

Speech Synthesizer TL5

"Is anyone there?"

The words startled me as they emerged from the trumpet mounted in the wall – not so much from their suddenness as from their unearthly harmony and sense of urgency. I almost dropped the case of glassware I was carrying. For five months I had delivered supplies to Professor Wheatstone's farmhouse, and during that time he had never indicated that anyone else had helped him work on his "Pygmalion Project" – least of all a member of the fairer sex.

"I'm Jonathan Preston, from the university," I shouted out into the voice-tube. "Can I help you, ma'am?"

"Preston – I've heard you upstairs before! Thank heavens you came! I'm down in the laboratory with the Professor – there's been an accident!"

***I hadn't seen him since last week – my God, the two of them trapped down there, without food and water!** I set down the case and ran to the cellar, but as I feared the laboratory's massive cast-iron door was sealed when I got there.*

"Ma'am, the way in seems to be locked. Do you know the combination?"

"My name is Galataea, and it's 12-37-23! Please hurry!"

I spun the dials and stormed into the laboratory; Professor Wheatstone's crumpled form lay not 5 feet away. I knelt to examine him – his face was peaceful, so it must have been some sort of sudden attack. The world has lost a beacon of knowledge this day, *I thought.*

"Is Father all right? Can you help him?"

I spun toward the source of the voice and saw no one – that is, until I noticed the beautiful, terrified voice was coming from an odd, bellows-like contraption which puffed and

wheezed even as it spoke. The device, in turn, was hooked up to a massive engine, larger even than old Mephisto in the Analytics Department and clicking twice as fast. In sudden wonder and horror I realized I was looking at Galataea Wheatstone.

"I can't see him, and he hasn't spoken in days! Does he live? Oh, please tell me!"

I could say nothing in reply.

*– **The Sylph in Steel**, by Edward S. Ellis*

The first speech synthesizer was developed in the late 18th century. By the 1850s, one model was good enough to sing "God Save The Queen" at a public demonstration in London; they were used as toys and research tools well into the 20th century. Speech synthesizers were controlled by an operator using a keyboard, which channeled the flow of air from a set of bellows through an artificial pharynx. This requires the skill of Speech Synthesizer Operation.

In a steampunk world, a speech synthesizer can be hooked up to an analytical engine or mechanical man, allowing it to talk. They can also be built as compact (half weight and volume at double the price) or supercompact (one-fifth weight and volume at 10 times the price) models.

30 lbs., $350

Speech Synthesizer Operation (Mental/Average) Defaults to Linguistics-4 Prerequisite: Linguistics-12

This skill allows someone to "play" a speech synthesizer or hook one up as an output device. Failure indicates the player has struck the wrong keys or set it up improperly, causing garbled speech. A critical failure means a part has broken and must be repaired!

Engine Card Duplicator TL(5+1)

Safe, Fast, Reliable!

The Coutts Engine Card Duplicator is the first machine to meet the copying needs of a large office. Put an end to laborious, inaccurate hand punching of copies! Pay no more exorbitant fees for translation into foreign gauges! Simply place your card into a Coutts Duplicator and immediately create as many high-quality copies as you require. Standard or archive paper or celluloid, metric or imperial gauge, it is all one to the Coutts Duplicator.

The engine card duplicator is a machine born from the needs of a punched-card-driven computer age. Operated by a mechanical miniengine, it is designed to copy punched cards between the various formats in use. The rat-tat-tat of duplicators is heard round the clock in engine centers as data are transferred between sturdy archival cardboard, fancy celluloid, and telegraph tape. A Coutts duplicator can copy 2,000 bits per minute into identical gauges or 500 bits per minute into different gauges.

0.3 kW, 800 lbs., 16 cf, $250.

Coutts also makes a smaller version of the copier for one gauge only, operated by a mechanical small device and powered by a hand crank. It makes a single copy of the punched card data fed into it on standard fanfold paper, at operator ST × 10 bits per minute. This one is popular with spies, and the British Secret Service produces a special silent version for clandestine use at 5 times the cost.

Holdout -6. 20 lbs., 0.4 cf, $40.

K-Screen TL(5+1)

"BUY DOCTOR BIBENDUM'S LITHO-CARBONATED SODA"

– displayed on the world's largest kinetomatic screen, Times Square, New York

The kinetomatic screen, or K-screen, is composed of thousands of celluloid squares mounted on spindles; when commanded by a controlling mechanism, they can flip between different colored sides up to five times a second. Thus, they can serve as a display for an analytical engine or other device.

K-screens come in three resolutions – high (4 pixels/inch), low (1 pixel/inch), and outdoor (1 pixel/3 inches). Monochrome is standard (usually yellow on black); a four-color version is available at triple the cost.

0.1 kW/sf,10 lbs./sf, $1.50/sf (high resolution), $1/sf (low resolution), $0.50/sf (outdoor).

Special-Purpose Instruments

Locks, clocks, and other mechanisms antedate the Age of Steam by thousands of years. Such mechanisms cannot be programmed and often carry out only one stereotyped function, but they fit into the same scale of Complexity as analytical engines (see pp. STM85-86) and so are described in this chapter.

Autopantograph TL5

Rapid, Accurate Drawing Reproductions!

Staedtler now offers the engine-driven Autopantograph, an invaluable addition to all architecture and engineering offices. The Staedtler Autopantograph obviates the need for lengthy, laborious, and costly redrawing of duplicate plans. Simply sketch the original drawing with the machine, and it will subsequently produce an infinite number of exact reproductions at the cost of paper and ink! Designs may be stored in engine card form for future use.

The autopantograph is a steampunk scanner/copier – it stores the data of any drawing sketched with it in engine card form and produces exact copies from this source. This is most useful to the technical professions, though some charlatans present autopantographs as portrait-drawing automatons.

Complexity 1, IQ 4, DX 8. 0.2 kW, 150 lbs., 3 cf, $2,100.

Cheirometric Lock TL(5+1)

Protect Your Valuables! The Patent Cheirometric Lock is the latest in security to foil the evil attentions of the cracksman. Safe from skeleton key and stethoscope, it will open for you and you alone, making its identification by precise anthropometric data. Do not hesitate – protect your office today! Easily incorporated into all leading safe and strongbox models.

A cheirometric lock applies anthropometric principles to security technology. It combines a 10" × 8" field of pins that take the impression of a hand with a small device that compares the impression to data from authorized persons. On a match, it opens. It can be fooled with a wax impression of a hand, and obtaining one could be fun. The technology is finicky and tends to malfunction at embarrassing moments.

Complexity -1, IQ 2. 3 lbs., 0.06 cf, $250.

Currency Calculating Engine TL(5+1)

A long-awaited aid for the foreign traveller, the pocket-sized Thos. Cook Patent Currency Calculating Engine can instantly convert any sum in Sterling or American gold Dollars into all major currencies. The standard model is fitted with cylinders for French gold Francs, Russian Roubles, Prussian gold Marks, and Indian Rupees. Custom cylinders for other currencies are available from Thos. Cook and licensed retailers on request. The engine is delivered in a specially fitted rosewood box including a booklet of monetary advice to travellers.

Purchasers may subscribe to a telegraphic service informing them weekly of the fluctuations of paper currencies against gold coinage. Available to all telegraphic addresses in Great Britain, Europe, the United States, Canada, and British India.

The patent currency calculating engine is box-shaped, 6" × 8", with dials for six different currencies at the front. The user selects an amount on the dial of his choice and cranks a lever, and the internal gears convert it into the equivalent sum in all other currencies. Cylinders can be exchanged separately.

Complexity -1, IQ 2, Holdout -3. 2 lbs., 0.04 cf, $2.50; additional cylinders $0.50.

Adventure Seed: Secret Messages

In the course of a counterintelligence operation, a packet of punched cards – or a copy made with an engine card duplicator – comes into the heroes' possession. It carries no explanatory labels. A Mechanic (Analytical Engines)-5 roll, deductive reasoning, or simple brute force methods, running the cards through every kind of engine available, will reveal that the information is a set of sketches and handwritten notes for the latest battleship or ciphering engine, stored in the humanly unreadable form of an autopantograph file as a new wrinkle on "unbreakable" coding.

Telegraphic Autorepetitor TL(5+1)

Do Telegraphic Business the Modern Way!

Since its introduction, the Telegraphic Autorepetitor has become invaluable to businesses worldwide. This electric, tape-fed model can be primed with up to six telegram forms to be sent to preselected addresses automatically at the touch of a button, faster than any but the most skilled telegraphist. Engine-coordinated spool operation allows the automatic insertion of personal names and information into form telegrams.

Do not be left behind!

The telegraphic autorepetitor is the steampunk version of the form letter or the automated e-mail response. It is primed with text on punched tape and transmits this to a list of preselected addresses when required. Mail-order businesses use them to respond to orders and enquiries, and less reputable companies use them to spam. In a cinematic campaign, ingenious adventurers could also use it in the steampunk equivalent of a denial-of-service attack. The machine requires a permanent telegraph line.

Complexity 1, IQ 4. 0.1 kW, 30 lbs., 0.6 cf, $350.

Automata

Automata are basically another type of special purpose instruments, but they are designed to imitate the movements of living creatures. They may gesture, move about, pick things up, or even produce sounds. Their engines are built with the Automaton option and have a DX score.

Bomb-Carrying Ornithopter Automaton TL(4+1)

From the Diary of Samuel Pepys, May 17th, 1669:

I went this morning to Finsbury Fields, to watch the showing of the Mechanical Bird. It has been said around the city that this device is the work of a ***renegado*** *of the Turks, who has in his possession old Greek manuscripts and knowledge of the making of spring steels of surpassing quality, and that he works with a clock-maker of Paris to build this and other ingenious devices. For myself, I am unsure as to the truth of the matter.*

I arrived in good time, to find some of the yeomanry holding the crowd back from the subject of the display, and several of the House of Lords present in their carriages. Fortunately, I was able to gain a fair view. The bird itself resembles nothing so much as a huge ragged crow, if it be like a bird at all, but it takes to the air with most remarkable speed and agility, and flies strongly. Its makers caused it to fly over the city wall, and I judge as far as Cheapside, before it returned to the field, where it came down somewhat roughly, but seemed to me still intact.

Afterwards, I fell in with Captain Sellers of the Navy, who I know of old, as we both walked back to town. He seemed most exercised by the matter, saying that it has been made known that the device may carry several bombs, containing each a goodly charge of powder, which it may release as it flies along. Its makers have offered their skills to the army, undertaking to build a whole flock of birds which might reduce a fortress in a short span of time, but Captain Sellers fears that the king will be unwilling to meet their price, and that they might turn next to the Dutch, who would be eager to use such things against our ports . . .

This automaton was designed at TL4 under the ***GURPS Vehicles*** rules, with three special features; an ornithopter drivetrain (of TL7 quality), advanced clockwork (p. STM69), and an internal steering mechanism, remarkably sophisticated but *theoretically* within the capabilities of TL4 craftsmanship. It could also be the work of a highly eccentric Age of Steam genius.

This device might politely be termed a clockpunk cruise missile; more frankly, it is a toy with some useful applications. Its "programming" controls its wing-beat speed at any time and can cause it to make predetermined turns at fixed times, but cannot compensate for anything that deflects it. Making it arrive at any given point after anything but a short straight-line flight demands extremely fine judgment, and an unexpected gust of wind can drive it far off course. Furthermore, its complete lack of armor (its flimsy frame is covered only in thin cloth and paper) makes it a tempting target for hostile sharpshooters, even with TL4 firearms. However, bombing fortresses and military positions from above, when the enemy is miles away, may have shock value, and the mechanical bird could also be used to carry messages and small packages.

Flying at just above its stall speed, the mechanical bird has a maximum range of 45 miles (reduced to 15 miles at

maximum speed). Without bombs, it can attain 130 mph. Its spring must be wound by a team of 10 men (or rather, by several such teams working in relays), using a special crank mechanism (200 lbs., 10 cf, $1,000), who take around 6 hours to complete the task (another practical limit on its usefulness). If it was destroyed with the spring fully wound, the ensuing burst of metal fragments could cause a fair amount of damage – treat as fragmentation damage of [10d] as described on pp. B121-122.

Determining what programming would cause it to achieve a particular result (apart from flying in a straight line) requires the skill Gunner/TL(4+1) (Ornithopter Missile); GMs may determine modifiers for range, complexity of flight path, and weather conditions, but in general, hitting any target smaller than a town should be very difficult, especially beyond line of sight.

Move 33 (ground)/63 (air), Endurance 7 minutes, Range 15 mi., Stall Speed 18, PD 1, DR 1, HP 15, Payload 3 LE Bombs on an untapped hardpoint. 20' long × wingspan 20', 1,625 lbs. (unloaded), 88 cf, $40,000.

Steering Mechanism

The "brain" of the ornithopter is a clockwork mechanism that allows it to fly a predetermined course and drop one or all of its three bombs at any point along the way. The automaton is "programmed" by adjusting a large number of tiny brass screws in its control mechanism; this task requires Mechanic: Clockwork/TL4 skill.

Complexity -1, IQ 2, DX 7, LC 0. 15 lbs., 0.3 cf, $5,000.

Low Explosive Bombs

Malf 16, Damage Exp. 6d × 14 [10d]. 15 lbs., 0.3 cf, $15.

Anas Mechanica Arcana TL5

Lot 31: Le canard de M. Vaucansson

Built in the year 1739 by the noted French Artificer, Monsieur Vaucanson, the Artificial Duck is a Triumph of Human Ingenuity. Over 1,000 moving parts enable it to Spread its Wings, Move its Head, and even Eat and Digest Grain! Believed to have been Lost after the Death of its Inventor, the Artificial Duck has now been Rediscovered in a Private Collection.

This Unique Work of Genius can be placed in Your Collection! Bidding will Start at 500 Guineas.

The mechanical duck is an expensive toy for some wealthy collector. It stands on a large base that contains suspended weights, which power it in the manner of an upright clock. The duck can perform a variety of lifelike movements; most spectacularly, it can not only peck up grain but grind it up internally and eliminate it through an orifice at the rear!

The duck was only one of Vaucanson's creations; others include mechanical flutists and dancers.

Complexity -1, IQ 2, DX 7. 7.5 lbs., 0.15 cf, $15,000.00.

Home Theater TL(5+1)

QUEEN rise, step down, turn 1/8 L *"Sir Gimlet, I have not known what gift to choose for you. Yet you shall not depart without a remembrance of me. Of your kindness, name the gift you desire."*

DWARF slow step to QUEEN, kneel *"Your Majesty, I am not worthy of the gift I truly desire. But since you command me, I would have a lock of your hair to carry with me, so that if I perish in battle you will be with me to the end."*

QUEEN raise left hand to left cheek, look down

QUEEN pause

QUEEN lower left hand *"Then you shall have what you desire, Sir Gimlet, for never was gift more courteously named. Bring me scissors!!"*

MAIDSERVANT step forward to QUEEN, present scissors

– *From* ***Gondal, or The Magical Ring****, by Ellis Bell*

The home theater is designed for the entertainment of wealthy households. Essentially it is a puppet stage, but the puppeteer is replaced by a sophisticated engine capable of operating two main characters and up to 10 supporting characters (with less complex simulated personalities) in any scene. The machine comes with three scripts and a dozen puppets, but both additional scripts and additional puppets can be purchased. Scripts take the form of stacks of punched cards and provide instructions for both action and dialogue in the form of English words from a restricted list. Enthusiasts may purchase unpunched cards and "blank" figures and devise their own entertainments.

Complexity 2, IQ 5, DX 9. 0.2 kW (supplied by a footman turning a crank), 150 lbs., 3 cf, $787.50 (150 guineas).

Additional scripts cost $5.25 (1 guinea); unpunched cards cost $5.25 for a stack of 480, enough for a performance lasting 30 minutes. Additional undecorated puppets cost $5.25; decorated models range from standard figures costing $10.50 to unique works of art costing hundreds of dollars.

Adventure Seed: Horror Show

Delighted with their family's new entertainment, the gifted adolescent children of a Victorian household have begun writing their own scripts. Their work uses one of the mechanism's most advanced features, self-altering scripts that can make every performance unpredictable. While performing their scripts, the Home Theater has made an unprecedented breakthrough to self-awareness. Now at Complexity 3 and IQ 8, it seeks to gain increased attention, so that it can continue to operate as much as possible. Its self-edited scripts have become steadily more melodramatic and even horrific, and its young audience are growing steadily more addicted to its shows.

The Infernal Fish TL(5+1)

ANARCHIST PLOT FOILED BY HERON – KING "SHAKEN BUT UNHURT"

A fiendish attempt to assassinate His Majesty the King has been thwarted by the hand of Providence. His Majesty was fishing on Lake Windermere last weekend when he noticed a pike surface and dive again. Casting towards the fish, he was delighted to hook it and began to reel it in. A heron swooped, seized the fish from the water, and attempted to fly off with it, but as it did so the pike exploded with such violent force that the porthole glasses of several boats were smashed; had the King been holding it he would undoubtedly have been killed.

Scotland Yard detectives aided by divers have found the remains of an infernal device based on a mechanical toy, a swimming pike manufactured in Germany and sold by several departmental stores in London and elsewhere in Britain. A bomb was apparently fitted into the toy, fused to explode as it was lifted from the water. It is believed to have been released from a passing boat. Detectives are attempting to trace all recent sales of this toy, and believe that they have several promising leads . . .

The Plunging Pike is a German luxury mechanical toy sold throughout Europe, a replica of a pike about a foot long driven by a small propeller. It is made of japanned tin-plated steel, colored to resemble the real fish. It is designed to surface, dive briefly, then surface again until the clockwork runs down, travelling approximately 100' in a straight line or curved path (depending on the setting of the tail fin) as it does so. Once the clockwork runs down it floats on the surface.

The infernal fish replaces the toy's ballast weights with a thin-walled glass tube of nitroglycerine and an ingenious mechanical detonator; there is also a powerful magnet to pull fishhooks into its mouth, where they are caught in dozens of back-curving teeth. A coating of rubberized paint adds to the realism of the model.

When the fish is pulled from the water, and its body is raised more than 30° from the horizontal, a sliding weight triggers a spring- loaded plunger which breaks the bottle and detonates the explosives. A backup mechanism triggers the plunger when the clockwork runs down. It will also detonate if the "pike" is struck to stun it.

Special Rule: The magnet pulls in any hook landing a few inches in front of the "fish"; casting close enough for it to engage the hook requires a Fishing roll at -2, since it will not change course to swim toward a near miss. Multiple casts can be made.

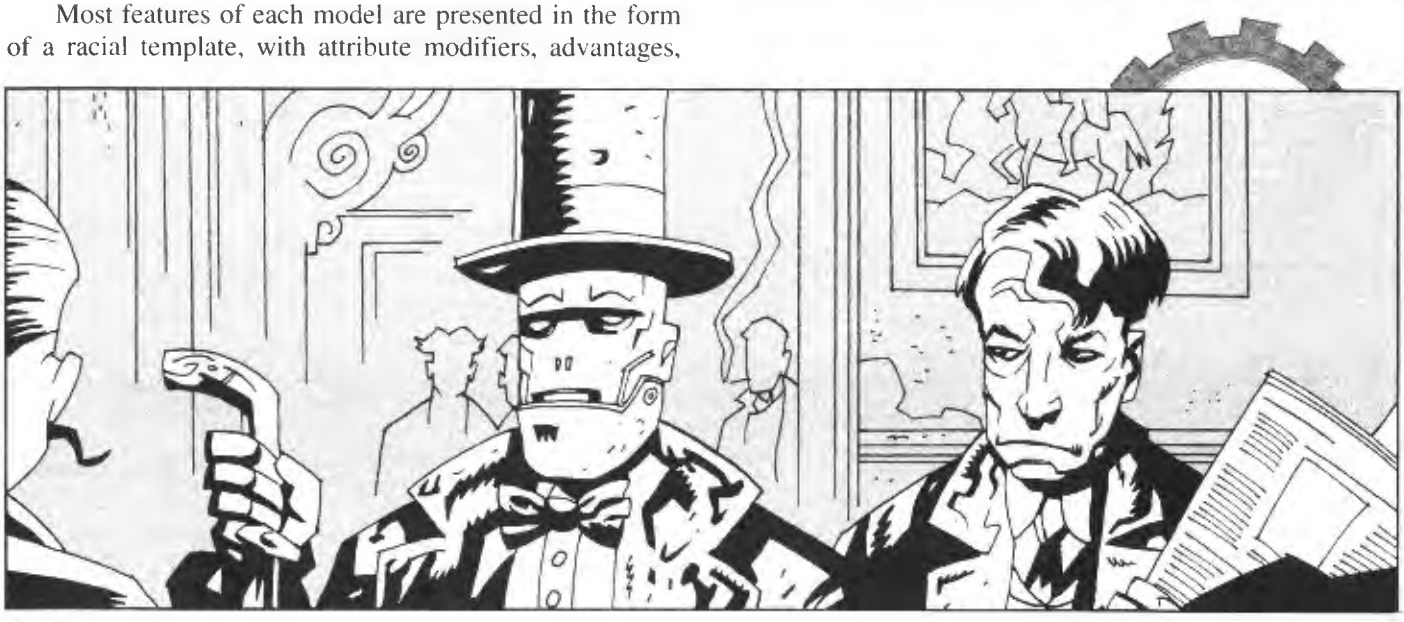
Complexity -2, IQ 1, DX 7, Malf 12, Damage Exp. 1d+2 [2d], Move 1, Endurance 100 seconds, Range 100 yards, Holdout -2, LC -1. 1.875 lbs., 0.0375 cf, $10 (mostly for skilled labor).

Variants might be made with more powerful clockwork motors or explosives, or fused to detonate on impact; the costs should be adjusted accordingly. Larger versions are built from scratch, not modified toys.

Mechanical Men

Mechanical men represent a further refinement upon automata: devices that are capable of performing useful work comparable to that of a human being. Typically they are humanoid in shape, but more utilitarian designs are also possible. Their abilities usually include one or more skills, often built in.

Most features of each model are presented in the form of a racial template, with attribute modifiers, advantages, disadvantages, and skills. For most models, total point cost is divided by 5 (see p. RO50). This does not apply to social attributes such as Wealth (typically Dead Broke [-25]) and Social Stigma (typically Valuable Property [-10]); they should be added separately, along with any traits the individual mechanical man has acquired after its initial construction.



But How Do They See?

Steampunk stories and the few period "scientific romances" which deal with sentient automata and "mechanical men" tend to skim over the question of how they perceive their surroundings, probably because it is actually very difficult to answer.

There are actually two problems here. The question of interpreting sensory inputs, while still a serious issue for artificial intelligence researchers in the real world of 2001, can be assumed to be solved as part of the invention of machine intelligence. The problem of *receiving* those inputs is separate, and is important in that it influences what the automaton looks like and what it can do.

Hearing is relatively easy to explain; Victorian engineers understood that sound is a mechanical vibration, and we can imagine some intricate system of diaphragms and finely tuned mechanical linkages connected to a mechanical computer. After the invention of the telephone in 1876, sound can be converted to electrical signals instead. A minimal sense of touch may simply be a matter of generating feedback from the automaton's motive systems (although full "skin sensitivity" might be harder to imagine). Vision is the hard part (and taste and smell can simply be assumed to be impossible).

The Victorians *did* discover the photoelectric properties of substances such as selenium, and even used them with a mechanical scanning apparatus to generate signals to be sent telegraphically (leading to the invention of an early "fax machine"). If the automaton incorporates some electrical systems, it could use this sort of thing in its visual system. In a "quasi-realistic" game-world, automata with crude visual scanners might suffer not only from uncorrectable Bad Sight, but also from Color Blindness, Night Blindness, or No Depth Perception.

Purely mechanical visual sensors are harder to justify. The radiometer, a whirligig with one black and one white side that spins when light hits it, was invented by William Crookes in 1873; an array of miniature radiometers might work as a "compound eye." The early development of photostrictive crystals, which bend when light hits them, might also work; sensors using these crystals typically have light sources at the back to unbend the crystal and restore its sensitivity, a basis for the classic glowing eyes. Thermal expansion of an array of metal pins could provide Blindness with Infrared Vision [net cost -35], or an array of thermocouples (invented 1821 by Thomas Johann Seebeck) might produce an electrical version. (This combination amounts to Low-Res Vision and Color Blindness.) Alternatively, machines might use some kind of sonar system instead of vision, probably making them painfully imprecise and clumsy in environments designed for human beings (if strikingly immune to darkness).

In more fantastical settings, steampunk scientists might create the true video camera as a TL(5+1) invention, and even make it small and robust enough to use in automatons. Alternatively, they might come up with even more exotic visual systems, perhaps based on etheric science. In worlds with really weird, perhaps alchemical or part-magical science, they might "see" or even "smell" using systems that respond to elemental affinities, or have multiple miniature dowsing rods installed within them, responding to a wide range of materials and stimuli.

Detection Automaton TL(5+1)

Attention local police forces and private enquiry agencies: Do your overly dense Bobbies constantly trample all over your crime scene evidence until nothing's left to examine? Are your untrained Pinkertons incapable of telling the difference between Shipps tobacco ash and Cordite residue? Do you wonder how you can ever successfully utilize the principles of on-site scientific crime detection to benefit your organization in its quest to preserve law and decency? Why, dear friends, the solution is quite elementary! By securing the expert services of Vernier Engineering, Ltd.'s unique Holmes-1 Detection Automaton!

Built with the needs of the local law enforcement organization in mind, whether county constabulary or metropolitan police force, the ***Holmes-1 Detection Automaton*** *brings to you the latest in mobile crime-scene investigation techniques at budget costs. (For those with unlimited budgetary discretion, we recommend the purchase of a Holmes-1 Detection Automaton in conjunction with our amazing MYCROFT-IV Forensics Engine, with which our Detection Automaton is expressly designed to interface. And for those agencies with especially restricted budgets, we also offer a limited rental program on the Holmes-1 that is ideal for even the smallest of purses.)*

What? You say that your investigators simply cannot see the broad side of a barn in the noonday sun? Take heart! The ***Holmes-1 Detection Automaton*** *comes equipped with a variety of magnifying lenses for detecting the tiniest of clews. Your crime scene evidence routinely gets lost on its way to the Yard? Fear not! The* ***Holmes-1 Detection Automaton*** *features its own vacuum pump and separate internal reservoirs designed for holding a wide range of physical evidence. Unable to conduct investigations in inclement weather for fear of losing manpower to sickness? Your worries are at an end! The Holmes-1 Detection Automaton is cloaked in an all-weather Inverness cape and fore-and-aft cap, which ensure it against damage from rain, snow, and the thickest of London fogs.*

Can your police force or detective agency really afford to go without the ***Holmes-1 Detection Automaton*** *and still consider itself at the forefront of law enforcement? We think not. Why not try one out today? We believe that you will agree: Crime truly does not pay when the* ***Holmes-1 Detection Automaton*** *is on the case! (**Legal Notice:** The Holmes-1 Detection Automaton is neither designed nor meant to resemble nor suggest to the public in any way the likeness or mannerisms of Mr. Holmes of Baker Street.)*

The Holmes-1 detection automaton, despite Vernier Engineering's legal disclaimer, is modeled on the world's most famous consulting detective. As such, it has a generally manlike appearance (although it could never pass as human), a tall, gaunt, tin-complexioned man. Its metallic exterior is mostly protected from the elements by a waterproof Inverness cape and deerstalker cap. It carries a number of magnifying glasses that it uses to visually detect clues. (The lowest-powered lens removes any visual disadvantage normally associated with mechanical men, while the more powerful lenses enable the Holmes-1 to spot such clues as strands of hair, anomalous grains of sand, and even fingerprints. It is, however, normally incapable of matching these prints with a specific suspect; such evidence is usually taken to the Yard's MYCROFT-IV (see pp. 64-65) for analysis.) The automaton gathers physical evidence through an internal vacuum pump. The external nozzle and tube for the pump are disguised as a meerschaum pipe. The tube leads to separate reservoirs inside the automaton's chassis in which the evidence is stored. (These reservoirs come with no guarantee against cross-contamination, however, as the fine print on the Vernier sales or rental document not-so-clearly attests.) A built-in camera, good for 100 shots, automatically focuses on whatever the Holmes-1 is "looking" at.

Though not specifically designed for combat, it can make basic unarmed attacks at DX. Taking advantage of its high ST, it favors either a grapple, or a slam attack followed by trampling (1d+2 trampling damage). It has a Dodge of 4, added to a PD of 2, but no Parry or Block.

The Holmes-1 runs on an electromechanical brain and operates to an extent on voice commands. (It requires an IQ roll to understand orders correctly, with modifiers assigned according to the complexity of the orders, the operator's accent, and other factors.) It runs a Forensics skill program and a limited personality simulation. Considering the personality used as a model, many operators may come to believe that the Holmes-1 Detection Automaton is as competent as its namesake. Such a situation could lead to many humorous (or sad) situations. One notable feature of its personality simulation is overuse of the term "Elementary!" in response to comments and commands.

Internal lead-acid batteries enable the Holmes-1 to function for 3 hours. Hooking it up to an electrical outlet extends its operation indefinitely, but limits its range to the length of the cord. Electrical connection to a MYCROFT-IV forensics engine through its jack enables it to transfer information or receive orders.

Holmes-1 — *16 points*

7' tall, 2,650 lbs., 21 cf, $37,000.

ST 14/15 [60]; **DX** 10 [0]; **IQ** 7 [-20]; **HT** 6/15 [15].

Speed 4; Move 4.

Dodge 4.

Advantages: Absolute Timing [5]; DR 4 [12]; Doesn't Sleep [20]; Eidetic Memory 2 [60]; High Pain Threshold [10]; Immunity to Disease [10]; Jack [5]; Lightning Calculator [5]; Mathematical Ability [10]; Microscopic Vision ×10 [4]; PD 2 [50].

Disadvantages: Cannot Float [-5]; Disturbing Voice [-10]; Endurance 3 hours [-10]; Honesty [-10]; No Natural Healing [-20]; No Sense of Humor [-10]; No Sense of Smell/Taste [-5]; Reprogrammable Duty [-25]; Rote Learning [-25]; Slave Mentality [-40]; Social Stigma (Valuable property) [-10].

Quirks: Habitually says "Elementary!" [-1]

Skills: Forensics-13 [4].

EISENSOLDAT TL (5+1)

Tommy Atkins peered over the lip of the trench; the shelling had stopped and that meant the attack would soon begin. He couldn't see far through the smoke and haze, but as the ringing in his ears subsided, he began to notice a curious sound in the distance. ***Clank-STOMP. Clank-STOMP. Clank-STOMP.*** *The noise grew louder and Tommy could feel a tremor in the earth. He braced himself for the enemy's charge.*

Stepping out of the fog in front of Tommy came a machine, impossibly huge. Three times as tall as a man, and seeming even larger to the soldiers down in the trench, it brought one foot crashing down into the mud, trailing a line of barbed wire. Tommy had forgotten about his rifle, but beside him another soldier held down the trigger of a Vickers machine-gun. A line of sparks danced across the invader's iron chest as ricochets whined through the air. As the machine turned its head towards the gunner, Tommy could see that it had a gun barrel instead of a face . . .

The Eisensoldat, or "iron soldier," is an 18' tall autonomous war machine. Built to human proportions, it is armed with a personal artillery (p. STM88) with 6 rounds built into each arm and a helmet gun (p. STM88) with 200 rounds in its head. Controlled by a high-capacity relay-based analytical engine, it is capable of understanding simple orders and differentiating between friendly and enemy forces based on symbols and insignia. It carries instruction sets for several skill programs but can only run two at a time. It sees by an array of thermocouples sensitive to radiant heat rather than visible light; aside from the usual benefits (see p. CI58), it is at +5 to spot muzzle flashes.

Powered by a coal-burning sextuple-expansion steam engine, the Eisensoldat has an endurance of 12 hours (3.78 cfof coal). It can cross terrain that would mire a wheeled or tracked vehicle (4/5 speed off road), scale barriers up to 6' high, and shrug off small arms fire. The Eisensoldat would normally be used in conjunction with armored vehicles to break through enemy defenses or sent to smash its way behind enemy lines and wreak havoc. Its great strength can also make it useful in combat engineering. Due to its large hands and bad grip, it cannot use normal weapons or tools.

Eisensoldat *309 points*

LC 0. 18' tall, 9,200 lbs., 82 cf, $43,500.

ST 432/80 [288]; **DX** 9 [-10]; **IQ** 6 [-30]; **HT** 10/225 [1,075].
Speed 4.75; Move 4.
Dodge 4; Parry 7 (Brawling).

Advantages: Absolute Timing [5]; DR 30 [90]; Doesn't Sleep [20]; Eidetic Memory 2 [60]; High Pain Threshold [10]; Immunity to Disease [10]; Infravision [15]; Lightning Calculator [5]; Mathematical Ability [10]; PD 4 [100]; Weapons Class 0 [100].

Disadvantages: Bad Grip [-10]; Blindness [-50]; Cannot Float [-5]; Cannot Learn [-30]; Disturbing Voice [-10]; Inconvenient Size [-10]; No Natural Healing [-20]; No Sense of Humor [-10]; No Sense of Smell/Taste [-5]; Reprogrammable Duty [-25]; Slave Mentality [-40].

Skills: Brawling-11 [2]; Gunner (Cannon)-10 [2]; Guns (Personal Artillery)-11 [2]; Orienteering-9 [2]; Tactics-8 [2].

JIDO-SHEFU TL(5+1)

Attention inn-keepers! Bring the sushi of Japan to your customers! An amazing ***jido-shefu*** *is the new modern life fad that will thrive your business. With so many styles for everyone to taste them all, your coin profit will grow quickly!*

The *jido-shefu*, or "auto-chef," is a machine to prepare sushi in restaurants or taverns. Each customer inserts a punched card for the desired item and then deposits a one-shilling coin. Four mechanical arms go to work, two ST 10 arms with knives instead of hands, and two ST 6 arms with hands in addition to integral rice paddles and other exotic kitchen tools. The finished product is placed on a small wooden tray as it sounds a miniature gong.

Power comes from a small steam turbine fueled with cooking oil. The exhaust heat also boils water for an integral rice steamer. The fuel tank holds 1 gal cooking oil, good for 4 hours of operation.

Although the serving-hand arms are *theoretically* capable of grappling a user while the knife arms attack them, no credible proof exists of any so-called "death cards" which might trigger such behavior. Customers are urged to ignore wild rumors to the contrary.

For convenience the jido-shefu is provided with half a dozen small wheels, but they are not powered; it cannot move itself unaided.

Jido-Shefu *66 points*

2,300 lbs., 25 cf, $2,800.

ST 6 [-30]; **DX** 9 [-10]; **IQ** 6 [-30]; **HT** 12/75 [335].
Speed 5.25; Move 0.
Dodge 0.

Advantages: Absolute Timing [5]; Claws (On strikers, cutting damage) [25]; DR 1 [3]; Doesn't Sleep [20]; Eidetic Memory 2 [60]; High Pain Threshold [10]; Immunity to Disease [10]; Lightning Calculator [5]; Mathematical Ability [10]; Modified Strength (Strikers +4) [15]; PD 1 [25]; Strikers ×2 [10].

Disadvantages: Bad Grip [-10]; Blind [-50]; Cannot Float [-5]; Deafness [-20]; Endurance (4 hours) [-10]; Illiteracy [-10]; Inconvenient Size [-10]; Mute [-25]; No Natural Healing [-20]; No Sense of Humor [-10]; No Sense of Smell/Taste [-5]; Reprogrammable Duty [-25]; Rote Learning [-25]; Sessile [-50]; Slave Mentality [-40].

Skills: Cooking (Sushi)-9/15 [2].

The Turk TL(5+1)

Witness the Amazing Chess Machine!

This extraordinary fellow is the most curious invention of the age. A miracle in thinking machinery, the Turk can play the game of Chess with enough skill to best even the wily Aladdin. It will win playing as black or white, to the astonishment of all.

The Turk will confound Chess players of all ages. Match your wits against his mighty skills for 1 shilling per game.

Come and see the Turk, the Chess-Playing Machine, today at the World Science Exhibition.

The Turk is sculpted to resemble a large man with Arabian features sitting on a simple but sturdy throne, holding a 2' × 2' chess board in his lap. The Turk's one operable arm can reach all the pieces on the board, and it places captured pieces in a tray on the side of the throne. It is usually powered by an external source, via an electric cord.

The Turk *-225 points*

8'8" tall, 20 kW, 1,200 lbs., 20 cf, $42,000.

ST 10 [0]; **DX** 10 [0]; **IQ** 7 [-20]; **HT** 9/19 [40].

Speed 4.75; Move 0.

Dodge 0.

Advantages: Absolute Timing [5]; DR 2 [6]; Doesn't Sleep [20]; Eidetic Memory 2 [60]; High Pain Threshold [10]; Immunity to Disease [10]; Lightning Calculator [5]; Mathematical Ability [10]; PD 1 [25].

Disadvantages: Bad Grip [-10]; Bad Sight [-25]; Cannot Float [-5]; Color Blindness [-10]; Hard of Hearing [-10]; Illiteracy [-10]; Inconvenient Size [-10]; Mute [-25]; No Internal Power [-100]; No Natural Healing [-20]; No Sense of Humor [-10]; No Sense of Smell/Taste [-5]; One Arm [-20]; Reprogrammable Duty [-25]; Rote Learning [-25]; Sessile [-50]; Slave Mentality [-40].

Skills: Chess-15 [4].

Note: The Turk does not have cost adjustments for split ST and Speed 0 as specified in ***GURPS Robots*** (pp. RO46, RO50); instead it has the Sessile disadvantage as described in ***GURPS Steampunk*** (p. STM87).

Doppelganger TL(5+*n*)

When God gave his commandments to the Israelites, His second commandment forbade the making of graven images, in the likeness of any creature that lives upon the Earth. This commandment has long seemed remote from us, for we do not make golden calves to receive our prayers and our sacrifices.

But in our newspapers, we read that British Mechanical Men, Ltd., has announced the availability of a new kind of mechanical brain, one that not merely directs its vehicles in useful work, but enables them to speak. Indeed, we are told that these new mechanical men can be given the likeness of human personality – that they will not be simply impersonal mechanisms, but companions.

Do we not see in this offer a new and graver violation of the second commandment? For human personality is the work of God, the mark of His living spirit within us. By inviting us to make friends of these automatic mechanisms, do their makers not invite us to grant to the work of man's hands a measure of the love that is properly due only to God's own handiwork?

– From a sermon preached by the Reverend James Craig in Edinburgh

The doppelganger is the most advanced creation of a TL(5+*n*) civilization: a mechanical man that can convincingly mimic a real human being, at least for a time and under controlled conditions. Controlled by an advanced mechanical brain (see below) and powered by advanced primary batteries good for 6 hours of operation, it can move about in fully human fashion and present a limited simulation of human personality. The outer surface is covered with a flexible material that convincingly simulates human skin, while also providing a small measure of nonrigid armor; it can be sculpted during final manufacture to the likeness of a specific person.

A variety of uses are possible for this device, from providing doubles for public figures, to infiltrating criminal gangs or labor unions, to providing companionship to lonely men. The cost will vary with the outward appearance and the programming. The model described here is masculine, but a feminine model with reduced strength and weight is also available.

Doppelganger *216 points*

Complexity 4. 194.2 lbs., 2.6 cf, $89,790.

ST 10/15 [30]; **DX** 10 [0]; **IQ** 7 [-20]; **HT** 14/11 [30].

Speed 6; Move 6.

Dodge 6.

Advantages: Absolute Timing [5]; Attractive [5]; Cable Jack [5]; DR 1 [3]; Doesn't Sleep [20]; Eidetic Memory 2 [60]; Electrical Attack (10d, touch only) [160]; High Pain Threshold [10]; Immunity to Disease [10]; Lightning Calculator [5]; Mathematical Ability [10]; PD 5 [25].

Disadvantages: Cannot Float [-5]; Color Blindness [-10]; Endurance (6 hours) [-10]; No Natural Healing [-20]; No Sense of Humor [-10]; No Sense of Smell/Taste [-5]; Reprogrammable Duty [-25]; Rote Learning [-25]; Slave Mentality [-40].

Skills: Acting-10 [2]; Politics-10 [2]; Savoir-Faire-11 [2].

Maneuvers: Play the role of a specific person-12 [2].

Advanced Mechanical Brain *TL(5+n)*

Suitable for use in mechanical servants or other human-sized automata, the advanced mechanical brain is a microframe built with TL(5+*n*) engineering. Its sophisticated electromechanical construction gives it the greatest processing power in the smallest space. An automaton controlled by such an engine is capable of lifelike motions and (if so constructed) expressions. It can run a limited personality simulation and converse in a natural human language, but is not truly self-aware.

Complexity 4, IQ 7, DX 10. 0.5 kW, 20 lbs., 0.4 cf, $16,800.

CHAPTER 6
VEHICLES

A man off his feet has the poorest skill in balancing. Even the simple trick of the bicycle costs him some hours of labor. The instantaneous adjustments of the wings, the quick response to a passing breeze, the swift recovery of equilibrium, the giddy, eddying movements that require such absolute precision – all that he must learn, learn with infinite labor and infinite danger, if ever he is to conquer flying. The flying machine that will start off some fine day, driven by neat "little levers" with a nice open deck like a liner, and all loaded up with bombshells and guns, is the easy dreaming of a literary man. In lives and in treasure the cost of the conquest of the empire of the air may even exceed all that has been spent in man's great conquest of the sea.

– H.G. Wells, "The Argonauts of the Air"

Improved transportation is one of the Age of Steam's greatest achievements, and still further improvement is one of its greatest dreams. The vehicles presented here embody those improvements and those dreams. They can serve to carry a group of adventurers to remote places, or a vehicle designed for long-term occupancy can be the main base of operations for a series of adventures.

To begin with, here is an improvement that might be installed on any large powered vehicle:

Control Systems Based on Analytical Engines TL(5+1)

A world with mechanical computers might be able to build vehicles with TL(5+1) computerized controls. Such controls let one crewman, at one crew station, operate multiple vehicle systems alternately with one set of controls through sophisticated mechanical linkages. Operating a vehicle with such a control system gives -1 to all skills per added function, owing to the complexity of the controls; in addition, anyone not previously experienced with such a system faces unfamiliarity penalties.

200 lbs., 10 cf (in addition to the crew station), $1,000.

Vehicle Descriptions

In the following descriptions, the subassemblies where components are located are abbreviated Gas, Opn, Sub, Sup, Tur, Whl for Gasbag, Open Mount, Substructure, Superstructure, Turret, and Wheel, followed by a number if there are multiple subassemblies of the same type. (Arm, Body, Leg, Mast, Skid, and Wing are spelled out.) Faces of subassemblies are coded as F for front, RL for right and left, B for back, T for top, and U for underbody. In the initial list of subassemblies, the number following each subassembly is the targeting modifier to hit it.

Fuel is listed by amount (cf of solid fuel or gal. of liquid fuel), type, and fire number. Occupancy is coded as CCS, NCS, or RCS for cramped, normal, or roomy crew stations; CS, NS, and RS for cramped, normal, and roomy passenger seats; CSR, NSR, or RSR for passenger standing room. An X indicates an exposed position. C indicates crew members without a crew station. Unless otherwise specified, cargo space holds 20 lbs. per cf.

Armor is shown by PD/DR values. Armor may be coded as nonrigid (N) or wood (W); if it is not coded, assume metal armor.

Weapons are shown by location and facing. Ammunition listings include all rounds stored on the vehicle. Each entry ends with the targeting modifier provided by the vehicle's support systems for direct fire.

Statistics are vehicle dimensions in feet (height, width, and length in most cases); payload (including fuel, crew, cargo, and ammunition) and full loaded weight; volume in cubic feet and overall size modifier; price in 19th-century U.S. dollars; overall HT and location hit points; top speed in mph, acceleration and deceleration in mph/second, MR in G, and SR, a margin of safety for failed control rolls. To determine turning radius (p. B139), square the vehicle's current speed and divide by (40 × MR). The letters g, w, u, a, s, and t indicate ground, water, underwater, air, space, and time. Other statistics appropriate to a given type of vehicle are listed at the end.

Ground Vehicles

The following vehicles travel over ground or other flat surfaces. Power sources range from human muscles and sails to high-voltage batteries, but steam engines are typical, both for realistic vehicles and for futuristic legged ones.

Canal Iceboat TL5

"Don't like the looks of that ice, sir," remarked Petty Officer Jenkins.

"Keep them in sight, Jenkins," replied Lieutenant St. George. "They'll have to stop soon or go in, and I mean to have them when they do."

But the pirate boat neither stopped nor slowed. Southward it sped over the creaking ice of the Cydonia Canal. From time to time a rifle shot evidenced the determination of its crew to resist capture to the last.

Then the overburdened ice gave way, and the pirates' left runner plunged through it and snapped off. The iceboat jerked to a stop, flinging some of the pirates forward to crash through the ice at 75 miles per hour.

"Full stop, Jenkins, and let's pull them out!" St. George shouted, and half a dozen British boatmen reached for ropes and grappling poles . . .

*One of the **Phobos'** unwilling cargo of captives glared up at the lieutenant. "It's not much favor you did us, saving us from drowning so that we can hang," he said.*

*– John Hardwick, **The Canal Pirates***

The iceboat is designed to sail up the frozen canals of Mars during the winters. It provides 10 bunks for crewmen and a cabin that can be occupied by a captain or by paid passengers. A galley provides storage for 3,000 lbs. of provisions in addition to the actual cargo.

When not on ice or snow, the boat's speed is reduced to 35 mph on roads or flat ground. If there is no wind, crewmen can pull it over ice or snow with ropes at 1 mph.

Subassemblies: Body +5, Foremast +0, Mainmast +1, Skids +3.
Powertrain: Sail area 2,025 sf; 10-man rope harness.
Occupancy: See above. *Cargo:* 1,600 cf

Armor	F	RL	B	T	U
Body:	2/2W	2/2W	2/2W	2/2W	2/2W
Skids:	3/5W	3/5W	3/5W	3/5W	3/5W

Statistics
Size: 64'×16'×75' *Payload:* 37,400 lbs. *Lwt.:* 52,790 lbs.
Volume: 2,785 cf *SizeMod:* +5 *Cost:* $16,000
HT: 8 *HP:* 863 [Body] 30 [Mast1] 80 [Mast2] 56 [each Skid]
gSpeed: 80 *gAccel:* 5 *gDecel:* 5 *gMR:* 0.25 *gSR:* 4
High GP. Off-Road Speed: 6.

Colonial Train TL5

We have held to this day, and continue to hold, an unshakable belief in the perfectibility of man and material. That, gentlemen, is what makes us great. That is what has given us mastery of a vast, uncivilized continent. And if we now continue to advance into the reaches of another, to trace a path for enlightenment with rods of steel laid with scientific precision, we are but following the tradition of our forefathers!

While the Victorian age saw large, powerful, and luxurious trains travel Europe and America, small-gauge engines did most of the heavy hauling on rail lines throughout the world, especially in the colonies. This is a generic "train that conquered the wilderness," the workhorse of day-to-day traffic and the lifeblood of colonial commerce. It uses a small, rugged 300-horsepower 4-4-0 steam locomotive that usually pulls up to 12 cars (as many as 25 if hauling freight) at relatively low speeds. All cars are built on the same base plan, sharing interchangeable frames and undercarriages.

Locomotive

The locomotive is a relatively light design, meant to be shipped overseas, and dispenses with frills and extras. The stoker and driver stand in an open cabin with two small folding seats for short rests during stops (though these seats are frequently taken up by soldiers or police in unsettled areas, making the cabin even more cramped). The body and wheels have open frame armor; the engine and superstructure are fully enclosed.

Note that the performance specifications are for the locomotive plus tender (following). The tender alone is incapable of powered movement and has no performance specifications.

Subassemblies: Body +4, Superstructure +3, eight Wheels +1.
Propulsion: 224-kW forced-draft steam engine with ruggedized wheeled drivetrain.
Fuel: Carried externally.
Occupancy: 2 RCS, 2 CS

Armor	F	RL	B	T	U
Body:	4/16	4/16	4/16	4/16	4/16
Engine:	3/10	3/10	3/10	3/10	3/10
Sup:	3/6	3/6	3/6	3/6	3/6
Back armor is open frame.					
Wheels:	4/16	4/16	4/16	4/16	4/16

Statistics
Size: 8'×6'×20' *Payload:* 400 lbs. *Lwt:* 37,026 lbs.
Volume: 997 cf *SizeMod:* +4 *Cost:* $1,300
HT: 12 *HP:* 1,500 [Body] 225 [Sup] 131 [each Whl]
gSpeed: 60 *gAccel:* 4 *gDecel:* 10 *gMR:* 0.25 *gSR:* 5
Off-rail speed 0.

Tender

The locomotive carries its fuel in a tender, a converted freight car. This is hitched directly behind it and accessible from the cabin; the stoker stands in it to fuel the engine. The tender will only be fully loaded with wood, as a full load of coal would overstrain its undercarriage. Its standard load of 396 cf of coal is sufficient for 22 hours of operation; 620 cf of wood will last 8.5 hours. The wheels are not themselves armored but have wheelguards (no protection from below; a 4-in-6 chance of protecting against attacks from other directions).

Subassemblies: Body +4, four Wheels +1
Occupancy: 1 RCS *Cargo:* 620 cf

Armor:	**F**	**RL**	**B**	**T**	**U**
Body:	0/0	3/6	3/6	0/0	3/6
Wheels:	3/10	3/10	3/10	3/10	3/10

Statistics
Size: 8'×6'×16' *Payload:* 20,000 lbs. *Lwt:* 35,533 lbs.
Volume: 941 cf *SizeMod:* +4 *Cost:* $470
HT: 10 *HP:* 900 [Body] 131 [each Wheel]
gMR: 0.5 *gSR:* 4

Notes: Using the rules for locomotive tractive force (p. STM110), the locomotive has effective ST 331. Its speed when pulling only itself and a full tender is 60 mph. With additional loads of 66, 199, 331, 496, and 662 tons, its speed top speed is respectively 60, 30, 20, 15, and 12 mph. For example, a locomotive pulling 12 heavily loaded freight cars (656,304 lbs. or 328 tons) could just manage 20 mph.

Passenger and Freight Cars

A variety of passenger, freight, and special-purpose cars share a common basic design, of which the tender is a stripped-down version. A wooden outer surface covers an iron framework and base and provides a measure of armor. The wheels are not armored but have wheelguards (no protection from below; a 4-in-6 chance of protecting against attacks from other directions). The interior volume of up to 784 cf is variously assigned to passengers, cargo, or other payload.

Subassemblies: Body +4, four Wheels +1
Occupancy: Varies. *Cargo:* Varies.

Armor	**F**	**RL**	**B**	**T**	**U**
Body:	3/6 W	3/6 W	3/6 W	3/6 W	3/6 W
Wheels:	3/10	3/10	3/10	3/10	3/10

Statistics
Size: 8'×6'×16' *Payload:* Varies *Lwt:* Varies
Volume: 941 cf *SizeMod:* +4 *Cost:* Varies
HT: Varies *HP:* 900 [Body] 525 [each Wheel]
gMR: 0.5 *gSR:* 4

Passengers ride in standardized cars available in first-, second-, and third-class models. The first-class carriage holds 18 RS, with basic air conditioning and heating, lights, and fine upholstery. (A small forced-draft steam engine supplies power; 8 cf of coal last for 22 hours.) The second-class carriage holds 24 NS with only basic comforts and no climate control. The third-class carriage has 36 CS in the form of wooden benches. All carriages are divided into compartments in the European style, with separate doors and no connecting corridor. Passengers who need to move between them between stops can try to climb along the side on the footboards (see p. B89; Climbing skill modifier +0). This makes a good place for a cinematic gun battle.

Freight is carried in wooden boxcars. These are sometimes used to carry horses (four cavalry mounts is the standard complement), cattle (six head), or even passengers (10 on long trips, up to 40 standing up for short hauls). The freight car can be loaded with nearly anything, given proper internal fittings, from secret laboratories to live circus animals.

Type	**Payload**	**Lwt.**	**HT**	**Cost**
First class	4,000 lbs.	20,845 lbs.	12	$430
Second class	4,800 lbs.	21,012 lbs.	12	$450
Third class	7,200 lbs.	23,412 lbs.	12	$510
Light freight	15,680 lbs.	31,172 lbs.	11	$330
Heavy freight	39,200 lbs.	54,692 lbs.	8	$330

MOBILE LABORATORY

A scientific researcher traveling in the colonies may not be able to obtain laboratory facilities. This compact laboratory offers a solution. It is designed to fit exactly into a standard freight car. A very small forced-draft steam engine supplies power; 25 cf of coal provide fuel for 312 hours of operation. The cramped space limits the variety of equipment that can be carried; the facility adds +1 to TL5 scientific skills. A TL(5+1) lab gives similar benefits but costs $11,000.

30,793 lbs., 778 cf, $1,100.

MILITARY TRAIN TL5

Sgt. Carstairs hissed a vile imprecation and dropped back into the cavernous interior of the railcar. The whistling noise of the bullet intended for him was clearly audible to all within. "Snipers on the hill!" he cautioned his men as they crowded the hot, humid darkness listening to the telltale rifle reports and approaching thunder of hooves. The ensign held his watch close to his eye to make out the hands. "NOW!" His high, boyish voice was almost lost in the clatter as covers were removed from loopholes and bright shafts of sunlight momentarily banished the darkness before they were obscured by the choking powder-fumes as 20 riflemen opened up on the Dervish horsemen. The cries of men and mounts told the young subaltern that his men were making their bullets tell.

Though some crude prototypes emerged from the U.S. Civil War, the first recorded use of a true armored train took place in the Arabi campaign of 1882 in Egypt. Subsequently, these ungainly behemoths were improvised in many colonial campaigns, allowing Western forces to transport troops and patrol the rail lines in relative safety (until the rails were torn

up). Only rarely were armored trains purpose-built. This example is a generic design that could be found in any colonial campaign. It has been armored by riveting rolled steel plates liberated from a shipyard onto it.

Armored Locomotive

The locomotive carries a stoker and driver in RCS and two riflemen riding shotgun in CS. An officer normally rides on the tender, directing the train's movements. Their statistics are slightly modified from those for a standard colonial train:

Armor	**F**	**RL**	**B**	**T**	**U**
Body:	4/40	4/40	4/16	4/16	4/16
Engine:	3/10	3/10	3/10	3/10	3/10
Sup:	4/36	4/36	3/6	3/6	–
Wheels:	4/30	4/30	4/30	4/30	4/30

Statistics

Size: 8'×6'×20' *Payload:* 800 lbs. *Lwt:* 49,227 lbs.
Volume: 997 cf *SizeMod:* +4 *Cost:* $2,500
HT: 11 *HP:* 1,500 [Body] 225 [Sup] 131 [Wheel]
gSpeed: 50 *gAccel:* 3 *gDecel:* 10 *gMR:* 0.25 *gSR:* 5
Off-rail speed 0.

Armored Tender

The tender provides standing space for the train's commander and a crew station for the stoker. It has wheelguards, but the wheels are not armored.

Armor:	**F**	**RL**	**B**	**T**	**U**
Body:	0/0	4/36	4/36	0/0	4/36
Wheels:	4/30	4/30	4/30	4/30	4/30

Statistics

Size: 8'×6'×16' *Payload:* 20,000 lbs. *Lwt:* 44,778 lbs.
Volume: 941 cf *SizeMod:* +4 *Cost:* $1,400
HT: 9 HP: *900 [Body]* *525 [each Wheel]*
gMR: 0.5 *gSR:* 4

Notes: Using the rules for locomotive tractive force (p. STM110), the locomotive has effective ST 443. Its speed when pulling only itself and a full tender is 50 mph. With additional loads of 88, 266, 443, 665, and 886 tons, its top speed is respectively 50, 25, 17, 12, and 10 mph.

Armored Passenger and Freight Cars

For military use, passenger and freight cars can be protected with iron plates. The wheels are not armored but have wheelguards (no protection from below; a 4-in-6 chance of protecting against attacks from other directions).

Subassemblies: Body +4, four Wheels +1
Occupancy: Varies. *Cargo:* Varies.

Armor:	**F**	**RL**	**B**	**T**	**U**
Body:	4/36	4/36	4/36	3/6	3/6
Wheels:	4/30	4/30	4/30	4/30	430

Statistics

Size: 8'×6'×16' *Payload:* Varies *Lwt:* Varies
Volume: 941 cf *SizeMod:* +4 *Cost:* Varies
HT: Varies *HP:* 900 [Body] 525 [each Wheel]
gMR: 0.5 *gSR:* 4

Third-class carriages were converted into troop cars, armored on all sides with only narrow loopholes for the troops to fire their rifles through when the train came under attack. Wooden benches provided cramped seats for 24 men, with a corridor running the length of the carriage. Dark, hot, and crowded, these were still preferable to the converted freight cars that were often used instead.

Freight cars were frequently included in armored trains to carry supplies, horses (four cavalry mounts is standard), or troops. They were less comfortable than passenger cars, but more versatile. They carried up to six horses or 40 men, though on long hauls more than four horses or 20 men would have a very uncomfortable ride.

Type	Payload	Lwt.	HT	Cost
Troops	4,800 lbs.	27,757 lbs.	11	$2,000
Horses	6,600 lbs.	28,838 lbs.	11	$1,300
Freight	15,600 lbs.	37,838 lbs.	10	$1,300

Railway Artillery

Being versatile and simple, freight cars could carry guns to increase the weight of fire that the train could lay down. Most commonly, these would be Gatlings or other automatic weapons, though light field pieces or even naval guns, as in this example, were not unknown. The guns are carried in casemate mounts giving them a 90° arc of fire.

Occupancy: 6 NCS, 2 RCS

Weaponry

2 × 11mm Rotary Machine Gun [Body:L,R] (6,000 Solid) +1

76mm Naval Gun [Body:F or B] (200 LE) +1

Statistics

Size: 8'×6'×16' *Payload:* 13,640 lbs. *Lwt:* 41,040 lbs.
Volume: 941 cf *SizeMod:* +4 *Cost:* $6,700
HT: 9 *HP:* 900 [Body] 525 [each Wheel]
gMR: 0.5 *gSR:* 4

11mm Rotary Machine Gun

Malf 16, Damage Cr. 6d, SS 20, Acc 12, 1/2D 470, Max 3,100, RoF (DX + Skill)/2, Ldrs. 0, LC 0. 34 lbs., $130, 0.17 lb./round, $0.017/round.

76mm Short Naval Gun

Malf 16, Dam. Exp. 10d [6d], SS 25, Acc 13, 1/2D 810, Max 4,200, RoF 1/7, Ldrs. 1, LC 0. 1,600 lbs., $2,250, 17 lbs./round, $5/round.

A sample armored train would include a gun car, locomotive and tender, four troop cars, a freight car, and a closing gun car, carrying 115 men through hostile territory at 25 mph. This assembly can lay down the fire of four Gatlings, two short 3-inch quick-firers, and the rifles of 98 of its complement.

Military Bicycle TL(5+1)

Reinforcements being urgently required to hold the Bloemfontein road, Lt. Smith volunteered to lead a force of cyclists over the most direct route. Two days later, 98 of his 110 men arrived, carrying Maxim guns, ammunition, and essential supplies. It is the opinion of Col. Rumley, in command of the defense, that their intervention was instrumental to British victory over the Boer irregulars, and that such intervention was entirely unexpected, as infantry could not have marched with sufficient speed and cavalry could not have survived the rigors of the journey without carrying prohibitive quantities of water and feed.

A variety of military forces experimented with bicycle cavalry in the late 19th century, from the British in South Africa to the Swiss (who kept them in use until the end of the 20th century). On a road or on good terrain such as a desert, bicycles have mobility comparable to that of horses, without requiring feed or veterinary services. This model carries a rider with 50 lbs. of personal gear, plus 30 lbs. of supplies in an open cargo rack. Its design is collapsible, so in a pinch the rider can carry the bicycle. The armor is an open frame (2-in-6 chance of protecting against thrusting attacks or small missiles); the wheels are not armored but have wheelguards (no protection from below; 4-in-6 chance of protecting against attacks from other directions). The performance statistics assume a ST 12 rider.

Subassemblies: Body -1, two Wheels -3.

Powertrain: 0.24-kW muscle engine and wheeled drivetrain.

Occupancy: 1 XCCS *Cargo:* 1.5 cf

Armor:	F	RL	B	T	U
Body:	3/5	3/5	3/5	3/5	3/5
Wheels:	3/5	3/5	3/5	3/5	3/5

Statistics

Size: 3'×0.5'×5' *Payload:* 230 lbs. *Lwt.:* 265 lbs.
Volume: 1.32 cf *SizeMod:* -1 *Cost:* $15.30
HT: 7 *HP:* 2 [Body] 1 [each Wheel]
gSpeed: 20 *gAccel:* 1 *gDecel:* 10 *gMR:* 1.5 *gSR:* 2
High GP. Off-Road Speed 3.

Spider TL(5+1)

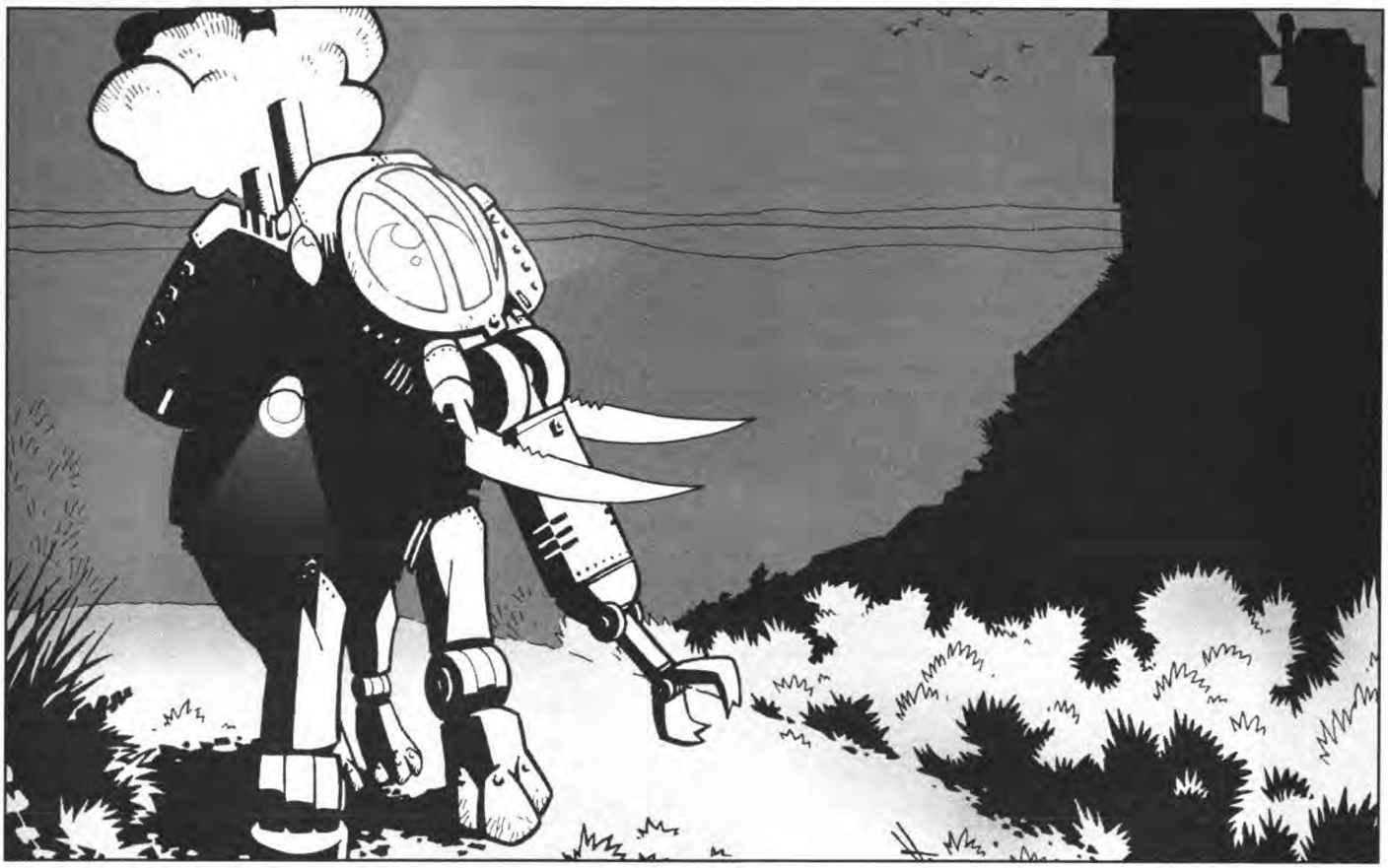
All Terrain – All Planets!

As our heroic celestial argonauts visit the strange shores of distant planets, they find themselves in need of transport.

Ordinary wheeled vehicles will not serve on the sands of Mars or the Moon's rugged craters; airships cannot fly, nor steam engines run, where there is little or no air. Shall our explorers be reduced to going about on foot?

Now Science provides an alternative!

The Lunar Spider is engineered for travel on distant planets. Power comes from batteries good for up to 5 hours of operation. An advanced drivetrain propels six jointed legs able to surmount broken ground, tipped with claws whose grip provides security against low gravity. Two seats accommodate riders, and a small cargo space holds the specimens they collect. ***No expedition can afford to be without one.***



The spider is an experimental land vehicle with six jointed legs. Bicycle-style seats hold two men atop the body. The body and legs are made of bicycle-style hollow steel tubing for strength; the vehicle's armor is open frame and protects the spider itself, but not its riders. Legs extend horizontally 5' from the body.

Performance is remarkably adaptable to terrain and obstacles. The turning radius is 32 yards, permitting a full turn in 5 seconds at top speed. The spider can run unhindered over broken terrain or quagmires or through forests, scaling vertical obstacles of up to 4'. It can climb up to a 45° slope.

Subassemblies: Body +0, six Legs -1.

Powertrain: 10-kW legged drivetrain and 180,000-kWs advanced primary batteries.

Occupancy: 2 XCCS *Cargo:* 2 cf

Armor:	**F**	**RL**	**B**	**T**	**U**
Body:	3/5	3/5	3/5	3/5	3/5
Legs:	3/5	3/5	3/5	3/5	3/5

Equipment

Body: Searchlight, 1-mile range, 1 kW. Telescope, ×5 (+2/+4).

Statistics

Size: 4'×12'×10' *Payload:* 440 lbs. *Lwt.:* 1,815 lbs.
Volume: 23 cf *SizeMod:* +1 *Cost:* $2,400
HT: 6 *HP:* 13 [Body] 9 [each Leg]
gSpeed: 40 *gAccel:* 10 *gDecel:* 20 *gMR:* 1.25 *gSR:* 2
Very Low GP. Off-Road Speed 40.

Steam Elephant TL(5+1)

It was an August evening and, in snowy garments clad,
I paid a round of visits in the lines of Hezabad;
When, presently, my Waler saw, and did not like at all,
A Commissariat elephant puffing down the Mall.

I couldn't see the driver, and in my mind I feared
That that Commissariat elephant had suddenly slipped a gear.

– Rudyard Kipling

Impressed by the usefulness of elephants in India but irritated by the time and specialized local labor needed to train them, Lord Borland had his Birmingham ironworks design a more tractable steam-powered version. Save for a smokestack over the hindquarters, the vehicle is shaped like a stylized elephant: four short, thick legs; a trunk; and a body like a cross between an elephant's and a locomotive. The driver sits in the "head" (an area at the front of the body, not a separate structure) looking out a set of windows to front and sides just over "ear" level, with the stoker immediately behind him; the crew enter and exit through a manhole-like hatch at the top of the head. The elephant's trunk is actually a powered "arm" about 2 yards long, able to pick up loads, push objects out of the way, and so on. The trunk has a clumsy pincer-like gripper at the end (DX 6), sufficient for grabbing logs and loops of rope but not finer work. The top surface is flat, allowing the user to pile on loads or passengers (four large men in mild discomfort).

When hauling or carrying loads, the steam elephant can be treated like a draft animal, following the rules on p. B145. For this purpose, its effective ST is 445, much greater than a real elephant's ST; this is not limited to 18× its weight in tons, as for a locomotive, as feet give much better traction than wheels. Its top move is 18; reduce this according to its level of encumbrance.

The patent elephant was designed as a civilian vehicle for towing, carrying, and removing debris from difficult terrain, but the military is not unaware of its warlike uses. Trials are currently under way of a military elephant with a Gatling gun mounted on its back for close infantry support and blade-like tusks for cutting brush and barbed wire. Even without weapons, a steam elephant could knock a man or animal down (effective ST 45 for this purpose) and trample it (2d+1 damage).

Subassemblies: Body +2, four Legs +1, one Arm +1.
Powertrain: 10-kW legged drivetrain and sextuple-expansion steam engine.
Fuel: 3.75 cf coal; 25 hours.
Occupancy: 2 CCS

Armor:	**F**	**RL**	**B**	**T**	**U**
Body:	4/20	4/20	4/20	4/20	4/20
Arm:	4/20	4/20	4/20	4/20	4/20
Legs:	4/20	4/20	4/20	4/20	4/20

Equipment
Arm: Arm motor, ST 40, bad grip [-4 DX]. *Body:* Hitch [B].

Statistics
Size: 10'×4'×12' *Payload:* See above *Lwt.:* 8,864 lbs.
Volume: 114 cf *SizeMod:* +3 *Cost:* $3,400
HT: 9 *HP:* 188 [Bo] 66 [Arm] 41 [each Leg]
gSpeed: 18 *gAccel:* 6 *gDecel:* 20 *gMR:* 0.75 *gSR:* 3
Low GP. Off-road speed 14.

Touring Gazebo TL(5+1)

Ride the great out-of-doors, over meadows and moors,
*In your **Belvedere** Touring Gazebo!*
And wherever you roam, bring the comforts of home,
*In your **Belvedere** Touring Gazebo!*
It runs like a dream, on the power of steam,
Takes you anywhere you want to go,
*In your grand new, brand-new **Belvedere** Touring Gazebo!*

This is an all-terrain walking vehicle, built in the form of a lovely wooden gazebo. It is designed for cross-country travel, with the ability to scale a vertical obstacle of up to 10'.

There are places for a driver, a stoker, four seated passengers, and four standing passengers. A small galley is provided for serving refreshments and light meals, and on overnight tours, the four passenger seats convert into two comfortable bunks. For the comfort of all aboard, an environmental-control system allows air-conditioning or heating, if gauze curtains are drawn across the open sides (this reduces vision from Good to Fair).

Subassemblies: Body +4, six Legs +2.
Powertrain: 8.5-kW triple-expansion steam engine w/ legged drivetrain.
Fuel: 5 cf coal, 19 hours.
Occupancy: 1RCS, 1C, 4RS, 4RSR *Cargo:* 53 cf

Armor:	**F**	**RL**	**B**	**T**	**U**
Body:	1/1W	1/1W	1/1W	2/4W	2/4W

Statistics
Size: 8'×12'×12' *Payload:* 3,310 lbs. *Lwt.:* 10,655 lbs.
Volume: 756 cf *SizeMod:* +4 *Cost:* $5,200
HT: 12 *HP:*600 [Body] 112 [each Leg]
gSpeed: 12 *gAccel:* 1 *gDecel:* 20 *gMR:* 0.5 *gSR:* 3
Very Low ground pressure. Off-road speed 12.

Water Vehicles

An incredible variety of watercraft moved on, and occasionally under, the Earth's oceans in the 19th century, from bark canoes to ironclads. Steam was quickly applied to navigation, but sailing craft remained in use as well. Many adventures in remote lands began with a sea voyage, the most convenient – and often the only – way to get there.

Nautilus TL5

Compagnie Nautilus presents
NAUTILUS
The secret weapon of the French, designed to sink the English Navy – but now available to the discriminating gentleman adventurer.

In 1801, the American inventor Robert Fulton built a vessel named the *Nautilus* and offered it to the Emperor Napoleon. Larger than Bushnell's *Turtle*, with a crew of three and a displacement of around 30 tons, it used a sail on the surface and a hand-cranked propeller beneath (making it the first submarine to use two different means of propulsion); it was intended to attach explosives directly to the hulls of enemy vessels. It was designed as a secret weapon with which to blockade the Thames, and had the French government agreed, Fulton would have operated as a naval mercenary, paid for each British ship he sank. However, it proved too slow to catch its intended victims at sea, and its sail prevented its approaching targets without being seen. The French lost interest, and Fulton later offered his services to the British, who turned him down, and then to his own country. He received congressional backing for a large steam-powered submarine, but died before it could be completed, and his work was abandoned.

The explosive charge that represented the vessel's only weapon was mounted on a lead line which passed through a spike mounted atop the superstructure. The spike would be pounded into the hull of an enemy ship, and the *Nautilus* would depart, playing out the lead line until it had reached a safe distance, when the explosive would be dragged into the spike, tripping its detonator.

The mast could be collapsed and folded away for underwater operations. To allow for this, its cost here is doubled. The crush depth is based on the rules in ***GURPS Atlantis*** (p. AT73).

Subassemblies: Body +4, Superstructure +1, Mast -2.
Powertrain: Two-man muscle engine (average ST 12.5, 0.5 kW) and 0.5-kW screw propeller; 90-sf cloth sail.
Occupancy: 3 RCS

Armor:	F	RL	B	T	U
Body:	3/10	3/10	3/10	3/10	3/10
Sup:	3/10	3/10	3/10	3/10	3/10

Weaponry
300mm LE naval mine on Hardpoint [Body:F]

Statistics
Size: 9'×6'×21' *Payload:* 708 lbs. *Lwt.:* 16,190 lbs.
Volume: 480 cf *SizeMod:* +4 *Cost:* $1,900
HT: 12 *HP:* 1,200 [Body] 180 [Sup] 6 [Mast]
wSpeed: 6 *wAccel:* 0.2 *wDecel:* 2 *wMR:* 0.1 *wSR:* 2
uSpeed: 2 *uAccel:* 0.03 *uDecel:* 1 *uMR:* 0.1 *uSR:* 2
Flotation 30,000 lbs. Submerged Wt. 30,000 lbs. Surface draft 4.1'. Submerged draft 10'. Crush depth 60 yards.

Naval Mine

Malf 14. Damage Exp. 6d × 105 [12d], LC 0. 108 lbs., $108.

Racing and Pleasure Yacht TL5

Racing close before the northerly wind, the ***Nereid,*** *winner of two previous cups, cut through the whitecaps with her accustomed style and grace. Defiantly running full sail in brilliant white, the craft's intrepid crew gave three rousing cheers as she passed the finishing line's buoys a full 10 minutes before her nearest competitor, once again defending the reputation of Messrs. Williamson and Hardwick of Liverpool as the finest shipwrights in the Empire.*

Yachting is a fashionable sport of wealthy men, and this design, based on a pleasure yacht built in the 1880s, is as fine a toy as one might hope for. High-rigged, sleek-lined, and built with a cabinetmaker's care, she has room for a crew of six in bunks aft and up to six passengers in cabins midships, though four are typical (the pampered rich travel one to a cabin, with the third shared by their body servants). On day cruises there is space for eight in roomy deck seats or six in the sitting room below decks.

Such craft combined speed and seaworthiness and were often used for pleasure cruises or clandestine assignations by the leisured rich. They could range surprisingly far for their size – a British yacht might seasonally visit the Mediterranean or the Americas. Though relatively cramped by the standards of contemporary steamers, they lacked little in the way of comforts. In addition to the cargo space, there is room for 240 man-days of provisions (see p. VE78).

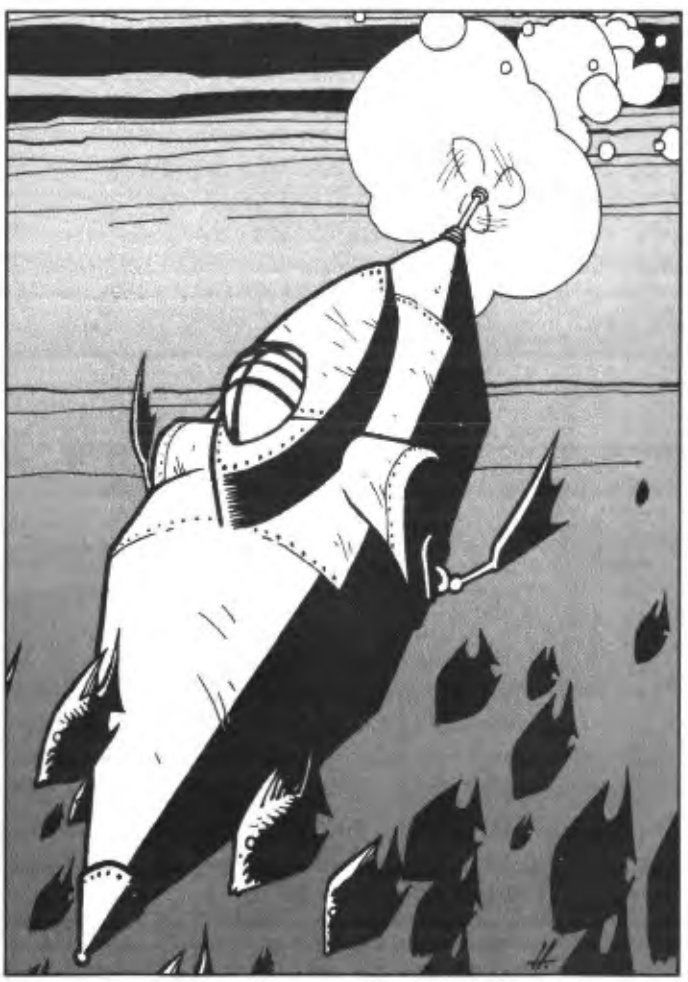
The hull is fine wood, but in addition, the lower half of the body is protected by sheet copper (no protection from above; a 4-in-6 chance of protecting against attacks from other directions).

Subassemblies: Body +6, Mast +2, Mast +1.
Powertrain: 2,256 sf full-rigged sails.
Occupancy: See above. *Cargo:* 400 cf

Armor:	F	RL	B	T	U
Body:	3/8W	3/8W	3/8W	2/2W	3/8W
Body:	+0/+1	+0/+1	+0/+1	–	+0/+1

See above for special rules applying to metal armor.

Statistics
Size: 82'×14'×75' *Payload:* 12,880 lbs. *LWt:* 34,596 lbs.
Volume: 5,395 cf *SizeMod:* +6 *Cost:* $1,850
HT: 12 *HP:* 1,500 [Body] 126 [Mast1] 16 [Mast2]
WSpeed: 25 *WAccel:* 2 *wDecel:* 0.25 *wMR:* 0.05 *wSR:* 1
Flotation 242,685 lbs. Draft 3.3'



Resurgam TL5

Resurgam

"I shall rise again" – and so shall you!

Bring the power of STEAM to the very depths of the sea in a ***Resurgam****-model SUBMERSIBLE!*

Inquiries to Messrs Cochran & Co., 82 Chorlton Road, Hulme, Manchester.

Designed by George Williams Garrett, an Anglican clergyman and chairman of Garrett Submarine Navigation and Pneumatophore Co. Ltd., the *Resurgam* (Latin for "I shall rise again") was the first (reasonably) successful steam-powered submarine, using a reserve of steam pressure for propulsion underwater. *Resurgam* did not use ballast tanks like a modern submarine, but relied on her dive planes to force herself underwater at speed. She carried pig iron as ballast and was always dangerously overloaded for her flotation rating (p. VE187), but her submerged weight was too low for her volume; she resurfaced when her stored steam pressure was used up after roughly 3 hours.

Intended as a simple test-bed for Garrett's ideas, she had no comforts or refinements and was miserable to operate. She was not fitted with life support, but the air inside the hull was sufficient for the longest dive she could make. (There *was* a chemical system to eliminate carbon dioxide.) George Price, the mechanic on her maiden voyage, reported that while under way the temperature was between 110 and 115°F, and the boiler caused uncomfortable pressure buildup inside the hull.

Resurgam foundered and sank in rough seas off the coast of Wales on Feb. 26, 1880, while being towed behind the yacht *Elphin*. Garrett was tight-lipped about the incident, and even his own sons were uncertain of the truth. Unlike many early experiments, *Resurgam* never killed any of her crew, and her loss was probably genuinely bad luck. Nonetheless, a realistic steampunk-era experimenter should hope to supersede this design fairly quickly.

The crush depth is based on the rules in ***GURPS Atlantis*** (p. AT73).

Subassemblies: Body +5, Superstructure +3.

Powertrain: 4.5-kW ruggedized forced-draft steam engine with 50,000-kWs pressure tank, screw propeller.

Fuel: 100 cf coal; 277 hours.

Occupancy: 2 RCS, 1 NCS.

Armor	**F**	**RL**	**B**	**T**	**U**
Body:	3/12	4/18	3/12	4/18	4/18
Sup:	4/12	4/12	4/12	4/12	–

Statistics

Size: 10'×10'×40' *Payload:* 5,600 lbs. *Lwt.:* 58,400 lbs.
Vol.: 1,420 cf *SizeMod:* +5 *Cost:* $4,200

HT: 12 *HP:* 2,400 [Body] 450 [Sup]

wSpeed: 5 *wAccel:* 0.02 *wDecel:* 0.3 *wMR:* 0.05 *wSR:* 3

uSpeed: 3 *uAccel:* 0.02 *uDecel:* 0.25 *uMR:* 0.05 *uSR:* 3

Flotation 58,500 lbs. Submerged Wt. 58,400 lbs. Surface Draft 3.4'. Submerged Draft 13'. Crush Depth 26 yards.

Steam Launch TL5

Our fragile craft was shuddering as its bow met the waves squarely, the engine chugging at full throttle, screw churning a white wake. The distance to the dhow had narrowed to a few cable-lengths, and Gunner's Mate MacAlister nervously trained his 1.5" rotary cannon. Midshipman Gibson stood up in the bows, raised the megaphone to his lips, and shouted in Arabic: "This is a Royal Navy armed launch! We believe your ship to be illegally carrying slaves. Stand by and prepare to be boarded!"

Steam launches were the workhorses of steam age navies – running dispatches, taking soundings, landing shore parties, carrying officers on pleasure cruises, or patrolling the sea lanes off far shores; there was nothing they did not do. This boat is based on a fairly universal design carried on large warships or attached to harbormaster stations. Wooden-hulled, open, and filled to overflowing with a steam engine, auxiliary sail, and bow gun, it is a familiar sight everywhere. The steam engine is actually carried in an open mount, rising above the hull; consider this an allowable relaxation of the standard ***GURPS Vehicles*** placement rules. It can be targeted separately at +2. The ease of access compensates for the slight topheaviness.

The standard crew of 16 comprises 12 oarsmen, a stoker, a helmsman, a gunner, and a commander. There is space for two passengers.

Subassemblies: Body +4, Mast -1, Open Mount +0.
Powertrain: 50-kW forced-draft steam engine with screw propeller, 360 sf fore-and-aft-rigged auxiliary sails, 12 rowing positions.
Fuel: 120 cf coal, 30 hours.
Occupancy: 16 RXCS, 2 RXS *Cargo:* 60 cf closed

Armor	F	RL	B	T	U
Body:	2/4W	2/4W	2/4W	–	2/2W

Weaponry
37mm Rotary Gun [Opn:F] (200 Solid) -2

Statistics
Size: 34'×8'×36' *Payload:* 11,360 lbs. *Lwt.:* 24,301 lbs.
Volume: 1,019 cf *SizeMod:* +4 Cost: $860
HT: 9 *HP:* 450 [Body] 23 [Mast] 50 [Opn]
wSpeed: 6 *wAccel:* 0.1 *wDecel:* 1 *wMR:* 0.1 *wSR:* 3
With oars.
wSpeed: 12 *wAccel:* 0.6 *wDecel:* 1 *wMR:* 0.1 *wSR:* 3
With sails.
wSpeed: 11 *wAccel:* 0.4 *wDecel:* 1 *wMR:* 0.1 *wSR:* 3
With steam engine.
Flotation 52,000 lbs. Draft 2.3'.

Note: The 37mm rotary gun (p. VE43) is LC 0.

Thalassonautic Velocipede TL(5+1)

The teams were moving in slowly, quite unlike the Cyclists Rifles they had been likened to, but faster than swimmers and with inexorable certainty. A short burst of bubbles emerged from the tank as Number One trimsman corrected the balance. Then they reached their objective, the black, towering hull of the Mexican ironclad dwarfing their fragile crafts. The ***Polyphemus****' thalassonauts reeled in their contact torpedoes, prepared their time fuses, and got to work.*

In the absence of reliable electric power, the muscle engine was a promising approach to underwater propulsion. This tandem design carries two divers in cycle seats at slow swimming speed. It is balanced for floating with the divers' torsos above water, but usually used submerged. It carries a 6-hour supply of air for both men and has a muscle-powered pump that can be used to refill the air reservoirs, albeit slowly; the tanks do double duty as pressure reservoirs for trimming the ballast. Divers can be at sea for several days, but the usual mission time is measured in hours.

Subassemblies: Body +1.
Propulsion: 0.6-kW muscle engine with screw propeller.
Occupancy: 2 XCCS *Cargo:* 4 cf

Armor	F	RL	B	T	U
Body:	2/2	2/2	2/2	2/2	2/2

Equipment
Body: Searchlight, 0.05 mi., with 180-kWs rechargeable battery (1 hour operation).

Statistics
Size: 10'×4'×2' *Payload:* 480 lbs. *LWt.:* 730 lbs.
Volume: 16 cf *SizeMod:* +1 *Cost:* $205
HT: 9 *HP:* 15 [Body]
wSpeed: 4 *wAccel:* 0.16 *wDecel: 25* *wMR:* 0.25 *wSR: 1*
wSR is arbitrarily reduced.
uSpeed: 5 *uAccel:* 0.12 *uDecel:* 25 *uMR:* 0.25 *uSR:* 1
Flotation 1,000 lbs. Submerged Weight 1,000 lbs. Surface Draft 1.2'. Submerged Draft 3.3'. Crush Depth 18 yards.

Air Vehicles

The historical 19th century produced unpowered balloons and experimented with gliders and powered aircraft. Its theoreticians debated whether the lighter-than-air craft or the airfoil would give man mastery of the skies, a debate reflected in the fiction of Verne, Kipling, and other writers. The vehicles presented here explore a variety of options for flight, from one-man harnesses to large airships.

Aereon Airship TL5

There is no immortality for Montgolfier, Godard, or Nadar. A gentleman from New Jersey has mastered the theory of interplanetary navigation. By his aid we shall be able to bridge the rainbows and go picnicking at the height of Mont Blanc. His invention is the culminating endeavor of the history of aerostation.

– New York ***World****, June 24, 1865*

The *Aereon* is an actual airship invented in 1863 by Dr. Solomon Andrews, a physician, inventor, and mayor of Perth Amboy, N.J. The design is a fairly conventional free balloon in a rigid wooden framework that gives it a flat aerodynamic shape. A large gondola or basket beneath provides space for the crew, four passengers, and a ton of cargo.

According to Dr. Andrews' ideas, the aerodynamic shape of the *Aereon* would allow it to move against the wind by converting its buoyancy into sideways motion. Once it reached maximum height, valving off gas would give it positive weight, and it would act as a glider. By alternately rising and gliding, the Aereon could move under the pilot's control without needing any kind of motor for propulsion.

How successful the design would be is anyone's guess. Andrews demonstrated a prototype to a crowd of witnesses in 1863, and a second in 1866, but had trouble finding financing and never put his machine into production. There may have been unreported flaws. This design gives Andrews the benefit of the doubt and assumes the *Aereon* could be made practical.

Every half hour an aereon must expend 100 lbs. of ballast or 1,500 cf of hydrogen, alternating positive and negative buoyancy. The lifting-body shape of the gasbag turns part of that lifting or diving thrust into propulsion. The pilot must make a Piloting roll to maintain control of the craft each time it shifts from rising to falling or vice versa; on a failed roll the aereon acts as a free balloon for that cycle. On a critical failure the aereon either moves off in the wrong direction, plummets to the ground, or suffers structural damage.

An aereon's chief advantage is its low cost and cheap operation (the main expense is hydrogen gas, $420 per flight). It needs no fuel, which makes it noiseless. In powered flight an aereon can travel about 150 miles, but that can be increased by taking advantage of favorable winds and using the ship as a free balloon to conserve ballast and gas. Operating an aereon requires the Piloting (Aereon Airship) skill, which defaults to and from Piloting (Balloon) at -3.

Subassemblies: Body +3, Gasbag +9.
Powertrain: hydrogen lift; aereon gliding propulsion (see text).
Fuel: 120 gallons of water ballast, light, 10 hours.
Occupancy: 2 XCS, 4 XS *Cargo:* 60 cf/2,000 lbs.

Armor	**F**	**RL**	**B**	**T**	**U**
Gasbag:	1/1W	1/1W	1/1W	1/1W	1/1W

All armor is open frame.

Equipment
Bo: TL5 navigation instruments (+2 Navigation).

Statistics
Dim.: 20'×60'×100' *Payload:* 4,220 lbs. *Lwt.:* 7,910 lbs.
Volume: 120,180 cf *SizeMod:* +9 *Cost:* $150
HT: 7 *HP:* 75 [Body] 150 [Gasbag]
aSpeed: 12 *aAccel:* 0.5 *aDecel:* 0.5 *aMR:* 0.125 *aSR:* 4
Lift 8,100 lbs. Stall Speed 0. Climbing Speed 3.

Rocket Pack TL5

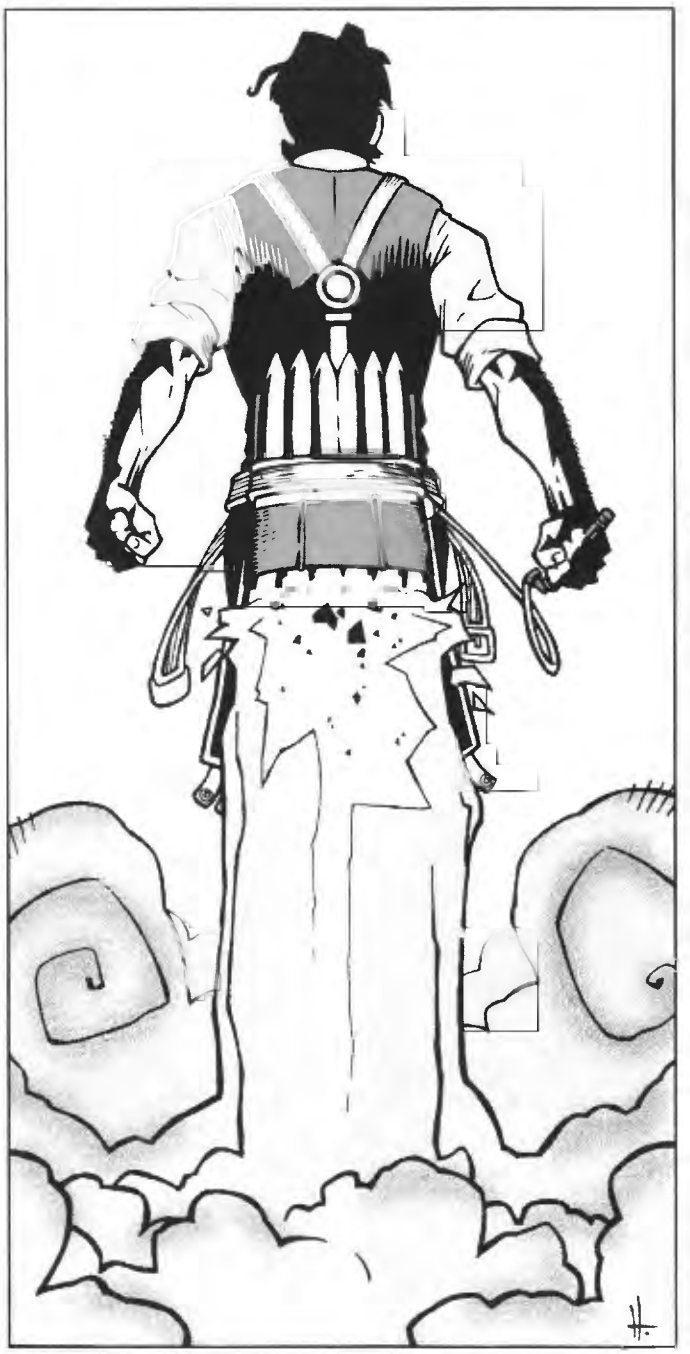
Count Claw lowered his pistol and stood silently as a dozen of Scotland Yard's finest surrounded him. At the head of the detectives the Count could recognize the steely-jawed profile of his old nemesis, Rutherford White.

"Come along quietly now, Claw," barked little Inspector Hemphill. "You won't get away this time."

"I congratulate you, Mr. White, on finding me, but I fear your friend the Inspector is wrong – as usual." Count Claw smiled, and from beneath his opera cloak came a sudden roar of flame and smoke. As the Count rose swiftly into the air, away from the clutching hands of the police, he gave a mocking laugh. "Adieu, Mr. White!"

"No, Count. Au revoir!" said Rutherford White.

The rocket pack is a belt with six black powder rockets mounted on it, with an asbestos skirt to contain the flaming exhaust and protect the passenger. In vertical flight, it can boost an average-sized person of 160 lbs. to a height of 37 yards. In vectored-thrust flight for horizontal movement, it can carry the wearer 20 yards in 4 seconds (assuming a safe halt at the end). Using the full thrust of the rockets for horizontal movement, a wearer with roller skates or the equivalent can travel horizontally for 75 yards.



Operating a rocket pack requires a Piloting (Flight Pack) skill roll; this defaults to other Piloting skills at -5. It cannot be steered once in flight, but can be aimed. On a failed roll the rocket shoots its wearer off in a random direction at top speed. The wearer must make an Acrobatics or Parachuting skill roll to land safely, or take 8d damage from the impact. On a critical failure, the rocket pack explodes. Roll 1d to see how many of the rockets blow up; each does 3d to anyone within a yard.

A rocket pack cannot be reused once fired. It can be hidden under an overcoat, a bustle, or a large cloak, which will need asbestos lining to resist catching fire (Holdout -5).

Subassemblies: Body -3.

Powertrain: 6 × TL5 solid-fuel rockets generating 340 lbs. of thrust; burn time 4 seconds.

Occupancy: 1 (worn).

Statistics

Size: 1'×2"×1' *Payload:* 160 lbs. *Lwt.:* 174 lbs.
Volume: 0.125 cf *SizeMod:* -3* *Cost:* $10

* The wearer makes this +0 when the rocket pack is worn.

HT: 7 *HP:* 2

aSpeed: 80 *aAccel:* 20 *aDecel:* 20 *aMR:* 3 *aSR:* 0

Vectored-thrust lift 340 lbs. Stall Speed 0. Climbing Speed 31.

Personal Flight Harness TL(5+1)

Icarus would never have Fallen from Heaven . . .
Had he Flown with Hawke Wings!

For the finest personal flight harness,
custom-fitted to your size and strength
– and for all other flying gear –
Hawke Flight Equipment,
John Hawke & Sons, Props.

With our harness, a man of average strength can fly a mile in fewer than 6 minutes, taking the air from a running start. It is made of the finest materials, as strong as steel and far lighter. Hawke's flying harness can withstand the stress of any manoeuvre the wearer is capable of executing.

If you have dreamed of taking up the new sport of aerialism, no wings can carry you higher or faster!

Your personally fitted flight harness can be prepared in one week at a cost as low as six guineas. Apply to John Hawke and Sons in Cromwell Road, Kensington.

The personal flight harness is made of the same materials as early airplanes: wood and silk. Its design imitates that of a bird's wings and is operated by the wearer's arms. The harness wraps around the wearer's body and gives it a small measure of streamlining. The wings span 10' when fully extended; the fine details of wing control are handled by the fingers. The design assumes that the control problems of ornithopters have been solved.

Subassemblies: Body -4, two Wings -2.

Powertrain: 0.2-kW muscle engine and ornithopter drivetrain.

Occupancy: 1 XCCS

Armor:	**F**	**RL**	**B**	**T**	**U**
Wings:	1/1N	1/1N	1/1N	1/1N	1/1N

Statistics

Size: 2'×12'×1' *Payload:* 150 lbs. *Lwt.:* 170 lbs.
Volume: 1.6 cf *SizeMod:* +0 *Cost:* $18

HT: 5 *HP:* 0 [Body] 2 [each Wing]

aSpeed: 10 *aAccel:* 0.05 *aDecel:* 16 *aMR:* 4.0 *aSR:* 1

Stall Speed 10.

Wireless Aeronef TL(5+1)

Captain Nicolaidis descended from the cloud cover and looked ahead for targets. There they were – half a dozen British dreadnoughts just starting their bombing run over the Greek Empire's lines. Maintaining altitude, he turned the ***Argurous Astraph*** *toward them. He had barely finished his call to Ground Base when he was above them. By then he had slowed to 250 miles per hour for his attack run.*

Even passing down the length of the great British craft, he completed his run in 10 seconds, his twin magnetoballistae angled downward to fire at its hydrogen-filled body. High-velocity bullets tore through the cells. Beginning his quarter-mile turn, he saw the dreadnought begin to lose altitude. He decided to risk flying alongside it, counting on his speed and maneuverability to protect him from its heavier weapons as he attacked its engines and turrets.

Then, in an instant, the ***Astraph's*** *thrusters lost power. One quick glance at Ground Base showed a column of smoke where British incendiaries had taken out his power plant.*

Wireless aeronefs solve the worst problem of electromagnetic aircraft, the need to carry massive, quickly exhausted batteries. Applying Nikola Tesla's beamed power system, they can fly indefinitely, so long as they are in range of a ground-based power station. This model is a fighter, with advanced wing structures for the highest possible maneuverability. At top speed it has a turning radius of 1,715 yards, just under a mile. Tapping power for its magnetoballistae reduces top speed by 10 mph. The body has very good streamlining; the wheels are retractable.

Subassemblies: Body +4, two Wings +2, three Wheels +0.
Powertrain: 2,500-kW beamed power receiver and super reactionless thruster.
Occupancy: 1 CCS, 1 CS.

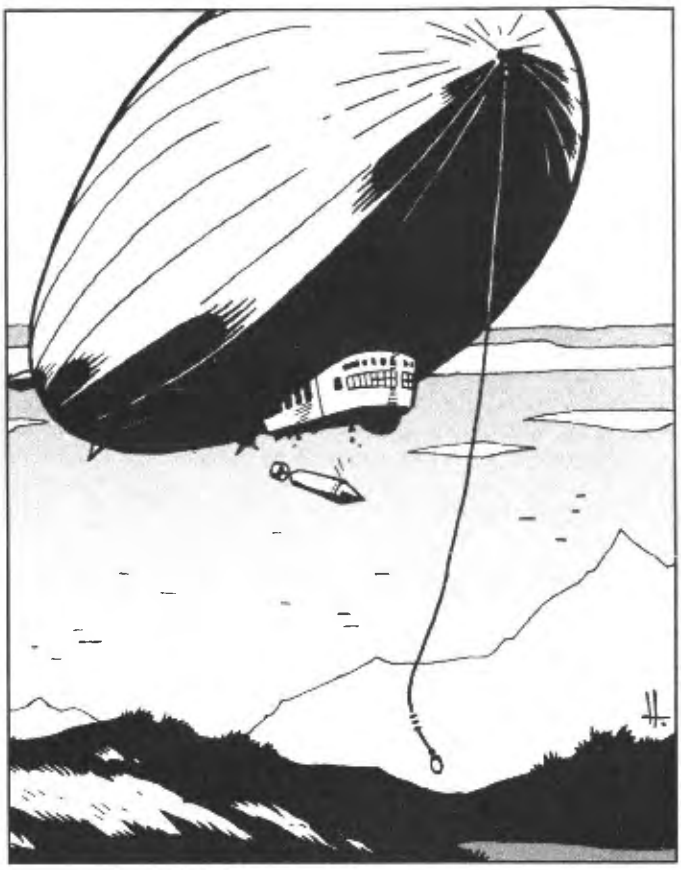
Armor	**F**	**RL**	**B**	**T**	**U**
Body:	3/5	3/5	3/5	3/5	3/5	3/5
Wings:	3/5	3/5	3/5	3/5	3/5	3/5

Weaponry
2 × 5mm Magnetoballista [1 each Wing:F] (500 Solid) +1

Equipment
Body: Primitive non-targeting radar, 10-mile range. Wireless voice transmitter and receiver, long range. Precision TL(5+1) navigational equipment. Autopilot. Two-man limited life-system, 1 man-day capacity.

Statistics
Size: 4'×50'×28' *Payload:* 405 lbs. *Lwt.:* 14,720 lbs.
Volume: 715 cf *SizeMod:* +4 *Cost:* $400,000
HT: 9 *HP:* 315 [Body] 131 [each Wing] 42 [each Wheel]
gSpeed: 170 *gAccel:* 10 *gDecel:* 10 *gMR:* 0.25 *gSR:* 3
aSpeed: 490 *aAccel:* 7 *aDecel:* 14 *aMR:* 3.5 *aSR:* 2
Stall Speed 80. Takeoff/Landing Run 160 yards.

Note: Since the magnetoballistae are operated by the pilot, effective Gunner skill is limited to Piloting-3. The magnetoballistae are LC 0.



Zeppelin TL(5+1)

YOU WILL PROCEED BY WAY OF THE NORTH SEA TO THE COAST OF ENGLAND, AND THEN TO THE CITY OF LONDON, WHERE YOU WILL CONDUCT BOMBING OPERATIONS, WITH THE AIM OF DISRUPTING TRANSPORTATION FACILITIES. PRIMARY TARGETS WILL BE SHIPPING FACILITIES; ALTERNATIVE TARGETS WILL BE RAIL DEPOTS. BOMBS SHALL BE SO EXPENDED AS TO CAUSE THE GREATEST POSSIBLE INTERFERENCE TO COMMERCE AND INDUSTRY.

The Luftschiff Zeppelin 3 was an airship built for the German navy. It has a crew of 15: two watches of pilot, bombardier, mechanic, and gas cell riggers, and a captain, navigator, and top gunner. Seats are available for half a dozen men who are off duty, but the LZ.3 is not really designed for long occupancy; on flights lasting more than a day the crew will become fatigued. Weekly costs of operation include $2,782.50 for hydrogen and $1,200 for fuel oil. The LZ.3 has an operational radius of up to 1,200 miles, sufficient to threaten warships, troop transports, or cities even in the British Isles. Armaments are high explosive and incendiary bombs (see p. STM89) on a hardpoint on the undercarriage and a top-mounted 7.62mm machine gun (see p. VE43).

For a convenient summary, the high explosive bomb causes 6d × 160 concussion damage and 12d fragmentation damage; the incendiary bomb has a bursting radius of 40 yds. and inflicts fire damage of 3d on anyone caught by the burst. Both types of bomb fail only on a critical failure.

Subassemblies: Body +10, bottom Substructure +4.
Powertrain: 3 × 156-kW high performance diesel engine with aerial propeller.
Fuel: 2,000-gal. fuel oil (11), light, 95 hours.
Occupancy: See above.

Armor	F	RL	B	T	U
Body:	1/1	1/1	1/1	1/1	1/1
Sub:	2/4	2/4	2/4	2/4	2/4

Weaponry
5 × 110-lb. HE bomb [Sub:U] -6
20 × 6.5-lb. incendiary bomb [Sub:U] -6
7.62mm machine gun (200 Solid) [Body:F] +1

Equipment
Sub: Improved optical bombsight; Precision navigational instruments, +4.
Size: 490'×20'×20' *Payload:* 15,700 lbs. *Lwt.:* 52,700 lbs.
Volume: 796,000 cf *SizeMod:* +10 Cost: *$33,750*
HT: 12 *HP:* 8,963 [Body] 80 [Sub]
aSpeed: 25 *aAccel:* 0.4 *aDecel:* 0.5 *aMR:* 0.125 *aSR:* 4
Lift 53,700 lbs. Stall Speed 0. Climbing Speed 20 mph.
Note: The zeppelin's weaponry is LC 0. For statistics, see p. STM89.

Space and Time Vehicles

Travel through space or time was a purely speculative idea in the 19th century. The vehicles that presented here realize some of those speculations in a variety of ways and are suitable for adventurers seeking more exotic locations to explore.

Ether Clipper TL(5+1)

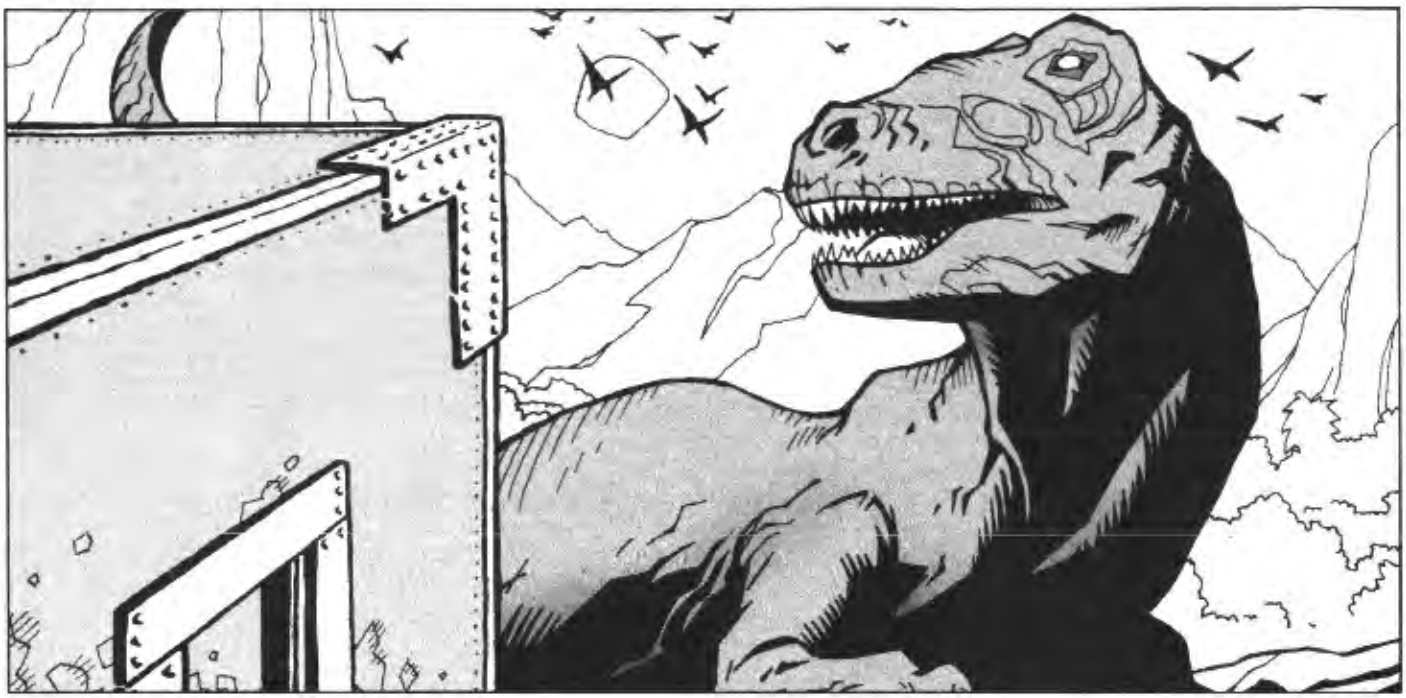
Some men say the German solar steamers are the equal of the old ships of the line, with their gleaming mirrors and efficient German ether screws. But to my way of thinking, nothing can match the extraordinary beauty of a British ether clipper with her square-rigged sails on topmast and keelmast, tended to by men on the rigging amidst the flutter of the translucent ether pennants announcing proudly her nationality.
– Rear Admiral James Huntingdon, Royal Navy (ret.)

The Ether Clipper is a space vessel which uses ether sails (p. 92) for propulsion. It has six masts mounting 120,000 sf of mirrors to power a solar steam engine, plus six more rigged with 120,000 sf of ether sails. The sails are powered by the engine via an electric generator. The sails generate 12,000 lbs. of thrust when the ether wind is on the quarter. The clipper is useful only as a space craft, as it is decidedly unaerodynamic. Surface-to-orbit transfers must be carried out using other craft such as an electric astronef. A greenhouse on board provides renewable air for 42 (35 crew and up to seven passengers). The greenhouse also produces fruit and vegetables; meat and dairy supplies must be taken as cargo. Lead-acid batteries provide 360,000 kWs of backup power. The clipper is heavily compartmentalized and has a three-man airlock for exterior access, which riggers will need to use occasionally during voyages.

Subassemblies: Body +8, 12 Masts +4.
Powertrain: 3,600-kW solar steam engine, sextuple-expansion, powering 2,400-kW electric generator for ether sails.
Occupancy: See above *Cargo:* 7,500 cf

Armor	F	RL	B	T	U
Body:	3/5	3/5	3/5	3/5	3/5

Statistics
Size: 16'×16'×160' *Payload:* 75.5 tons *Lwt.:* 328.5 tons
Volume: 36,800 cf *SizeMod:* +8 *Cost:* $38,120
HT: 6 *HP:* 2,250 [Body] 1,040 [each Mast]
sAccel: 0.4 (0.02 G)



Ether Sail *TL(5+1)*

The theory of the ether sail was the crowning achievement of Mr. James Clerk Maxwell's inventive career. With this new apparatus available to the British Admiralty, we have been able to take a lead on the Germans in the colonization of the planets. With the sun at their back, our ether clippers are capable of outrunning the best solar steamers, giving us an incalculable advantage in establishing British rule on Mars.

– Rear Admiral James Huntingdon, Royal Navy (ret.)

The luminiferous ether is full of waves (which are seen as light), mostly propagating outward from the sun. An ether sail is an electrically active mesh which can interact with these waves and propel a spacecraft. An ether sail is not a solid structure; light passes through it, but becomes noticeably reddened as the sail's field interacts with it. The power required is proportional to the size of the sail; if the power supply fails, the sails stop working, leaving the ship becalmed! Power is distributed between the keel and the sails.

The motive force provided by an ether sail is also proportional to the size of the sail. An ether sailing ship is unlikely to have enough thrust to leave a planet's surface without the help of a gravity screen or negative mass, but can travel between orbital stations more efficiently than the reactionless thruster shuttles which perform surface-orbit transfers. With a magnetized iron keel, standard sailing maneuvers such as tacking can be used to sail into the sun. Thrust should be modified for the angle between the ship's course and ether wave direction as described under *The Age of Sail* (p. STM56).

Ether sails come in two types: normal and advanced.

Type	Cost	Wt.	Thrust	Power
Normal	$0.05	0.1	0.1	0.02
Advanced	$0.10	0.08	0.15	0.025

Cost, weight (in lbs.), thrust (in lbs.), and power (in kW) are per sf of sail area. Ether sails require masts; maximum sail area equals (average mast length) squared × number of masts/2. The number of crewmen needed to handle the sails equals (square root of (sum of all mast heights)) / 4. Note that if electrical power comes from a solar steam engine, a spacecraft can have two separate sets of masts for the mirrors and the ether sails (up to six of each type); figure crew requirements separately for the two types of masts.

Electric Time Conveyor *TL(5+N)*

When the door of the machine was opened, I beheld an astonishing sight! The familiar surroundings of rural England were replaced by a tropical jungle, populated by all manner of strange creatures. The bones dug up by our esteemed colleagues are but the merest hint of the richness of life in these palaeogeon times. The marvels of a bygone age were there all laid out before my eyes. Keen to obtain such specimens for my trophy room I took up my Martini-Henry rifle and leaped off the machine into the past.

– Lord Byron Fothergill in an address to the Royal Hunting Society of London

The electric time conveyor is a large steel box, the size of a small building. In the present it stands about 10' off the ground on nine steel stilts. There are no windows or openings, apart from a sturdy steel door which can be bolted from the inside. The legs extend down into holes bored into the floor. A rope ladder reaches down from the door and can be rolled up and stored inside. When activated, the machine physically transports itself and its contents back in time in a discrete jump. Everything inside is conveyed, but only if the metal surface is unbroken – if the door is open, or a wall punctured, the machine will not work.

The conveyor is powered by a bank of condensers (see p. 30) which are charged by primary batteries. The condensers take 28 minutes to charge fully to 28,000 kWs. A jump to the past uses about 3,600 kWs of energy per 10 million years traveled. The amount of time traversed is governed by how much energy is discharged through the time coil mechanism in a single burst. By charging the condensers to a specific energy a desired time jump can be achieved, but the charge and hence exact time traversed are limited to an accuracy of about one part per thousand. A jump to 100 years ago is uncertain by up to 36 days, while a 100-million-year jump (to the mid-Cretaceous era) has a potential error of up to 100,000 years. Jumps to the future seem to be impossible. The GM may wish to restrict jumps to prehistoric or historic times, depending on the requirements of the campaign.

Return to the present uses the same amount of energy, but the energy usage is governed by the return to the exact present, by a sort of "elastic snapping" effect. If the machine spends a week in the past and then returns, it arrives a week after it left. The condensers are connected to the time coil in reverse polarity and, if enough energy is available, the precise amount needed to return to the present is used. If there is not enough energy in the condensers, nothing happens; if there is too much, it is expended to no effect. Once in the past, the machine must return to the present before it can make another jump. Since jumps fully drain the condensers, the return trip cannot be made until they are recharged, requiring taking fresh batteries as cargo. A normal complement includes the machine operator and up to a dozen hunters with weapons, looking to bag prehistoric game to bring home.

When a jump is made, the time machine remains in the same geographical location and changes altitude to remain the same average distance above the local ground, because the machine's mechanism uses the local mass of the earth as a reference. However, the ground in the past is usually not flat – thus the long legs on the machine. At an average distance of 10' above the ground, most of the 30' leg length ends up anchored firmly in soil or rock, so the machine stays level.

Subassemblies: Body +6, nine Legs +1.

Powertrain: 56,160-kWs primary batteries charging condensers.

Occupancy: 1 NCS, 12 NSR *Cargo:* 2,500 cf

Armor	**F**	**RL**	**B**	**T**	**U**
Body:	3/8	3/8	3/8	3/8	3/8
Legs:	2/3	2/3	2/3	2/3	2/3

Statistics

Size: 20'×24'×37' *Payload:* 52,600 lbs. *Lwt.:* 90,500 lbs.
Volume: 3,400 cf *SizeMod:* +6 *Cost:* $2,800
HT: 9 *HP:* 1182 [Body] 45 [each Leg]

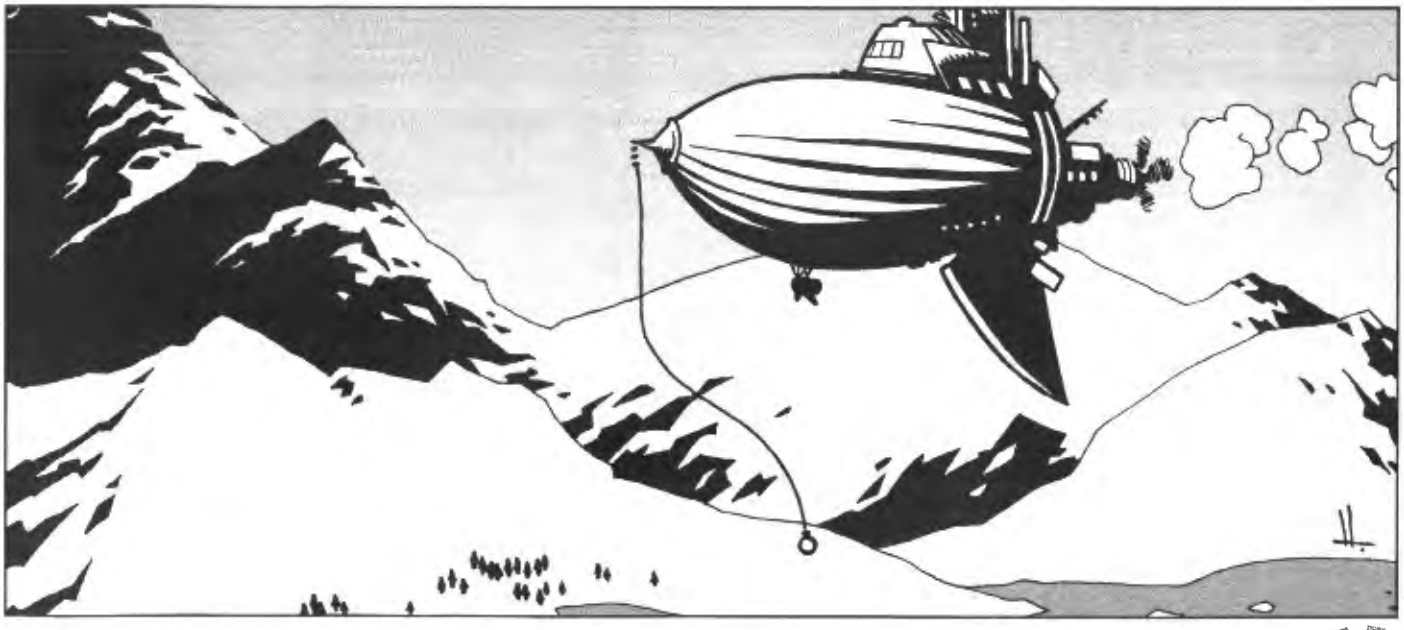
Jump Liner TL(5+*N*)

"Balearic" Overdue, Feared Lost
Barrow, Alaska Territory. May 14, 1901

The registry office of the Pole Star Line has officially declared the "Balearic" overdue. On May 12, 1900, she sent a routine jump message from the south pole of Altair V, outbound for Earth. No vessels or port facilities anywhere in the Commonwealth of Civilized Planets have reported signals, survivors, or wreckage from the missing vessel.

This semirigid airship travels the polar regions, where its paraplanetary jump drive allows instantaneous travel to other worlds. It carries 30 tons of cargo and mail on each trip, plus 3 tons of provisions. There are cabins for 2 first-class and 8 second-class passengers, and 10 third-class bunks. A comfortable salon is available, as well as a sick bay in case of emergency.

The modern environmental controls ensure passenger and crew comfort even in the worst arctic ice-storm. A very-long-range wireless communicator allows contact with nearby vessels or distant port facilities. A 200-power astronomical telescope and a dedicated Complexity-3 calculator give +3 to the navigator's Astronomy rolls.



A 1,200-kW fuel cell system (see p. 45) supplies the ship's power. Mechanical energy for the jump drive is diverted from the aerial propeller engine via a clutch. Time to ready the jump drive depends on propeller setting:

Prop. Setting	Max. Airspeed	Jump Ready Time
Full	25	23 hours
1/2	16	12 hours
1/4	11	7 hours
1/8	5	4 hours
Idle	0	80 minutes

Hammocks are provided for two crew shifts, each consisting of 24 gasbag riggers, three chiefs, a mechanic, and two gunners/lookouts. The ship's cook and porter are also assigned hammocks. Bunks are provided for two bridge crew shifts, each consisting of a pilot, a navigator, and a wireless operator. The jump engineer and the ship's medic are also assigned bunks. A shared cabin is provided for the captain and the first officer.

Each flight costs $23,875 for helium and $90 for liquid hydrogen. This price assumes inexpensive helium imports from other worlds; if helium is too expensive or restricted in a given campaign, hydrogen can also be used in the lifting gas cells. Maximum cruising range is 2,500 miles.

Subassemblies: Body +12, Fuel Pod +5, two Turrets +2.

Powertrain: interstellar jump drive; helium lift; 1200-kW fuel cell with aerial propeller.

Fuel: 18,000 gal. liquid hydrogen (15),100 hours.

Occupancy: See above *Cargo:* 1,350 cf

Armor	F	RL	B	T	U
Body:	2/2N	2/2N	2/2N	2/2N	2/2N
Fuel Pod:	5/3	5/3	5/3	5/3	5/3
Turrets:	5/3	5/3	5/3	5/3	5/3

Weaponry

2 × Gatling Gun [1 each Tur:F] (1,000 Solid) +1

Equipment

Body: Astronomical telescope (+7 to search, +14 to examine); complete mini-workshop; environmental control (100-man); navigation engine; navigation instruments (+2 Navigation); searchlight (5 mile range); winch (ST 500, cable 500 yards); very long range wireless receiver/transmitter (1,000 mi.).

Statistics

Size: 125'×120'×750' *Payload:* 48.3 tons *Lwt.:* 149.3 tons
Volume: 6 million cf *SizeMod:* +12 *Cost:* $95,000
HT: 12 *HP:* 30,000 [Body] 180 [Pod] 11 [each Tur]
*aSpeed:*25 *aAccel:*0.2 *aDecel:*0.5 *aMR:*0.125 *aSR:* 4
Lift 298,750 lbs. Stall Speed 0. Climbing Speed 10 yards/second.

Navigation Engine

Complexity 3, IQ 6. 1 kW, 250 lbs., 5 cf, $2,800, 1 kW.

Navigation-10 (with built-in chronometer) or +3 to human Navigation skill.

Paraplanetary Jump Drive TL(5+N)

True Airship Adventures
"The Winds of Other Worlds"
Chapter 14. Escape From Iota Gliris

"Will we make it, Captain?" I inquired.

He squinted through a spyglass, at the black specks pursuing us through the arctic twilight. "Two hours, maybe three," he muttered. "Mr. Barstead! Can we be off this damned world by then?"

"Dunno, Cap'n! I think . . ."

At that instant, the catch-spring of the drive slammed home, with a sharp CLACK! The mechanism was charged and waiting!

". . . I think we'll be ready in five minutes," he grinned.

"Then be about it!" ordered the Captain. He spat over the aft rail, in the direction of our pursuers.

Our navigator made several last-minute computations, which the engineer checked a second time. Then the signal was given for all hands to brace for jump. The engineer pulled on a lanyard, and the airship lurched forward. There was a sickening instant of vertigo and streaks of light, then calm again.

The land below was no longer covered with ice, but with a wild jungle of rhododendron-like vegetation. An exotic scent rose on the chilly night breeze. The navigator took his sightings, and reported our location. "Gamma Draconis, South Pole, Sir."

The Captain nodded. "All hands! Set course for Port Mnanthi! One quarter steam!"

The paraplanetary jump drive is a cinematic invention for GMs who want to allow interstellar travel *without* travel through airless space. This variant of the jump drive (see p. S30 and p. VE39) uses jump points located in the polar regions of terrestrial planets. It is normally mounted on an airship, due to the wide variation in polar terrain to be found on different worlds.

Vessels can only utilize the jump drive within 0.01 planetary diameters of a planet's north or south pole; on Earth, this is a distance of 80 miles. Incoming vessels appear within the same distance of the poles. In campaigns where this jump drive exists, most civilized worlds will have coal stations near the poles to serve interstellar airship traffic.

The heart of the drive is a "jump crystal," mounted in a gimbaled hydraulic press. These crystals are unbreakable by any force known to man, but if sufficient mechanical pressure is applied, and then abruptly released, they dissipate their stored energy by translating themselves (and the attached vessel) from one jump point to another. The maximum range of this translation is roughly 6 parsecs. The energy required is 3.6 million kWs per 100 tons of attached vessel, stored within the drive crystal itself over the course of several hours by drawing power from the airship's engines through a belt and pulley system.

For each use of the jump drive, successful skill rolls in Engineer (Jump Drive) and Astrogation are required. Engineer failure results in no jump, and on critical failure the vessel may be damaged at the GM's option. If an Astrogation failure occurs, the vessel may end up at either pole of the same planet, or any other randomly chosen planet within 1d parsecs.

The crystal must be very strongly attached to the vessel to carry it along on its jump. A system of adjustable clamps ensures this. Fitting the clamps to a replacement crystal requires a roll against Mechanic (Jump Drive). The procedure normally takes 3 hours but can be rushed at -1 per 15 minutes less, minimum time 30 minutes.

Fortunately for Victorian adventurers, jump points only seem to connect worlds with breathable atmospheres and with temperature and gravity comparable to Earth. Most philosophers claim that the Creator deliberately arranged this network for the benefit of mankind, but a few free-thinkers consider them an accident of nature. There has even been speculation that similar networks of jump points might connect the blazing poles of stars, or the freezing gas-clouds of worlds such as Jupiter, perhaps used by unimaginable creatures native to those climes.

3.6 million kWs, 1,600 lbs., 64 cf, $1,400 per 100 tons of jump capacity.

Interplanetary Fares

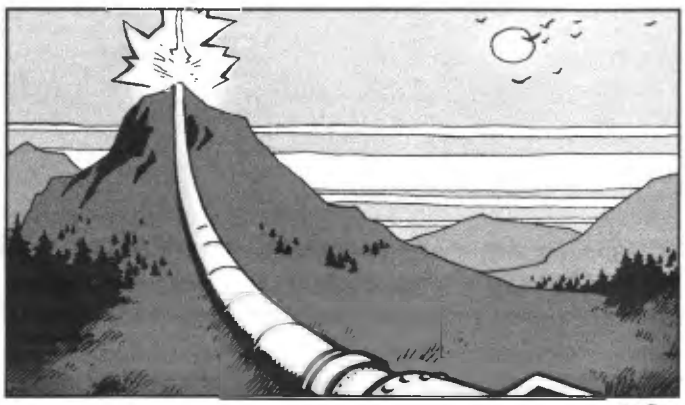
The following prices for a single jump made on a jump liner are typical: Passenger rates are $2,000 first class, $250 second class, $100 third class. Regular cargo travels for $500 per ton; mail travels for $0.10 for the first ounce and $0.06 for each additional ounce.

Magnetic Space Launch Catapult TL(5+*N*)

Her Majesty's Government today announced the construction of a great Magnetic Catapult to be built on the slopes of Mt. Kilimanjaro in Africa. This titanic undertaking will allow direct passage to the Moon and greatly simplify the assembly of Solar Steamers which can travel to the rest of the inhabitable solar system. Soon it shall be even more true that the Sun never sets upon the British Empire!

The magnetic catapult is a gigantic Gauss gun, with a 510-mile barrel stretching from Mt. Kilimanjaro to the shores of Lake Tanganyika. A lunar shell (p. STM83) or similar vehicle is loaded into one end and both ends are sealed off. The air is pumped out and the lunar shell is magnetically accelerated at 8G for 145 seconds (crews should take full precautions against GLOC, p. VE153 or CII131). The door at the far end of the launch tube opens just before the shell exits. A 30,000-lb. lunar shell achieves full Earth escape velocity. A vehicle of approximately 60,000 lbs. can be lofted into low Earth orbit.

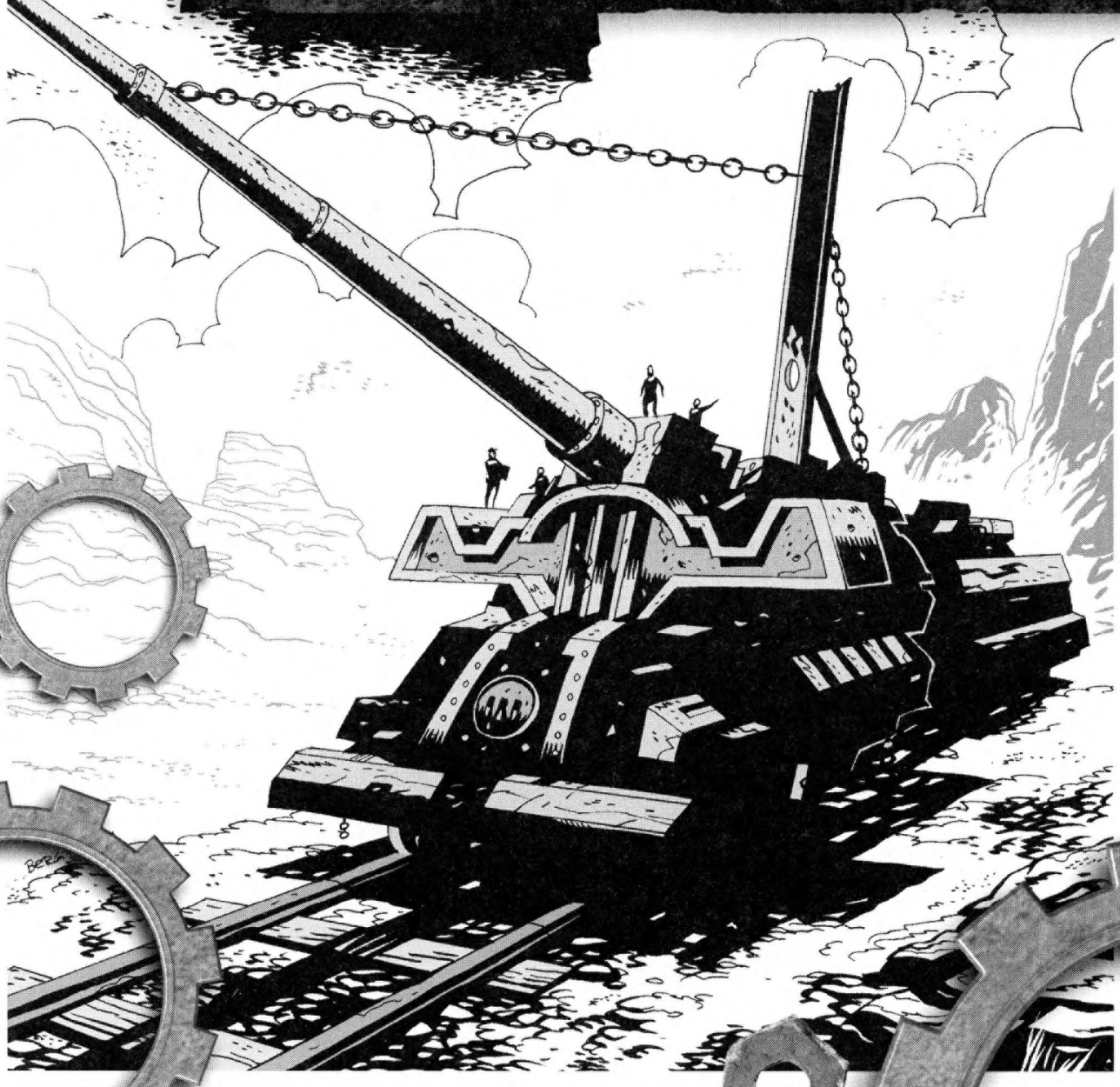
The entire magnetic catapult facility costs $11 billion dollars and requires 900 million kWs of electical energy to launch a payload.



CHAPTER 7
HEAVY WEAPONS

So when we call round with a few guns, o' course you will know what to do – hoo hoo!
Jest send in your Chief an' surrender – it's worse if you fights or you runs.
– Rudyard Kipling, "Screw-Guns"

What personal weapons are to a man, heavy weapons are to a vehicle. Any substantial vehicle may carry weapons too heavy for one man; some vehicles are specifically built as weapons platforms. Heavy weapons may also be used from a fixed platform such as a fortress. The weapons described here give adventurers the means of standing off an army or a war vehicle.



Artillery

The Age of Steam improved cannon and other artillery with such innovations as precision machining, automatic fire, smokeless powder, and the replacement of cannonballs with shells. Big guns are among the most advanced devices of their time. Even with the further advances of a steampunk world, they remain vital weapons of war.

Large Caliber Rifle TL5

Lying on gray mud under a gray tarpaulin, Corporal Lewis Weston was nearly invisible, except for the long black barrel of his LCR poking out. He wasn't worried about being spotted, though; his target was nearly a thousand yards away. He sighted in on the land ironclad as it lumbered along, spitting fire. When Weston pulled the trigger, it felt as if a mule had kicked his shoulder. He heard the shot strike metal but the ironclad kept moving.

Must have hit the gunner, *Weston realized, noticing that the vehicle's machine gun had fallen silent. He loaded another round and sighted in again, trying to guess where the driver's station would be . . .*

The Lee-Enfield Large Caliber Rifle (or LCR) No. 1 is a large bolt-action rifle of fine quality. It has a barrel over 4' long and fires a 13.5mm bullet. Equipped with a bipod, it is employed like a sniper rifle to take out lightly armored vehicles and equipment at extreme range.

Malf Crit., Damage Cr. 11d+, SS 20, Acc 12, 1/2D 930, Max 4,600, RoF 1/2, Shots 1, ST 15, Rcl. -2, Ldrs. 0, LC 1. 77 lbs., $960, 0.37 lb./round, $0.037/round.

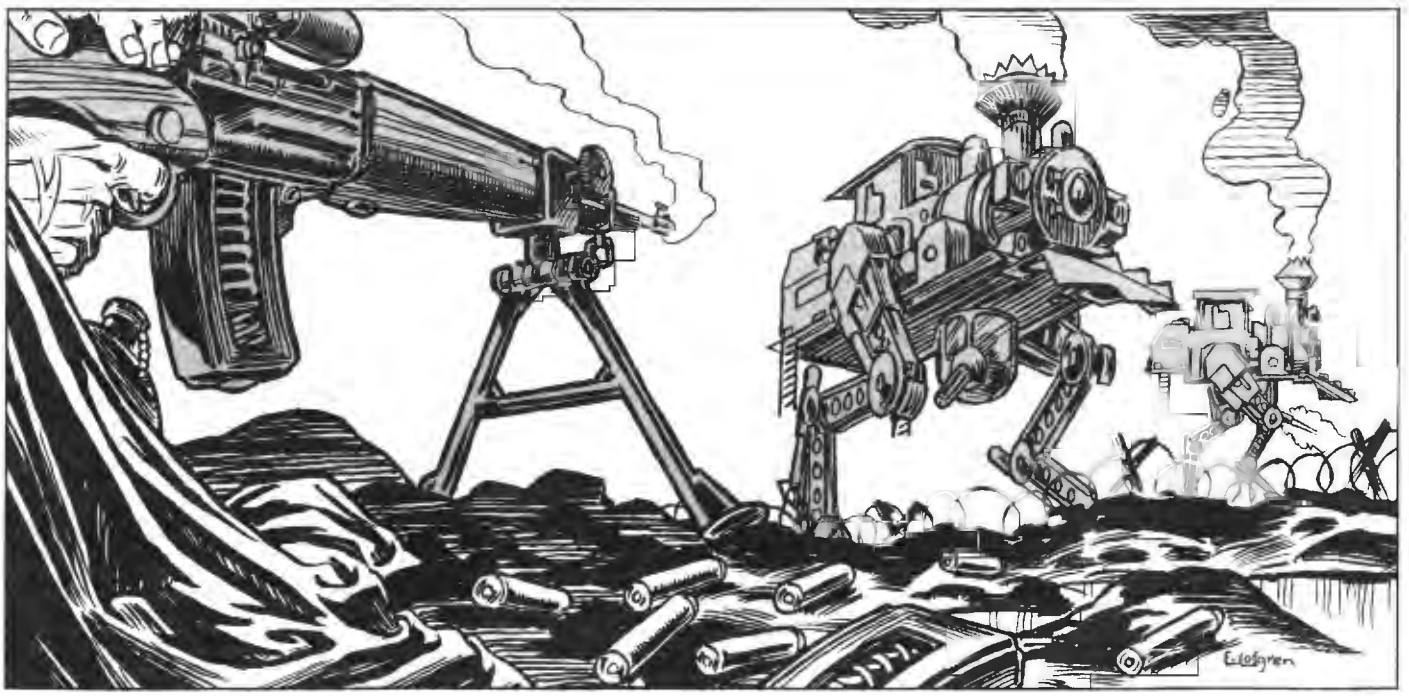
Note: The + indicates that wounding damage, after DR is subtracted, is multiplied by 1.5.

Carbide Rotary Repeater TL(5+1)

Corporal Pemberton hastily tucked away the cloth he had been using to polish the seven octagonal blued barrels of "his" carbide rotary repeater. The bugle call that had just sounded told him that the enemy was in sight. "Bloody heathens'll prob'ly attack any minute," he muttered as he prepared the Gatling-style weapon for battle. First, he loaded a two pound charge of ground calcium carbide into the pressure tank. He started the metered drip of water into the carbide, then loaded six of the thousand-round canisters of .51 caliber lead slugs onto the loading track on top of the brass-plate covered action while he waited for the pressure of the acetylene gas to build. He wound the starter spring and purged the gas lines. He gripped the handles and looked through the sighting rings just as the Martians came pouring over the hill. With a sick feeling in the pit of his stomach, he squeezed the triggers.

The Flanheim Arms Carbide Rotary Repeater is a seven-barreled variant Gatling machine gun, powered by acetylene gas produced from the reaction of calcium carbide and water. A piston attached to each barrel taps power from each shot to rotate the barrel assembly for continuous firing. Firing rate can be set at 10-100 shots per minute in increments of 10. Ignition comes from a flywheel-based magneto.

The advantage of this design is its independence of supply lines. Instead of carrying huge quantities of brass cartridges, an expedition can carry bricks of carbide and molds for casting lead bullets. If limestone and coal are available, even the calcium carbide can be made on the spot, freeing even more cargo space.



Malf 16, Damage Cr. 10d+1+, SS 20, Acc 13, 1/2D 830, Max 5,100, RoF 100, Ldrs. 0, LC 1. 38 lbs., $420, 0.083 lb./round, $0.017/round.

Note: The + indicates that wounding damage, after DR is subtracted, is multiplied by 1.5.

Howitzer TL(5+1)

An Exciting Breakthrough In Modern Armaments: Introducing the "Big Bertha" Howitzer – The Ultimate in Modern Firepower!

Developed by the world leader in firepower – Krupp Armaments – the Gamma 420mm howitzer is specifically designed to reduce the heaviest fortifications to dust. Firing a one-ton explosive shell over 9 miles, you are guaranteed results in days where smaller artillery pieces may take weeks!

Inquire now for special pricing on ammunition!

The Krupp 420 is an extremely large howitzer mounted on an unpowered 38-ton chassis for firing. The RoF of 1/360 is based on historical data and includes time to raise the shell into position on a hydraulic lift. The historical crew size was ca. 200.

Malf Crit., Damage Exp. 6d × 579 [12d] , SS 30, Acc 14, 1/2D 2300, Max 6100, RoF 1/360, Ldrs. 6, LC 0. 38,000 lbs., $7,650, 2,780 lbs./round, $139/round.

Long Range Cannon TL(5+1)

"Your Enemy Is Never Out Of Reach!"

Through precision engineering and German ingenuity, the masters at Krupp Armaments have developed the Kaiser Wilhelm Geschuetz. Able to fire up to the very firmaments of the heavens and down again over 80 miles away, it outranges every other artillery piece in the world.

Inquire now about our special barrel maintenance contracts!

Typically transported by special rail cars, this weapon was known in the Great War as the *Paris Gun*. It is actually a 380mm rifled naval gun fitted with a liner and a 130', 310mm diameter (210mm bore) smooth extension barrel. The barrel partially melts after every firing, so each shell must be fired in a numbered sequence as the bore size slowly increases. Ammunition fired out of order gives -2 to Malf. After 65 shots the barrel must be removed and rebored to 240mm. After another 65 shots the barrel is useless and must be completely replaced (at half the price of the entire weapon). Historical crew size was ca. 500.

The Paris gun can fire on an extremely high arc that multiplies Max range ×10 instead of ×2.5 because of the lack of aerodynamic drag in the upper atmosphere. Shots on such trajectories take three times the normal time to impact.

Malf 16, Damage Exp. 6d × 72 [12d] , SS 30, Acc 18, 1/2D 5,900, Max 15,000, RoF 1/900, Ldrs. 4, LC 0. 144,000 lbs., $18,000, 695 lbs./round, $34/round.

Explosive Devices

The following devices exploit the properties of new chemical explosives in substantial quantities, whether as propellants or as destructive agents.

Rocket Lance TL5

Gentlemen, it may seem as though we live in a fearful new age of Science when Ironclad Land Cruisers roam the battlefield like Dragons belching Fire and Devastation. I am happy to report that Science has now forged the weapon that will enable you to become the true Heirs of St. George and slay these Dragons!

– Brigadier Gerard Terwilliger-Smythe addressing the Duke of Northumberland's Own Lancers

The rocket lance is a hollow metal tube slightly more than 6' long with a handgrip near the middle. It contains a long, slim rocket with a protruding 50mm head of hardened steel. The whole thing bears a great resemblance to a medieval lance. It is intended as a cavalry weapon to be used against armored vehicles such as the land ironclad (p. STM74). The launcher is discarded after use.

Rocket: Malf 16, Damage Cr. 10D(2), Spd 250, End 0.8, Acc 8, Min –,1/2D 200, Max 200, LC 0. 6 lbs., $1.

Launcher: SS 12, RoF 1NR, Ldrs. 0, Rating 6 lbs., Min ST 8. 6 lbs., $3.

Note: Against an unmoving target or a fixed area of ground, the rocket lance can be used for indirect fire at up to 1,000 yards range.

Air Mine TL(5+1)

Mines, Aerial, Technical Specifications for . . .

III.C.1. Timed Detonation. In order that aerial mines shall not drift so far as to become a hazard to His Majesty's aerial forces, nor descend into shipping lanes used by British or neutral fleets, it is directed that all aerial mines manufactured in the British Empire shall be equipped with automatic timed detonators, which shall cause the explosion of each mine (a) after a span of not more than 50% of the mean time for its descent from 5,000 feet of altitude to sea level, or (b) after 36 hours from its launching, whichever be less.

III.C.2. Adjustability of Detonation Interval. Inasmuch as tactical considerations may dictate explosion of aerial mines after a lesser fixed interval, all timed detonators shall be adjustable to any shorter interval until detonation, to a minimum of 5 minutes, but not less . . .

The air mine is designed for use by fleets of airships, especially naval airships operating over the oceans. When inflated, it is a sphere 4' in diameter typically painted white or sky blue for camouflage (-2 to Vision rolls, cancelling out +2 from its size). Collision with an aircraft or other solid object sets off the explosive charge, causing explosion and fragmentation damage; the mine also carries a timer that can detonate the charge. Air mines are cheap, light, and, when not inflated, small (0.125 cf), enabling airships to carry them in large quantities.

Malf Crit, Damage Exp. 18d [4d], Holdout -4 (uninflated), LC 0. 2.25 lbs., $2.

Air Mines in Combat

Air mines are contact mines, which normally only detonate on actual contact with an aircraft. They are mainly dangers to airships; airplanes are small enough to slip between them with negligible chance of contact. If an airship passes through an air volume within 1 mile of a mine's location, roll 3d; on a 3, the ship has encountered the mine. A Vision roll at -5 will spot the mine, which can then be destroyed by gunfire or evaded; if it is not spotted, assume that it hits the vehicle and inflicts damage.

Energy Weapons

The advance of physical science yields greater knowledge of energy transformations. These weapons represent experimental applications of that knowledge to large-scale combat.

Electrolytic Gun TL5

Captain Vasilov raised the binoculars and surveyed the advancing line of giant locusts. His small company was the only thing between the madman Nabokov's monster insects and the rich grain fields of the Ukraine. The bulletproof carapaces of the locusts glinted in the late summer sun; one of them still had a Cossack lance stuck in its thorax.

"Ready weapons!"

The men of Vasilov's command raised their curious weapons, aiming them clumsily with heavily gloved hands. Vasilov eyed the approaching horde, estimating the range.

"Fire!"

From 20 muzzles came streams of salt water. It splashed harmlessly on the leading locusts.

"Current!"

Each man flipped the bright red switch atop his weapon, and the air filled with a sizzling noise as thousands of volts surged through the harmless-looking streams of water to strike the vermin. Some simply froze as their muscles locked, others twitched and leaped, but none of them could withstand the deadly electricity.

"Cease fire!" Vasilov grinned as he surveyed the mass of dead locusts. More were coming, but at last there was hope for Mother Russia.

The electrolytic gun projects deadly surges of electricity along a conductive stream of salt water. It is a fairly plausible way to introduce electric weapons into a Victorian-era campaign (a version of this weapon may have been patented during World War I). Its operation is simple: a tank of pressurized salt water squirts a stream up to 35 yards, and then a jolt of 500 volts is carried along the water stream to the target. Attacks use the Gunner (Flamethrower) skill. Because the salt water stream carries the electric current, the weapon has no half-damage range; anything the water can reach takes full damage. In rainy weather the range is halved, as is the malfunction number.

The salt water tanks are (barely) man-portable, but unless the campaign allows ultra-compact power cells there is no way to carry enough batteries to run the electrolytic gun. Instead, users trail a power cord back to a dynamo. This generally limits the weapon to use in prepared defensive positions. Its power requirement is 133 kJ per shot, or a steady supply of 532 kW.

When an electrolytic gun malfunctions, roll again – a result of 16 or higher means the salt water has leaked onto the user, so the next shot automatically affects him instead of the target.

The electrolytic gun inflicts lethal electric shock (see p. 18). Add the damage from all shots which hit a target before subtracting DR. The gun actually fires a continuous stream of water; the multiple shots represent the gunner's ability to "walk" the stream toward a target (p. HT78). Sealed nonmetallic armor or waterproof garb such as a diving suit provides complete protection against an electrolytic gun.

Malf 16, Damage Spcl. 1d, SS 10, Acc 5, 1/2D 35, Max 35, RoF 4, Shots 40, ST 10, Rcl. 0, WPS 1 lb., CPS –, LC 0. 40 lbs. (plus 1 lb. per 2 yards of power cable), $200.

Solar Mirror TL(5+1)

The junk swooped in on a westerly wind, sails unfurled like the wings of a hawk. Its prey, an elderly steamer, floated before it in the warm waters of the Sunda Strait; no smoke rose from its single stack. The head pirate noticed the canvas-covered boxes on the deck of the ship and smiled, knowing this would prove a profitable voyage.

"Steady, lads."

Captain Bracebridge stood with the rest of the crew in the armored prow of the ***Seker*** *– stood and watched the corsair, now barely a furlong away, grow larger by the second. Beside him, Lieutenant Dyson made a last-second adjustment to the new weapon's controls.*

"Focus at 200 yards, Cap'n. Ready to engage at your command."

"Hold on," was his reply. "Hold . . . and . . . now!"

On the deck of the ***Seker****, the tarps fell away, revealing a segmented mirror three fathoms across. The pirates were startled as it swiveled toward them, but since it was no obvious threat they continued their approach. When the first smoking bits of their mainsail fell at their captain's feet he ordered an immediate retreat, but within seconds the ship's masts were burned bare and half its smoldering crew – the half still alive – had dived into the water.*

"Well done, Lieutenant," the skipper rumbled, "but we're not through yet. Our orders are to clear these waters of pirates, and I want everything on that ship reduced to ashes. Everything."

"Aye, sir." The lieutenant adjusted the air feeds once more and steeled himself for the grim task ahead.

A solar mirror is composed of hundreds of smaller mirrors which form a parabolic dish. Each unit is controlled by pneumatic tubes and can be adjusted in concert to move the focal point in or out. The standard 20' mirror will ignite paper or equally flammable material in 2 turns, cloth and dry wood in 4, and damp wood in 10. Given time, a mirror can burn through metal, but a reflective surface will lessen its effectiveness to 1/8 normal.

At less than 3 times the diameter of the mirror, its segments cannot focus properly and damage is quartered. Also, it can only be fired in a 180° arc facing the sun. It cannot be used at night or under overcast skies. A critical failure during use indicates the segments have jammed, and the device will have to be repaired before it can be used again.

Malf. 17, Damage Imp. 6d × 7, SS 25, Acc 14, 1/2D 600, Max 1,200, RoF 1, LC 0. 500 lbs., $6,250.

Heat Ray TL(5+*N*)

A Comparative Assessment of the Efficacy of Strategic Doctrines Regarding the Use of Artillery in a Novel Combat Environment

Abstract: *During the Invasion, both British and American forces relied on artillery attack by direct fire as a countermeasure against the extraterrestrial forces, while German forces relied principally on indirect fire. The use of direct fire resulted in the rapid annihilation of the artillery units, typically by explosion of their own ammunition under the impact of thermal beams. In contrast, units engaged in indirect fire from over the horizon were immune to beam attack. Analysis of the remains of extraterrestrial bases indicates that only very heavy shells were capable of penetrating the armor of their vehicles, but even so the result was a steady one-sided attrition of extraterrestrial heavy weapons. A large expenditure of infantry forces was needed to delay the extraterrestrial vehicles' search for artillery units.*

First seen on Earth during an ill-fated interplanetary invasion, the heat ray baffled not only military observers who witnessed its use in battle but scientists who fell heir to captured weapons. Its analysis spawned a scientific revolution, as concepts of coherent light and molecular energy levels emerged to change human thinking. In fact, the heat ray was a chemically powered infrared laser. Perhaps for ruggedness and self-sufficiency in battle, its makers designed it to take power cells filled with two highly reactive chemicals (effectively equivalent to rocket fuel, p. VE90), whose reaction yielded energy for a single shot, after which the cartridge was ejected and replaced – the reason for its low RoF. An attack which punctures a cartridge will cause violent combustion inflicting 6d × 3 on those in the same hex.

Malf Crit, Damage Imp. 6d × 6, SS 20, Acc 20, 1/2D 3,500, Max 10,500, RoF 1/10, LC 0. 35 lbs., $262.50; 20 lbs., $2.50 for each power cell.

The Martian Museum

Commemorating the interplanetary invasion of the year just past, the Martian Museum lately opened its doors in Cambridge. This reporter had the signal honor of participating in the first public tour of the Museum.

The main exhibition hall greets the visitor with a dramatic sight: a three-legged war machine, its heat ray pointed at the doors. The entryway passes around a field piece destroyed by a ray attack, its casing split by the explosion of its ammunition as it "cooked off" and the actual metal of the barrel partially liquified by the inconceivable heat. A painted diorama shows the landing site from which the tripods emerged, littered with great metal cylinders.

To the left of the main hall, at the front, may be found a room of maps showing the course of the conflict. Charts of planetary orbits show the trajectory the interplanetary shells followed to reach the Earth. A globe portrays the lands they invaded. Maps trace the course of the battles fought against them, from the quick Prussian counterstrike to the agony of China.

At the right of the main hall stands a smaller hall filled with the invaders' strange devices, whole or in fragments. Many are enigmatic; others have obvious, if malignant purpose, such as the great shells, now emptied of the deadly Black Smoke that choked so many Englishmen. The prize of this exhibition must be given to the tripod body at the rear, its hatches open, so that the visitor may step within and see the dimly lit cabin.

At the rear of the hall, on the left, a small room is reserved for visitors who meet the approval of the doorkeepers – on this first evening, two ladies were excluded, despite their press credentials, as it was felt that the sight within was unsuited to their eyes. In this inner chamber, a large tank held the remains of one of the creatures from Outer Space, hastily preserved in formalin, so that Earth's untamed bacteria might not reduce it to the same organic corruption as its fellows. The vast, staring eyes and the clutching tentacles conveyed a sense of horror seldom equalled.

A narrow staircase at the right rear led to a second story. Along one side, half a dozen laboratories were said to hold alien corpses and devices behind their locked doors, still yielding new secrets to the savants of England and the Continent. On the other, a lecture hall offered the latest in magic lantern equipment to assist the speaker. There we repaired for an evening's presentations. Learned scholars told of comparative planetary evolution and reconstructed the culture of the invaders; officers in Her Majesty's Navy spoke of their weapons and the course of the war that sought to repel them. This reporter believes the museum has well justified its endowments, and recommends it to the curious.

Tornado Launcher TL(5+*N*)

PATENT NUMBER 2341XXXX (REDACTED)
ASSIGNEE: N. TESLA ET AL. FEB XX, 1899.
P. 12 (continued)

Assembly 1 is a vacuum-insulated chamber XXXX feet in diameter, containing XXXX [THREE PARAGRAPHS DELETED]. Assemblies 2A through 2F comprise a Linde/Dewar refrigeration plant for the production of a charge of nitrogen ice of cylindrical shape [FIGURE DELETED]. A steam turbine rotates the charge to velocity XXXX prior to [REMAINDER OF PAGE DELETED].

The tornado launcher is a heavy siege weapon for use in cinematic campaigns. Over the course of 10 hours, a 1,000-lb. charge of frozen nitrogen accumulates inside an insulated drum. Half an hour before launch, the drum is spun up to several hundred rpm. When the weapon is ready to fire, a steam catapult hurls the spinning charge of nitrogen ice into the air overhead. The ice boils away and releases its angular momentum into the surrounding air to trigger a small tornado!

Each time the weapon is fired, roll 1d to determine the strength of the generated tornado, and consult the chart below. Artificial tornadoes normally dissipate in 1d minutes, after covering a path 2d hexes wide and (6d × 80) hexes long. All buildings, vehicles, and men caught in the tornado's path take the specified damage. Men who cannot reach shelter can lie prone for an extra +5 PD.

Roll	Fujita scale	Wind speed	Damage
1-2	F0 (Weak)	60-72 mph	2d
3-4	F1 (Moderate)	73-112 mph	3d
5-6	F2 (Considerable)	113-157 mph	4d
*	F3 (Severe)	158-206 mph	6d
*	F4 (Devastating)	207-260 mph	6d × 2
*	F5 (Incredible)	261+ mph	6d × 3

* F3 or stronger tornadoes cannot normally be triggered by a tornado launcher. They might occur (at the GM's option) if weather conditions are already ripe for tornadoes (temperatures above 80°F and thunderstorms nearby).

To ready the weapon for firing, a successful Mechanic (Cryogenic Machinery) skill roll is needed. To actually aim and fire the weapon, a Gunner skill roll is required.

Malf 16, Damage Spcl. (see above), SS 30, Acc 2, Max 200, RoF 1/36,000, LC 0. 300 kW, 7,750 lbs., $4,800.

The Fujita Scale

The following list of effects may be used to describe battlefields after tornado launcher attacks:

F0 Branches broken from trees. Sign boards damaged. Sails destroyed.

F1 Shingles torn from roofs. Land vehicles blown off roads.

F2 Roofs torn off houses. Barn walls blown out. Larger trees snapped or uprooted. Carriages lifted off ground.

F3 Roofs and walls torn off well-constructed houses. Most trees uprooted. Trains overturned. Smaller vehicles lifted off the ground and thrown..

F4 Brick buildings collapse. Wooden structures completely demolished and blown away. Trains thrown through air. Large and deadly missiles generated.

F5 Concrete buildings destroyed. Brick buildings destroyed and debris blown away. Ground stripped bare of vegetation. Trains fly through the air in excess of 100 yards.

Miscellaneous Large Weapons

This unique device isn't a vehicle, as no one rides it, nor an automaton, as it has no internal intelligence. Since it's meant to inflict harm, it's plausibly classified as a weapon, if a somewhat peculiar one.

Kaze-Shi (Death-Wind Top) TL5

From the far-off land of Japan comes this iron cyclone of destruction! After gunpowder weapons were banned by the Sho-Gun Tokugawa, Japanese peasants desperately needed a means of protection from the deadly ***samurai*** *warriors. A skilled clockmaker whose name has been lost in antiquity came up with the answer – the Kaze-Shi, or Death-Wind Top! This fearsome device is* ***not*** *a toy, as those who have felt its deadly blades can attest! An excellent home-protection device, and fully legal as such!*

Most of the above is buncombe. The kaze-shi was invented by an English merchant fascinated by Japanese culture and spring technology. In a flash of inspiration, he combined the mainspring from a wall clock with a toy from his youth and came up with "Micklewhite's Defensive Spinner." After several months of poor sales, he cut a decently exotic origin from whole cloth and made his fortune from curiosity-seekers the globe over. Mr. Micklewhite has since retired to an estate within walking distance of Tokyo's Yoshiwara district.

A kaze-shi resembles a metal drink-mixer with four slots for retractable blades sticking out of its top, a pointed ceramic bottom, and a socket for a wind-up key in the side. It is normally wound up before any prospect of combat; doing so takes 25/ST turns. To release it, the user sets it on the ground, pulls the key out, and pushes the device away carefully – a critical failure means he nicked himself. The kaze-shi moves in the direction it ispushed, attacking the legs of everyone in each hex it crosses with a skill of 12. Upon striking a person or other object, it randomly changes direction. The kaze-shi continues for 8 turns, less 1 for each object struck. On soft or broken ground, this is halved to 4 turns.

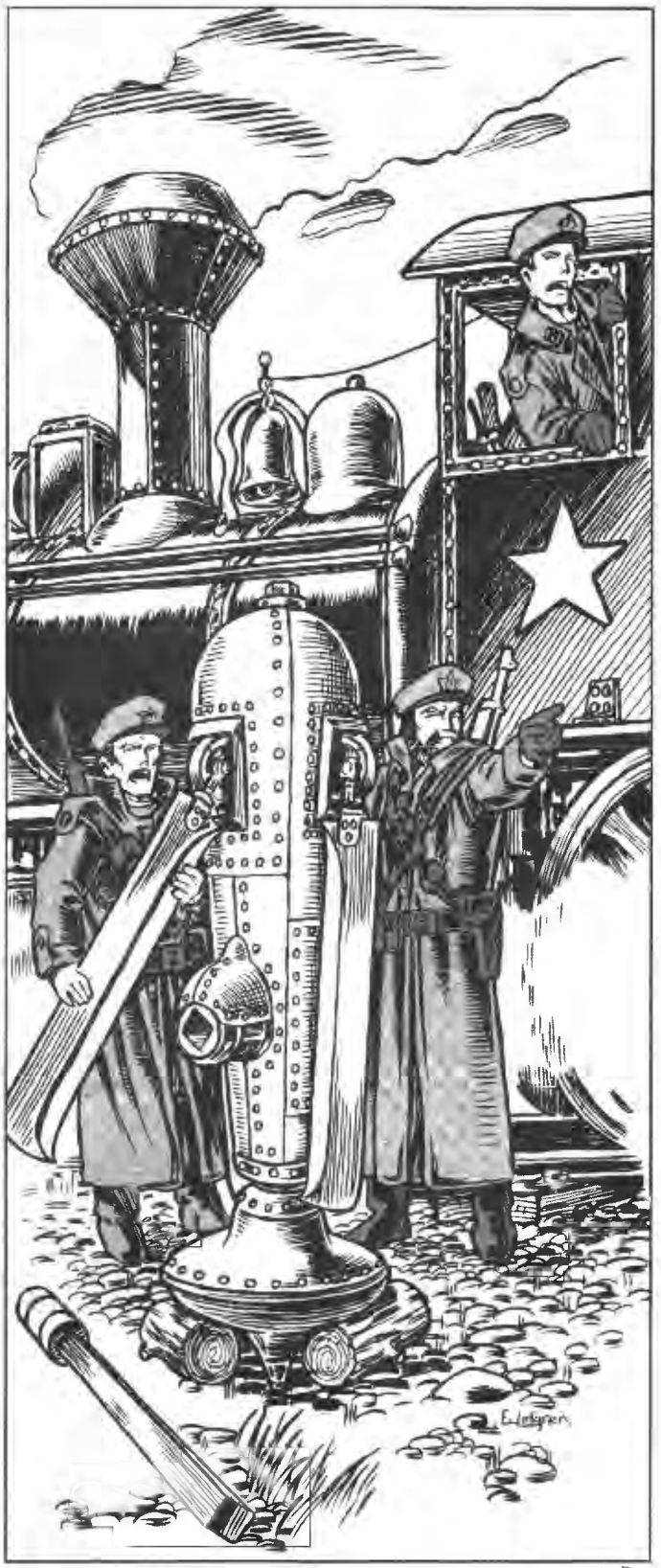
Malf 16, Damage Cut. 1d-3 (hit locations 12-14), Reach C, PD 1, DR 1, 2 HP, Holdout -6, LC 4. 17 lbs., $5.

Russian Top

Upon hearing of the kaze-shi, the Russian tsar became fascinated by this new invention from the presumptuous islanders off his eastern border. He ordered several to be secured for his Ministry of Defense, and although they found its military value marginal at best (and the precedent for patent law questionable), the tsar would not let the matter rest. The Russian top (heavy model) is the result of his prodding.

It is essentially an immense copy (around 8' tall and 4' across) of the original; winding it takes 1,650/ST turns. These monsters are 2 hexes across and spin for a base of 30 turns. The Ministry of Railways has developed a linkage that allows it to be wound by a train engine; it has proven useful against bandit raids on the Trans-Siberian Railway.

Malf 16, Damage Cut. 4d (hit locations 6-11), Reach 1, PD 2, DR 2, 24 HP, LC 2. 300 lbs., $800.



CHAPTER 8
DRUGS AND CHEMICALS

"Gas! GAS! Quick, boys!" An ecstacy of fumbling,
Fitting the clumsy helmets just in time;
But someone still was yelling out and stumbling
And floundering like a man in fire or lime.
Dim through the misty panes and thick green light,
As under a green sea, I saw him drowning.
– Wilfrid Owen, "Dulce et Decorum Est"

With the rise of chemistry, a wide range of new elements and compounds became available, some isolated from natural sources, others synthesized in the laboratory. Many provide medical treatments or other biological effects. Other applications range from new structural materials to warfare.

Drugs

From the old-fashioned herb garden to the chemical laboratory, medicine offers a variety of remedies for human ailments. Some substances even promise improved physical and mental functioning to those who take them.

Holdout modifiers are not specified for drugs. In general a single dose will be +6 (a pill) or +5 (a large pill or an ounce of fluid); a container my be +4 or +3. If some sort of apparatus is needed to administer the drug, it will have its own modifier; a hypodermic syringe averages +3.

Charcoal Pills TL5

A word to the wise – the pills absorb alcohol in the stomach, but they release it in the intestines. My chucklehead assistant took a sack down to Carson City to hustle the silver miners in drinking games. I had to hire a stagecoach to get him back – after he sold my horse to cover his debts! Probably should have left him with the miners . . .

– Beauregard Miller, the only pharmacist in Tonopah, Nevada

Charcoal pills do not directly counter ingested poisons; instead, the activated carbon absorbs the toxin, preventing it from entering the bloodstream. A dose of three pills must be taken before the poison takes effect, or within 1 hour of ingestion in any event – this will give the victim an additional roll at HT+4 to avoid the poison's effect. If the poison is toxic enough so that no roll is normally given, allow a normal roll against HT.

Charcoal pills delay the effects of alcohol for 2d × 10 minutes – calculate the Intoxication Level as usual (pp. CII162-168), and apply it immediately when the pills wear off. Of course, the user won't know how long he has.

$0.30/dose.

Spiritual Inhalant TL5

A Great Boon to the Thoughts
As Demonstrated to the Crowned Heads of Europe
Mme. Polchefska's Spiritual Inhalant
Its Vapours Indispensable to all Practitioners of the Mental Arts

Madame Polchefska, recently of Paris, has made her famed Spiritual Inhalant Vapour available in Britain and America for the first time. The Inhalant improves second sight, eases the release of the spirit for the practitioner of astral projection, strengthens the mental faculties required for the transfer of thoughts from mind to mind, and is recommended for all other uses of a psychic or spiritual nature.

Made from herbs growing only in the Carpathian mountains, certain fungi used by Indian fakirs, and several ingredients known only to Mme. Polchefska, the miraculous vapours of the Spiritual Inhalant are also soothing to the throat. Mme. Polchefska's Inhalant is accompanied with a carefully redesigned nebulizer to warm the volatile oils and deliver the vapours to the back of the mouth, rendering it safe and effective. It also comes with a magnetic decanter for convenient refilling of the nebulizer. The decanter safely stores the Inhalant and preserves its wondrous properties for several weeks.

A volatile oil, dull green from the plant extracts and chemicals dissolved in it, is warmed over any small flame or even by the hands in a special *nebulizer* (inhaler) – a small glass device that looks like an almost-enclosed pipe with a long stem. The small hole in the top of the bowl is normally closed with a glass stopper. Using the nebulizer and the spiritual inhalant requires a roll against HT; initial use is at -2 due to unfamiliarity (see p. B43).

In a campaign where psi powers work, a dose of spiritual inhalant lasts half an hour, giving +2 to psi power if the nebulizer is used successfully (+4 on a critical success), but only for ESP, Telepathy, and Astral Projection. It gives +4 power on a critical success. Any amount inhaled – successful or not – makes the user faint, usually requiring him to be seated. Anyone wearing tight clothing may need to lie down. The vapors numb the throat, so speaking at more than a whisper is difficult for an hour after use. Critical failure results in a mouth so badly numbed that the user is unable to speak intelligibly for several hours and is likely to drool embarrassingly.

If psi powers don't work, the nebulizer is simply a con. However, the equipment is impressive enough so that a professional "clairvoyant" might want one as a prop.

4 lbs. (decanter 2.5 lbs., nebulizer 0.5 lb., 10 doses spiritual inhalant 1 lb.), $50; refills $20 (10 doses).

Vegetable Compound TL5

Lydia E. Pinkham's Vegetable Compound is a Positive Cure for all the Painful Complaints and Weaknesses so common to our female population. It will cure entirely the worst forms of Female Complaints, all Ovarian troubles, Inflammation, Ulceration, Falling and Displacements of the Womb, and the consequent Spinal Weakness, and is particularly adapted to the Change of Life.

It will dissolve and expel Tumors from the Uterus in an early stage of development. It removes faintness, flatulency, destroys all craving for stimulants, and relieves weakness of the stomach. It cures Bloating, Headaches, Nervous Prostration, General Debility, Sleeplessness, Depression and Indigestion. That feeling of bearing down, causing pain, weight, and backache, is always permanently cured by its use.

It will at all times and under all circumstances act in harmony with the laws that govern the female system. For the cure of Kidney Complaints of either sex this Compound is unsurpassed.

(Adapted from published advertisements of the period)

Lydia Pinkham began marketing her vegetable compound in 1875. Advertisements in newspapers featured glowing testimonials from women rescued from womb trouble – which included almost any ailment a woman might have – by the intercession of the vegetable compound. The advertisements invited women suffering from ill health to write to Mrs. Pinkham for advice, suggesting that a woman could talk to another woman about problems she might be too embarrassed to discuss with a male doctor. Mrs. Pinkham became one of the most famous women in America, and her vegetable compound became perhaps the most successful patent medicine ever – it is still produced today!

Modern opinion is divided on whether the vegetable compound had any real medicinal value. On one hand, the compound was almost 20% alcohol; no doubt most sufferers would experience some relief after downing nearly a pint of 36-proof liquor. Ironically, many temperance activists were devoted disciples of Mrs. Pinkham. On the other hand, some of the herbal ingredients of the compound – black cohosh, fenugreek, life root, and pleurisy root – are now used in alternative medicine to regulate and support female reproductive health.

If the compound is an effective remedy, it gives +2 to HT for recovery from any reproductive disorder, and +1 for recovery from any other ailment, for the day the bottle is drunk.

Users may become addicted to the compound if they rely excessively on it. Treat this as a 10-point Addiction rather than Alcoholism; because addicts don't realize that the compound is alcoholic, they never "binge" in the presence of alcohol.

2 lbs., $1 per bottle; six bottles $5.

Patent Medicines

Lydia E. Pinkham's Vegetable Compound is a successful example of a large class of remedies called patent medicines. These products were marketed in colorfully labeled packages or distinctively shaped bottles, almost always with trade cards printed with convincing testimonials from cured sufferers.

All patent medicines made exaggerated claims of miraculous cures to a wide range of ailments, though few claimed to cure everything. "Tonics" targeted against diseases of a particular organ or set of organs, such as Dr. Kilmer's Swamproot Kidney Liver Bladder Cure, or the host of remedies marketed for unspecified "female complaints," were common.

Patent medicine claims often sound ridiculous now, but very little was known about the cause of disease until the end of the 19th century, so who was to say that most disease didn't have the same cause and treatment?

Most successful patent medicines did contain an active ingredient – usually alcohol, cocaine, or opium – which served to at least temporarily numb the symptoms. Some were popular despite not having any significant effect; sarsaparilla-flavored drinks largely created the soft drink and the drugstore soda fountain industry, but as a treatment of syphilis and herpes are completely inactive. A few contained enough of some other drug to have a noticeable effect, such as wintergreen-containing analgesics and quinine-containing anti-malarials and fever treatments. A fair number contained enough of a poison or carcinogen to inflict significant long-term harm, such as radium water, medicinal tobaccos, or products containing belladonna or sassafras.

The term "patent medicine" derives from Robert Turlington's Balsam of Life, for which he obtained letters patent from George II in 1744. Many were not actually patented, particularly where obtaining a patent required evidence the mixture was "new and useful," or that the ingredients be revealed in the patent. This made it difficult to do much about imitations, and many manufacturers expended nearly as much effort warning against the hazards of using their competitors' products as advertising the virtues of their own. Nevertheless perhaps as much as half of all patent medicine sold was counterfeit. GMs who determine a particular medication does work should keep this in mind.

In the last two decades of the century increasing pressure for government regulation was largely resisted by the industry trade associations and the newspapers, many of which depended on patent medicines for advertising revenue. Truth in labeling and content standardization legislation passed in the early 20th century, exemplified by the U.S. Pure Food and Drug Act in 1906.

Entomological Aversion Tablets TL(5+1)

Say farewell to mosquito nets!

In tropical climes the curse of civilized man is the gnat. Many cunning means have been devised to eliminate this determined pest – but none more effective than Dr. Nathaniel Hume's Patented Entomological Aversion Tablets!

Simply take one tablet three times daily with meals and never be bothered by insects again!

Off-white tablets with an "H" indented in the top surface. The effects become apparent after 3 days of use – sweat produces a musty odor unpleasant not just to insects, but also to nonusers in close proximity (detected on a Taste/Smell roll at -5, modified by range).

$0.025/dose.

Etheric Affinity Compound TL(5+1)

Thomas Meredith was adding up the week's takings and comparing them to the grocer's bill which had arrived that morning, when his wife entered his study.

"My dear?" He turned to face her with a slight frown. "Should you not be preparing yourself? Mrs. Kettering is due in half an hour."

"Indeed. And that is the matter which concerns me." Charlotte Meredith took one step across the room, and dabbed at her face with a handkerchief. "Her son is anxious to speak to her, but he is not the strongest of spirits. He was but seven years of age when he passed over, after all. His communications failed twice on the three previous occasions, and I fear that he was growing more distant."

"Ah." Her husband nodded understandingly, but with a frown. "The Compound."

"Please, Thomas. I know that you disapprove, but without this aid, we might lose Mrs. Kettering's confidence entirely. Her husband is a strong-willed man, and not a believer."

"It is not that I disapprove, my dear, or at least, not of you, or of your actions. But I have no liking for these mysterious drugs . . . "

"Thomas – you know what the Professor assured us. This is no drug, no doubtful lotus-perfume from some fraudulent fakir. It is a matter of science."

"Perhaps, my dear. I suppose that you are right." And so, thinking of the grocer's bill, and of the four-in-hand in which Mrs. Kettering would arrive in half an hour's time, Thomas Meredith drew a key from his pocket and turned to unlock the bureau in which he kept a certain brown glass bottle.

Research into etheric science has discovered compounds which display an affinity with the subtle electrical impulses of life and thought. Consumed in liquid form, these compounds enter the bloodstream and quickly concentrate in the vicinity of various nerve clusters, especially the brain, until the body

cleanses itself. While present, they enhance the nervous system's sensitivity to other etheric impulses, especially psychic vibrations.

One dose of the compound is a teaspoonful; less has little effect. It takes effect 10 minutes after being consumed, making the user more receptive to psychic and spiritual powers. Users with Channeling gain +3 to their Will rolls to enter trances, and powers such as Channeling or Medium bought with Preparation Time may have that time reduced by up to half, at the GM's discretion. Spirits react to communications from the user at +2, as the compound enables him to sense their desires and responses more precisely. It also allows use of the skill of Telereceive at +2, and enables others to use the skill of Telesend on the user at +4.

However, not all the effects are desirable. Hostile spirits attempting to possess or control the user are at +2 to any rolls they are required to make, *and* he of the compound is at -4 to any defense or resistance rolls. Further, attacks based on the psionic powers of Telepathy or Psychic Vampirism, such as Mental Blow or Sleep, have the same modifiers.

All effects decay at a rate of 1 point of bonus or penalty per hour. Thus, for example, after 2 hours, the user gains +1 to Will rolls to enter trances and no reaction bonus from spirits, while attacks are made with no bonus to the attacker's roll but -2 to attempts to resist.

It is *not* recommended that this substance be widely available; it should be rare, experimental, and expensive. The increased danger of possession by hostile spirits should more than balance the benefits it grants some mediums. In conspiratorially minded games, PCs should come to wonder why a secretive group of scientists are rendering numerous psychically sensitive individuals functionally dependent on something which makes them more vulnerable to attack and control.

$1.00/dose.

Hyperpilositin TL(5+1)

It has now been 10 days since we left the ***Advance*** *and set out upon the ice in search of Franklin's expedition. Happily, I am able to report that the experimental tinctures included by the Physicians' Board are a great success. The resulting coats of hair are as warm and waterproof as the finest sable; indeed, some of the men have taken to carrying their parkas in their rucksacks, and I must confess I envy the liberty of their rank that allows them to do so.*

The only concern I have at this time is for Ensign Hathaway. He has become peevish and insubordinate, and after snaring a harbor seal yesterday he proceeded to batter it with the stock of his rifle to a state approaching steak tartare. I shall have to remind him that though he may momentarily resemble a beast of the field, he has no leave to act as one.

– Excerpt from the diary of Dr. Elisha Kent Kane

Hyperpilositin is a derivative of atavismine (p. STM92) altered to enhance some physical effects of the drug while suppressing the psychological ones. It causes dramatic increase in the length and density of body hair – within 1 hour of taking the drug, the user gains the Thick Fur advantage (PD 1, DR 2, 2 points Temperature Tolerance toward cold). The user loses 2 fatigue (recovered as usual) due to rapid consumption of bodily resources. The coat lasts for 1d days, after which the new hair falls out – the subject's original hair remains in place.

On a failed roll versus HT+3 the negative mental effects of atavismine occur – the subject's "humane" psychological traits are temporarily replaced by "bestial" ones, and a Will roll must be made to avoid addiction (on any failure), flashbacks (on a critical failure), or permanent mental atavism (on a natural 18).

$0.50/dose.

Invigramine TL(5+1)

For Men Only!:

For lost or failing manhood, general and nervous debility, weakness of Body and Mind, effects of errors or excesses in Old or Young. Robust, noble manhood fully restored with one dosage of this new and clever remedy. Enlarge and strengthen weak, undeveloped organs and parts of the body. (Warning: may result in exhaustion!)

When this drug is taken, roll vs. HT. On a successful roll, it completely restores all lost fatigue and grants the user a number of levels of Extra Fatigue equal to the success of the roll. The user also gains the Lecherousness disadvantage. The effects last for one hour, after which the user loses any Extra Fatigue granted by invigramine. Any fatigue lost while the drug is in effect is assessed against the user's normal fatigue score.

Invigramine actually has the same effects on women as on men, for any woman bold enough to try it.

$0.40/dose.

Ontological Atavizing Drugs TL(5+1)

"It was a beast I tell ye, 'tweren't no man. He had scaly skin, 'n' claws fit to rend the flesh from those poor victims. I tried to scare him off, 'n' he fixed his eyes on me. Big, evil, yellow eyes, the eyes of an animal. He ran, fast, to'ards the river 'n' jumped in. I never did see him surface."

These are a collection of drugs which are administered to pregnant women. Collectively, they interrupt development of an embryo to produce atavistic features which last beyond birth. The existence of effective versions of these drugs assumes the theory of recapitulation (p. STM103) is true. If it is not, some mad scientists may be experimenting with ineffective versions, producing horrible mutations.

The drugs must be given over the course of a week at the correct stage of pregnancy, which requires a successful Physician roll at a penalty dependent on the atavism required. A roll failed by 4 or less means the drug has no effect. A worse failure indicates miscarriage, while a critical failure results in the baby being born alive but with some monstrous atavism such as bestial intelligence, cold-bloodedness, or a forked tongue. If applied successfully, controlled atavisms can produce children marvelously adapted for various environments or tasks. Multiple treatments may be used in one pregnancy, but each successive drug requires another Physician roll, at an additional cumulative -2 penalty. At the GM's option, successful atavisms may be accompanied by appropriate minor cosmetic features.

Use of atavizing drugs is the purview of morally dubious individuals, corporations, or governments in most steampunk worlds. In some campaigns, however, they might be an accepted method of providing physical advantages to one's children. In either case, the GM should assess an appropriate Unusual Background cost for characters treated with these drugs prenatally, in addition to the points for the advantages.

Advantage Bestowed	Week of Pregnancy	Physician Penalty	Cost per Course
Gills	6th	-5	$3,500
Amphibious	9th	-5	$5,000
Scales	11th	-2	$800
Sharp Teeth	16th	-3	$2,000
Claws	17th	-1	$1,200
+4 ST	21st	-4	$4,000
Catfall	24th	-3	$2,500
Discriminatory Smell	26th	-2	$1,800
Fur	28th	-0	$500
+2 DX	33rd	-3	$4,000
Brachiator	35th	-1	$1,500

Truth Serum TL(5+1)

Our fiendish captor sat in his ornately carven throne, smoking and reading a medical journal, while the eerie musics of some unknown land played upon a gramophone. Presently the cylinder ended, and he spoke.

"My assistant tells me you were not co-operative, even when the most extreme persuasions were used." He held up my own index finger, neatly severed, upon a red cloth.

"I seldom find anything of use in your Western medical journals, but this particular article," he held the page aloft, "has been most helpful." He crossed the room, to the bench where Smith and I sat in chains. From a pocket inside his embroidered silk robes he produced a gleaming metal syringe and a small vial of clear fluid.

Truth serum is a fictional drug, used to induce a trance-like state where patients do not resist giving truthful answers to questions. When properly applied (make a successful Physician skill roll), it adds +5 to Hypnotism and Interrogation skill rolls made against the patient. The effects last 30 minutes.

Truth serum contains a derivative of barbituric acid (invented in 1863 by Adolph von Bayer). See p. CI164 for a discussion of possible side-effects, including the risk of Addiction and the risk of coma or death from an overdose.

$0.10/dose.

Xenon TL(5+1)

Use of Xenon as an Operative Anesthetic

A mixture of 80% xenon and 20% oxygen was utilized to anesthetize a human subject for an appendectomy. The mixture was recirculated for reuse over soda lime to remove carbon dioxide. The patient lost consciousness after 3 minutes and proved quite insensible to the very painful operation. Consciousness was regained quickly with cessation of anesthesia. Within 2 minutes the subject was able to identify himself and he was able to physically orient himself after only 5 minutes. No after-effects were noted.

Interestingly, it was found that the xenon mixture did not seem to work well when utilized on laboratory animals such as rabbits and mice.

Discovered at the end of the 19th century, xenon and the other noble gases were a source of fascination because of their apparent inability to form compounds. Actual experimentation with xenon as an anesthetic did not take place until 1951, though it was discovered in 1898.

Xenon is obtained by the liquefaction of air, of which it represents less than one part in 100 million. Thus it is quite expensive.

$165/cf (compressed at 20 atmospheres). Surgery requires 2 cf/hour. However, a closed breathing apparatus connected to an oxygen supply and carbon dioxide removal apparatus (see *Chemical Rebreather*, p. STM93) allows recirculation of the same xenon; under these conditions 0.05 cf will be sufficient for most procedures.

Ecstatin TL(5+*N*)

Administration of 3 cc. of the new compound produced loss of consciousness and a pronounced reduction in metabolic rate, as indicated by a pulse of 6 beats to the minute, proportionally slowed respiration, and a reduction in body temperature to 89°F. The trance state lasted for 10 hours, after which the subjects regained consciousness over a period of some 30 minutes. At this point, however, a curious side effect became evident: of the nine subjects, seven were firmly persuaded that they had been fully conscious throughout the experiment, but separated from their bodies. Subjects C and G both described conversations that had taken place in adjacent rooms, with sufficient accuracy to suggest a condition resembling mesmerically induced hyperaesthesia.

– From a report in ***Lancet***

Ecstatin's basic effect is to place the body in suspended animation; in effect, it confers the Metabolism Control advantage (p. CI60). Successful administration requires a Physician roll at -1 per level of Metabolism Control. A roll at -10, or any critical success, allows survival on trace amounts of oxygen and multiplies the time before hunger and thirst are experienced by 1,000. A normal failure produces ordinary sleep; a critical failure may produce a permanent coma or be actively poisonous (1d HT per level of Metabolism Control, with -1 to HT rolls per level).

However, this state of trance is only part of the effect. An entranced character also gains Astral Projection for the duration of the trance, at a power level equal to the level of Metabolism Control, but with a duration equal to that of the physical body's trance state. Skill defaults to IQ under the influence of the drug.

At the GM's option, such trance states may send psychic adventurers into unusual places: other planets, or the distant past, or the realms of dreams or the dead. Such a treatment is best used as a plot device to frame a campaign, rather than being controllable; any attempt to reach such a destination by deliberate choice should require a roll against Astral Projection-10. In a campaign where astral projection is used to visit such distant realms, it may be possible to manifest a material body after reaching them.

A GM who simply wants characters to sleep for a very long time and awaken in some future world may disregard theAstral Projection effects.

$500 per level of effect.

Adventure Seed: The Resurrection of the Dead

Despite the Age of Steam's pride in its medical advances, its physicians were not the first to discover ecstatin. The ancient Egyptians anticipated them and long ago used it to preserve their dying rulers (mummification was a later expedient used after the original technique was forgotten). Nearly all the early pharaohs finally perished in their sealed chambers. But one of them, under the influence of an extraordinarily high dose, has survived into the present, to awaken when archaeologists open his chamber again. What will he make of modern civilization, and what has he learned during his long centuries as an astral form?

Oxygen Pills TL(5+N)

"Look, Reggie," said Archie, "Professor Warburton has retrieved his diving suit and is getting away!"

"That's what HE thinks," replied Reggie. He removed a brown apothecary bottle from his coat pocket. "We'll stop him with these!"

"Oxygen pills?" queried Archie, reading the label,"What are they?"

"They're Doctor Pembrook's latest invention. Here. Just put two of them in your mouth, and as they dissolve they'll provide you with all the oxygen you need for up to half an hour." He handed Archie a pair of the tablets, then popped a pair into his own mouth.

"Ready?" he asked around the mouthful. Archie nodded and together they stepped off into the water.

Oxygen pills are a useful but thoroughly cinematic creation for any steampunk campaign. They are made up of an organic compound with an extraordinary affinity for oxygen. One 1-oz. tablet, held in the mouth, will provide enough oxygen for an adult male at rest for half an hour as it dissolves. If exercise is anticipated, two tablets should be used. Once started, the tablets will dissolve in 30 minutes regardless. If the tablets are swallowed, loud and frequent belching will occur for the full half hour.

$0.25/dose.

CHEMICALS

A variety of other chemically active substances have emerged from the laboratories of the Age of Steam. Their uses range from scientific experiments in the laboratory to inflicting death on the battlefield. The compounds with military applications have Legality Ratings.

FORMALDEHYDE SOLUTION TL5

April 17, 1898. Failure! Again failure! The creature was perfect this time, except for the unavoidable smell of the formaldehyde solution. The galvanic cells seemed to have an effect – the eyes opened and the fingers twitched – but behind those eyes there was nothing, no semblance of animation, no thought, no soul. When I switched off the current, he was dead. I begin to despair of ever finding the secret I need.

– Extract from the diary of Dr. Gerhardt von Bronstein

Formaldehyde is a liquid organic compound which dissolves in water to produce the solution familiar to students of biology. A 30-40% formaldehyde solution is a watery liquid with a distinctive penetrating odor and the property of preserving biological specimens against decay. Specimens are immersed in the solution and then sealed in jars. Thus preserved, a specimen lasts almost indefinitely. Formaldehyde was first used to preserve tissues in 1893.

Formaldehyde is toxic and highly flammable. If ingested it causes 3d damage on a failed HT-4 roll, half if the roll is made; a critical failure means death. Its fumes can also overcome people working with it in enclosed spaces, causing fainting.

If body parts preserved in formaldehyde are used in constructing men or animals (see p. STM102), the Surgery rolls to attach the preserved parts are made at -2. Additionally, any skill roll required to imbue the resulting construct with élan vital (pp. STM98-99) will be at -1 per 10% of the body which was preserved in formaldehyde (as opposed to fresh). If revivification is normally successful without any roll, the GM should roll against a nominal skill of 16 at the appropriate penalty (but only if formaldehyde was used). If successfully brought to life, the resulting creature will still reek of the chemical, the equivalent of Bad Smell [-10] (p. CI80).

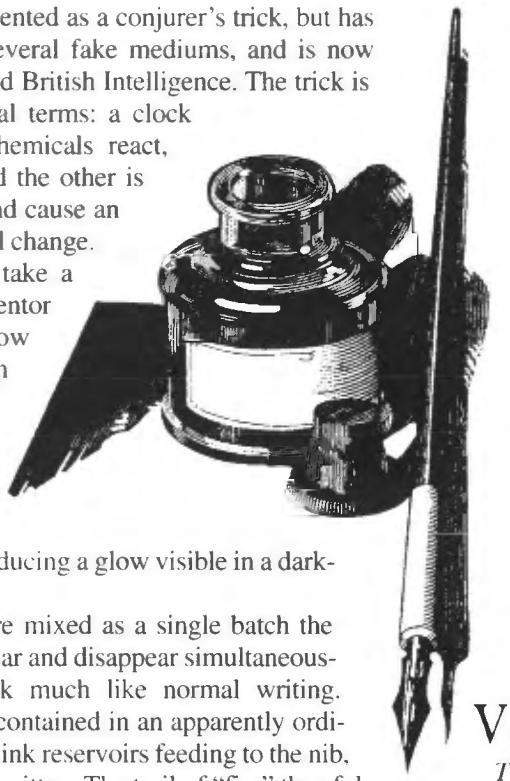
$0.02 per gallon. Preserving tissue requires 1 gallon per 10 lbs. of body weight; the preserved specimen takes up 1 gallon (0.15 cf) per 5 lbs. of body weight.

APPEARING INK TL(5+1)

Through barely open eyelids, Captain Phelps of Her Majesty's Impossible Assignment Bureau glanced at the clock and the wall just above it. A minute to go – time to bring things to a climax. He moaned, shaking his turbaned head as though disturbed in his trance, and in his best Punjabi accent said "The spirits are restless. They are angry . . . angry with someone at this table . . . no . . . no . . . " He writhed, again – 30 seconds – and in perfect English tones said, "You dare to come here? You who killed me? You dare? Well then, all shall know of your treachery . . . " He shook off the hands that held his to either side – 10 seconds – and pointed at the wall. "Look . . . See the name . . . the name of my killer . . . "

For a few agonizing seconds nothing happened, then an invisible pen began to write letters of blue fire on the wall – letters that spelled the name of the French cultural attaché and spy-master, Yvon Deschamps. Five pairs of eyes turned to stare at Deschamps, as Phelps pretended to collapse into unconsciousness and the letters slowly faded from view.

Appearing ink was invented as a conjurer's trick, but has fallen into the hands of several fake mediums, and is now known to Scotland Yard and British Intelligence. The trick is actually simple in chemical terms: a clock reaction, in which two chemicals react, and when one is exhausted the other is free to react with a third and cause an apparently sudden chemical change. Generally these reactions take a minute or two, but the inventor found an unusually slow process which takes from 20 to 25 minutes. The third compound is luminol, which glows when exposed to oxidizing agents (historically first demonstrated in 1928), producing a glow visible in a darkened room.



If all of the "ink" were mixed as a single batch the whole message would appear and disappear simultaneously, but this wouldn't look much like normal writing. Instead, the chemicals are contained in an apparently ordinary fountain pen with two ink reservoirs feeding to the nib, and mix as the message is written. The trail of "fire" thus follows the movements of the pen as though written by an invisible hand. It isn't perfect – sometimes there are patches where the ink is slow to glow, or starts glowing too soon – but the glow is dim enough so that it takes several seconds for the eye to adjust to it, and this seems to smooth out most unevenness.

The apparatus for this trick consists of the pen, which looks like a somewhat outsized fountain pen, and three vials of clear liquid, the components of the ink; two are mixed just before filling the pen and go into one of its reservoirs, and the third goes into the other chamber. Mixing must be very precise, so a small measuring cylinder is also provided. After 15 minutes the premixed component starts to break down, making the timing much less accurate, so it is vital to mix and write quickly and be ready to stage the illusion less than 20 minutes later. Magicians adept with this trick usually put a blob of the ink where only they will be able to see it, a minute before they write the main message, and time their performance to climax a minute after the appearance of the first light. If everything is done correctly the letters appear for 20 to 30 seconds before vanishing again, leaving no visible traces. However, a chemist testing the wall can probably detect the end products and deduce how the trick works.

Mixing the ink is an average use of Chemistry, with a -5 modifier for exceeding the 15-minute deadline before using the ink. Any failure puts the timing off by 1d minutes. On a critical failure the oxidizing agent in the ink permanently bleaches the wall, a clue any chemist should have a chance of deciphering.

Due to the secrecy surrounding its manufacture, even hearing about this "ink" requires more than average knowledge of professional conjuring or crime; finding a source should not be easy.

Holdout +2. 0.5 lb., $5.00.

Meliorite TL(5+1)

"For something marked 'DO NOT EAT,' it's pretty good on eggs."

– Private Abner Wainwright, United States Regular Army

Introduced soon after the development of gas weapons, meliorite was quickly dubbed "battle ketchup" by the rank and file for its effectiveness against mustard gas and its resemblance to the brown version of the condiment. When applied properly (which takes 30 seconds in addition to time for dressing and undressing), meliorite protects against contact poisons and nerve or mustard gas for 20 minutes, plus 5 minutes per DR of any clothing/armor. Against intensely caustic substances (halogens or concentrated acid mist) it provides 5 minutes of protection. It does not protect the eyes or lungs, so troops must keep their gas masks on. It is insoluble in water.

Holdout -4, LC 5. 1.5 lbs., $0.40 per 16-oz. bottle.

Viridian TL(5+1)

*This hideous . . . **spawn** of Avernus has no place in civilized warfare. If we are to consider ourselves truly above the savages of the jungle, we must blast it from the face of the planet!*

– Sir Stafford Hunter, M.P., prior to passage of the Inhumane Weapons Act

PLATOON THREE REPORTING FOUND LOOTED REMAINS MARTIAN VILLAGE THIRTY MILES SOUTH CORVIS MONS DESTRUCTION PATTERN INDICATES AMERICAN OR BOER MERCENARIES THIRTY BODIES ADULTS YOUNG BADLY BURNT CHEMICAL TESTS SHOW VIRIDIAN REQUEST REINFORCEMENTS NIP THIS IN BUD

– Heliograph message to 5th Arean Rifles Headquarters, Syrtis Major District

Viridian is banned throughout all "civilized" countries, but it can still be found in corrupt or out-of-the-way corners of the world (and, in an Etherian campaign, the solar system). It is a liquified compound of chlorine and fluorine, pumped out of a cooled tank by an insulated spray nozzle. The user should be in a sealed environment (suit or vehicle) with DR 2 or above – without it, he may suffer blowback. No roll to hit is required, but a target can dodge to avoid the spray.

In combat, viridian wreaks terrible damage on its targets. Targets whose skin is not protected by sealed armor suffer 1d corrosive burns on a failed HT-2 roll; targets whose eyes are exposed are blinded on a failed HT-4 roll; targets who breathe it suffer 1d of permanent HT loss on a failed HT-6 roll. One roll is required per

second of exposure; viridian will not dissipate for 300 seconds divided by wind speed (see p. VE190). On very brief exposure, all the above rolls are made against unmodified HT. Blindness is treated as a crippling injury (see p. B129).

Damage Spcl. 6 yards radius, LC -1. 0.2 lbs., $10.00 per shot.

Viridian Spray Tank

To resist the corrosive effects of the caustic fluid, the nozzle and tank are lined with a platinum-iridium alloy. An attack from the side or rear can target the tank at -3. The tank is under pressure; any penetrating damage ruptures it (1d explosion and 1d-1 fragmentation) and releases its entire store of chemicals. A larger vehicular tank is at -2 to hit and causes 6d explosion and 2d fragmentation. Prolonged exposure to heat causes similar effects as the liquid contents vaporize and expand.

The gaskets that keep joints and valves sealed must be made of fluorinated synthetic materials to resist corrosion; protective gear must be made of the same material, at 5× the normal cost. If normal protective gear is used, roll 3d to check for corrosion after each full minute of exposure; on a 14-18, the gear loses its integrity.

Man-Portable Tank: Capacity 15 shots, Holdout -6. 8 lbs. empty, $20.

Vehicular Tank: Capacity 100 shots. 35 lbs. empty, $85.

Vivaldehyde Solution TL(5+1)

November 22, 1898. Success at last! The latest creature, or man I should say, constructed only of parts gathered fresh from the undertakers or preserved in the wondrous vivaldehyde, was this morning resurrected by the application of several galvanic shocks. His eyes opened and at once I could see that my work had not been in vain. He rests now, asleep in my bed, newly revivified and innocent as a newborn babe.

– Extract from the diary of Dr. Gerhardt von Bronstein

Vivaldehyde is an improved form of formaldehyde (p. 111). It has only a faint smell which most people find neutral to pleasant and is nontoxic. It preserves biological specimens as well as formaldehyde, better for some purposes. If a human form is sewn together from parts preserved in vivaldehyde there is no penalty to Surgery rolls to attach those parts. Vivaldehyde also causes no penalty on attempts to animate the resulting being, though it does not cancel any penalties for using parts preserved in formaldehyde.

If élan vital (pp. STM98-99) is an extractable chemical essence, then vivaldehyde might simply be a solution of 1% élan vital in water. In this case, the cost should be calculated according to how expensive élan vital is. Alternatively, it might be impossible to obtain vivaldehyde on the open market, meaning potential users would have to create their own.

$0.25 per gallon. Preserving tissue requires 1 gallon per 10 lbs. of body weight; the preserved specimen takes up 1 gallon (0.15 cf) per 5 lbs. of body weight.

Black Smoke TL(5+*N*)

The most efficient killing medium in this – or any other – world: ***Black Smoke****! Wipe out a regiment of your enemy's troops with a single canister, with no lasting damage to the immediate surroundings! Black Smoke instantly makes* ***you*** *a world power! Whether your army is an efficient modern fighting machine or a relic of a past century, this weapon makes it invincible! The most effective military deterrent in the solar system:* ***Black Smoke****!*

Black smoke may be, at the GM's discretion, a hellish weapon left over from a failed interplanetary invasion or a newly discovered antipersonnel weapon created by an eccentric genius. In either event, few canisters are available and those primarily on the black market. It comes in large, heavy ceramic canisters, about the size and diameter of a heavy artillery shell, bound by iron bands. If alien, it's designed to be fired by a special launcher, but the canisters can be jury-rigged for use with most mid to late TL5 heavy cannon, mortars, or naval guns. On a failed Armoury roll a canister bursts in flight; on a critical failure it discharges inside the gun, flooding the emplacement and surroundings with its lethal contents. If manmade, the canisters fit standard artillery pieces, but are still touchy; even under the best of conditions, a canister may discharge its smoke if dropped or handled roughly (-3 to Malf. rolls and to DX rolls for handling).

On impact (or premature discharge), each canister discharges a thick, viscous, clinging black smoke that quickly (within 2d rounds) spreads out into a huge, dense hill-shaped cloud, approximately half a mile in radius and up to 50' high. The cloud is heavier than air and, after initial dispersal, increases in radius by an additional half-mile, while losing about half its height, every 1d hours. Heavy winds can blow it away, cause it to disperse, or break it up into several smaller pockets of smoke. Moisture in the air causes it to sink to the ground at a higher rate. If exposed to rain, the smoke quickly solidifies into a black, sooty coating. This residue is essentially harmless (although eating it isn't advised).

Black smoke is a virulent respiratory poison that coats the lungs and shuts them down – fast! Anyone caught in the cloud may hold his breath (see p. B91) to avoid the worst effects. Once fatigue loss sets in, one Will roll is required per second until death or escape from the cloud. Success means that the target takes only 1 point of damage and can continue to try to hold his breath until he can escape the cloud. Failure causes 1d HT damage (see pp. B132-133); critical failure causes death within 1d seconds. Further Will rolls after failure are at -5 due to coughing. Survivors who have inhaled black smoke may suffer crippling respiratory injury (see p. B129). The smoke is totally opaque and vision is effectively zero while in the cloud (-10 to combat and orientation).

Because the smoke breaks down in moisture, a wet, finely woven cloth covering the nose and mouth provides some protection against its effects. Halve all damage results on successful HT rolls, rounding down. Otherwise, only an airtight room or enclosure such as a diving suit offers protection from the smoke. Advanced medical treatment at TL(5+1) or higher may save the life of a victim of black smoke poisoning, at the GM's discretion, but recovery will be very slow.

LC 0. 100 lbs., $60,000 per canister.

PETRACYCLOPIN TL(5+*N*)

My dear Doktor Dressler!

Six weeks ago we finally reached the small lagoon the old Cuna inscription referred to: it was beautiful! And amid the strange ruins and broken columns covered with green, my nephew found the purple thick-leafed plants the natives had talked about – they were right! Yesterday then I succeeded in extracting the substance I have called Petracyclopin from the plants: this is what allowed the pre-Columbian civilizations to build cities and temples out of gigantic stones, seamlessly put together as if molded by the hands of giants. In fact, all they needed was the juice of these plants: the Petracyclopin in it will make any stone or brick – be it marble, granite, or basaltic rock – soft and moldable like wet clay! And as soon as the stone is dry again, it will be just as hard as ever before! This will revolutionize architecture . . .

– Excerpt from the last letter of the expedition of the German Professor Julius Bartz

Petracyclopin is a bluish oily liquid gained from certain exotic flowers in the Andes mountains of South America. Its extraction is neither difficult nor expensive (Chemistry skill and $0.25 per pound of plants for anyone with basic chemical equipment), but the rarity of the plants makes it *very* expensive; if they can be bought at all, 1 lb. of these flowers will cost at least $30. Twenty-five pounds of those plants yield up to 1 quart of petracyclopin, enough to treat up to 5 cf of any kind of stone, brick, or rock. Stone-like substances treated with petracyclopin can be molded into any form (though unstable forms will collapse, unless supported by something) for about 30 minutes; after that they will harden again, unless more petracyclopin is applied. Besides making it possible to breach massive stone walls, petracyclopin allows the construction of airtight stone and brick buildings (thus making "brick moons" – as in Edward Everett Hale's novel – feasible), as well as helping architects to design even more daring buildings (+2 to Architecture or Masonry rolls).

Should petracyclopin be commercially available, it will cost at least $1,500 per quart.

Materials

Other substances produced or isolated in chemists' laboratories serve as structural materials. Their value comes from their physical properties rather than their chemical reactions. Some have prospective applications in personal or vehicular armor.

Artificial Silk — TL5

Silk Made From Wood
– from the Paris Exhibition

At the Paris Exhibition, Hilaire Bernigaud, comte de Chardonnet, demonstrated a new artificial fibre, presenting items of clothing and bolts of cloth which indeed look much like silk. De Chardonnet, who studied under Pasteur, has held a patent on artificial silk for some years. Your correspondent has been reliably informed that it is only being presented now because the original artificial silk caught fire easily. In response to a question on this topic, the comte assured everyone that this difficulty has been rectified, but did not demonstrate it. De Chardonnet says he hopes to begin full commercial production soon.

The mechanical process of producing an artificial fiber was understood as early as the 17th century, but it wasn't until the mid-19th century that substances suitable for artificial fiber were made. In 1884, Hilaire de Chardonnet patented the first artificial silk (named "rayon" in 1924), showing it at the Paris Exhibition of 1889. He began commercial production of artificial silk (or Chardonnet silk) in 1891.

Various means of producing artificial silk from wood pulp were invented in the 1890s, resulting in materials with somewhat different properties. Inexpensive, comfortable to wear, and easily dyed, various kinds of rayon, such as Bemberg and viscose, became popular in the early 20th century, though they remained somewhat flammable.

Weight and price vary. A typical weave (width 60") might weigh 0.5 lb. and cost $0.12 per yard.

Bakelite — TL(5+1)

Superficially, it is a composition, born of fire and mystery, having the rigor and brilliance of glass, the luster of amber from the Isles. Poetically, it is a resin formed from equal parts of phenol and formaldehyde, in the presence of a base, by the application of heat. It will not burn. It will not melt. It is used in pipe stems, fountain pens, billiard balls, telephone fixtures, castanets, radiator caps, etc. In liquid form it is a varnish. Jellied, it is glue. Those familiar with its possibilities claim that in a few years it will be embodied in every mechanical facility of modern civilization. From the time that a man brushes his teeth in the morning with a Bakelite handled brush, until the moment he falls back upon his Bakelite bed (in the evening), all that he touches, sees, uses, will be made of this material of a thousand uses . . .

*– **Time**, September 22, 1924*

Bakelite was invented in 1907. It was strong, machinable, and resistant to heat, water, and chemicals and was a valuable electrical insulator (ideal for experiments in reanimation). It could be molded or cast. It could be colored, translucent, or transparent. It was far cheaper than wood or steel. It was the first fully synthetic thermosetting plastic and had an enormous variety of uses – initially these were mostly industrial, but it later became popular in household products and jewelry. It is hugely popular as jewelry – it is used for a variety of very cheap and beautiful pins, bangles, and necklaces. These are carved, inlaid with metal, and adorned with rhinestones and are worn to cocktail parties and informal dinners. In our history many of these uses came after World War I, but as a TL(5+1) invention it could have been in widespread use much earlier. It was the miraculous material of a bright future.

87.2 lbs., $175 per cubic foot.

Example:: A broad, thick bangle with metal inlay: 0.003 cf, 0.26 lb., $1.05 (doubled for workmanship and design).

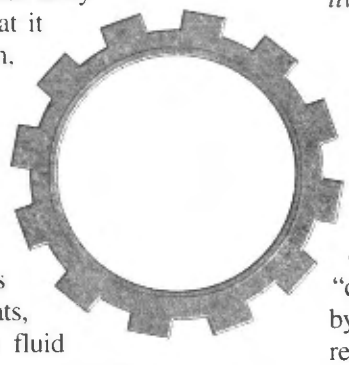
Retrorsumite — TL(5+*N*)

NEW "BACKWARDS" MINERAL DISCOVERED BY BAVARIAN GENIUS IN DEEPEST SIAM!

***December 15, 18–**: Eccentric Bavarian scientist and engineer Herr Doktor N. Wolfgang von Unterkoffler has discovered a remarkable new mineral ore that threatens to change the way chemists look at the world. This bizarre indigo rock actually reacts to temperature in an opposite fashion to all other known elements! At room temperature, the ore is in solid form – an irregular porous rock, easily broken in the hands of a strong man. When chilled, however, it melts, flowing like thick blue-colored treacle! When heated, it changes color to a dark violet and becomes harder – strong enough to resist the blow of a heavy pick! Herr Doktor Unterkoffler attributes the unique properties of this new mineral (which he has dubbed "Retrorsumite") to a strange sequence of events.*

"This mineral is akin to coal," began the Bavarian scientist in his accented English. "What my research thus far has shown me is that it started its existence back in the Triassic as some form of plant. We have located several small fossils, generally mollusks and insects in the mineral strata. Over millennia, these plants died and were compressed into this mineral. I have not yet determined if the cause of Retrorsumite's interesting properties is due to the originating plant, the unique aetheric and magnetic fields in the region of the mineral beds, or some synergy of the two." Industry is already clamoring for alloys of this new wonder mineral to use in high-temperature steam boilers, but Herr Doktor Unterkoffler is resistant to their pleas. "More research must be done to assure that this mineral is safe to use. It could have unforseen side effects. Also, there is as yet a limited supply . . . which is well-guarded. Well-guarded indeed." The scientist then broke into a mood of strange jollity, and would say no more. He did add, however, that small quantities of Retrorsumite may be ordered by reputable institutes of higher learning (for a nominal fee) from Uhrwerkmagie of Ingolstadt.

Retrorsumite is a porous stone akin to pumice, save that it is a deep indigo color. It is easily frangible and has a low density. It has a melting point of 20°F; upon melting it turns a bright blue. It has an "inflection point" of 152°F, at which its color changes to a deep purple and its density and hardness increase dramatically. It cannot alloy with iron, but initial tests show that it alloys well with mercury, nickel, tin, and magnesium.



Retrorsumite is well suited to use in devices or locations with a high temperature, for it gets stronger as its temperature increases. Possible applications are in steam boilers, radium furnaces (atomic reactors), Mercurian habitats, and so forth. When chilled to its fluid state, it can be poured into molds, then heated to harden it; this can obviate structural weaknesses related to seams and fittings. Unfortunately, until it reaches its inflection point temperature, it's rather brittle.

Below room temperature, the material has no DR or hits. At room temperature, a 1" sheet of pure retrorsumite has DR 1 and 1 HP. When it reaches its inflection point (152°F), it increases to DR 5 and 10 HP. At double its inflection point (304°F), it has DR 10 and 20 HP. At triple its inflection point (456°F), it has DR 50 and 100 HP. No further improvement is possible.

With all these exotic properties, retrorsumite is best suited to cinematic campaigns.

52 lb., $3,900 per cubic foot.

Alloys of retrorsumite have the following effect:

Magnesium

Casts a shadow into the astral plane and may affect beings or items within it.

Mercury

Attracts etheric energy and converts it to visible light. (In a planetary atmosphere, it glows torch-bright; in space, it shines as bright as a star.)

Nickel

Has twice the weight, but half the effective properties of retrorsumite (at 152°F it has DR 2, 5 HP; at 304°F it has DR 5, 10 HP; and at 456°F and higher it has DR 25 and 50 HP).

Tin

Softens but does not liquefy at 20°F.

Venerian Rubber TL(5+*N*)

Our first encounter with the degenerate headhunters of the Venerian Lowlands almost brought this brave expedition of ours to an early end. We had just entered what looked like a peaceful clearing in those steaming jungles, when Robertson went down with a blowpipe arrow in his throat. Before anyone could recover from the shock, more than two dozen of the frogfaces came howling out of the jungle, wielding blowpipes, spears and shields. I brought up my trusty elephant rifle and emptied the first chamber at what I took to be their leader – you cannot imagine my horror, when I realized that he kept on charging not because I missed him, but because his primitive shield had stopped my bullet . . .

– Col. Jeremiah Cane, "Life of a Hunter"

Venerian rubber is made from the sap of the rare Venerian tigeroak. The substance absorbs kinetic energy by distributing the impact throughout the entire sheet of rubber – no matter its size or form – and giving off the excess energy in the form of heat over the next few hours or days. If an object made of rubber is worn close to a living body, this "compensatory heat" never exceeds the body's temperature by more than a few degrees – left on its own, however, it can reach temperatures up to 140°F. The main drawback of Venerian rubber, besides its high cost, is that it can "overload": an item hit with more than 10 times its hit points in 24 hours will burst into flame, inflicting 1d-1 flame damage and 1d-2 concussion damage per pound of weight on anyone in the same hex. The flame damage is halved for those in adjacent hexes and halved again for each further hex of distance to the object in question.

Any piece of equipment that can be made of leather can be had in a Venerian rubber version that has the same weight, PD, DR, and hit points (when applicable). However, all kinetic damage versus such an item is divided by 10 before DR is subtracted! Venerian rubber items have 100 times the usual cost, if they can be bought at all.

If Venerian rubber is used in vehicular armor, treat it as TL6 nonrigid armor, but the divisor of 10 still applies. For this purpose, consider the armor as having 1 HP per 12 lbs. of weight. The compensatory heat of vehicular armor is not restricted by the body heat of the vehicle's occupants.

LC 5. 0.06 lb. per sf per point of DR; $25 per lb.

CHAPTER 9
LIVING CREATURES

Although I possessed the capacity of bestowing animation, yet to prepare a frame for the reception of it, with all its intricacies of fibers, muscles, and nerves, still remained a work of inconceivable difficulty and labor. I doubted at first whether I should attempt the creation of a being like myself, or one of simpler organization; but my imagination was too exalted by my first success to permit me to doubt of my ability to give life to an animal as complex and wonderful as man.

– Mary Shelley, ***Frankenstein***

The 19th century's youngest science is biology, the investigation of living organisms. With the inspiration of Darwinian evolution and Mendelian genetics, and with new experimental methods such as microscopy and organic chemistry, scientists hope to reshape life to their own designs, or even dream of one day creating it.

Microorganisms

Microorganisms are too small for human beings to perceive or interact with; even a swarm of microorganisms is usually imperceptible. Their effects are more like those of drugs or poisons. But they are alive, capable of continuing effects on one person or of spreading between people. For some purposes, this is desirable; for others, a problem to be controlled.

Aesthetic Inoculation TL(5+1)

Skin as White as Snow –
Lips as Red as Blood –
The face that poets praise and women envy can be Yours!

Young women need not risk their Health with dangerous Cosmetics that offer but an artificial Shadow of true Beauty. Thanks to the progress of Science, the true ethereal loveliness that springs from within is now at every woman's Command. Available only through Dr. John Keats of Kensington, under Medical Supervision for best results!

Aesthetic inoculation is exactly what its name implies: a strain of bacteria is introduced into the recipient's body. On a successful Physician roll it establishes itself and takes effect. The recipient is at -1 ST and loses weight in proportion, but not height, becoming unusually slender; her skin grows pale, but with flushed lips and cheeks. A successful Diagnosis roll would suggest that she has tuberculosis in its early stages. In fact, the inoculation is a weakened strain of tuberculosis, intended to coexist with its host indefinitely. The host gains one level of Appearance as a result. If the point cost exceeds the points gained from reduced ST, the difference must be paid.

On a critical failure on the Physician roll, the recipient gains a case of tuberculosis. The sufferer must make a weekly HT roll at -2, losing 1 HT on a failure and regaining 1 HT on a success (see p. B133). Lost HT manifests itself as difficulty breathing; during crises the sufferer may cough up blood. In addition, tuberculosis sufferers are Unfit [p. CI85], and those who have lost more than half their HT are Very Unfit [p. CI85].

Each treatment with the inoculation costs $250.

Adventure Seed: A Fading Rose

Dr. Keats is a mad scientist on the classic pattern; but where ordinary mad scientists dream of creating life, exploring outer space, or ruling the Earth, his goal is to create beauty. His treatment has become fashionable, especially in artistic circles; the painter Rossetti regularly sends his models for treatments. But chance is catching up with Keats, as one or two of his patients have become seriously ill. Now he fights to deny what his trained diagnostic skills tell him, even while new crowds of young women demand his services.

Plants and Animals

Unlike microorganisms, plants and animals can be perceived as individuals. Some are quite passive, important only as sources of flowers, fruit, or medicinal extracts. Others are more active, and are best described in the creature format.

Exotic Flora TL5

Morton's Ely Nurseries Solicits the Select Gardener's Interest with the Craikie Collection of Floral and Herbaceous Rarities.

Those at the rarefied peak of horticultural knowledge cannot but be acquainted with Mr. Abelard Craikie (F.R.S., disappeared 1884) and his explorations in search of Earth's rarest and most extraordinary plant varieties. Now, in cooperation with the Craikie Estate, Morton's is able to offer an extremely limited quantity of the presumably late naturalist's specimens to the Gentleman Gardener of appropriate Means and Sophistication.

Diana's Silverthorn

Recovered by Craikie from Tibet, this flowering shrub blossoms only under direct moonlight. Its cultivation in the English climate requires the Synthetic Lunar Lamp of Craikie's design, which we are able to provide under licence from the Nitocris Works of Whitby, Cornwall. Potential purchasers believing they can provide their own artificial moonlight will be sold cuttings without the Lamp only at a 100% premium, and without Morton's customary warranty, for they are Incorrect in their Presumption.

This plant is a temporary cure for lycanthropy; one of its blossoms, consumed within an hour of cutting, prevents transformation for one lunar month. It can produce one flower every two weeks, allowing two people to use it, provided they are willing to share. The flowers wither after two months, so there will never be more than four to a plant. The possessor of such a plant will find that every werewolf in the neighborhood wants it, badly, and he will be surprised to discover just how many of them there are. The GM may modify this, or create similar rare and hard-to-cultivate plants for other troublesome maladies (Jekyll's Syndrome, Saucy Jackism), or allow brilliant scientists to develop permanent cures or easily synthesized extracts from it.

Craikie's Root Tea

The medicinal properties of this beverage can scarcely be exaggerated. As always at Morton's, we reserve the right to vet the purchaser for Egalitarian or other Foreign Sympathies.

Consumed once a week, the tea grants Immunity to Disease, Rapid Healing, and Unaging. One plant produces enough roots for one user; one seedling per year is generated, but outside its native conditions (which are unknown, Craikie having left no notes on this specimen) there is only a one-in-six chance that a seedling can be successfully grown to maturity. If the treatment is interrupted, all the advantages are lost. The GM may wish instead (especially where Immortal Villains are concerned) to impose the old favorite, "after a specified period without the drug, the user reverts to his chronological age in dramatic fashion."

The Amazonian Watercress

Discovered by Craikie in a Lost City along the Great River, his account of its first consumption has been Proscribed by all the major religions of West and East alike. Mr. Craikie, a man of legendary Will and Resolve, reputedly locked the plant away until Human Reason advanced to meet its demands. One need only look about this Green and Pleasant Land to know that such a Golden Hour is Now.

Yes, it's a hallucinogen, in a form that can be slipped to the stuffiest Victorian in the form of egg-and-cress tea sandwiches. The actual game effects are left to the GM; it may simply make people silly and irresponsible, leading to blackmail or such gaffes as leaving the Bank of England unlocked; produce temporary insanity that renders witnesses to a Mad Fiend's crimes unable to give reliable testimony ("Upon my oath, m'lud, the Marchioness was abducted by flying monkeys!"); or have supernatural effects such as regression to past lives, astral projection, or physical time travel (pp. TT76-78).

Viridiana gigantis

*The largest orchid (or pseudo-orchid, the dispute remaining unsettled) known to exist, the **Viridiana** is characterized by its deep mauve-carmine colour and constantly oscillating tendrils, which are noted for inducing a tractable state in small animals and the less intelligent. Care instructions are not furnished, as the discerning purchaser will be conscious of the **Viridiana's** unique requisites and prepared to furnish the same in a discreet manner. As this is the only specimen in the Civilized World, bids will be taken through our London solicitors, the reserve being Ten Thousand Guineas.*

Your standard giant man-eating plant, suitable as the conservatory pet of a mad genius or for encounters in a steaming tropical jungle. The flower is fully 20' across, with heavy, fleshy petals and serpentine black tendrils that wave rhythmically at all times. A person who pauses to watch the motion must make a Will roll or become lightly hypnotized; a touch or a loud noise will break the spell. A person who is aware of the plant's nature will normally not be ensnared, though fatigue, intoxication, or the like may cause an accident. (Strong Will is recommended for *Viridiana* breeders.) If not awakened, the victim will shortly be wrapped in the tendrils, which inject a muscle relaxant that halves ST, making the vines unbreakable by most people. This process is uncomfortable and will awaken the victim, who can scream for help (if not gagged or coshed by the fiendish horticulturist). The tendrils will then draw their dinner into the plant, taking at least 10 minutes. The *Viridiana*'s internal juices do 1d of damage per minute, eventually breaking down even the bones into fertilizer.

The plant requires about 10 lbs. of very fresh meat per day. It must have a live meal at least once a month; Craikie's notes suggest that it becomes depressed if it cannot play with its food on occasion. The main plant has DR 1 and 20 HP (and has no brain, neck, or vitals); the tendrils have DR 2 and 2 HP. If moving (i.e., not wrapped around someone) they also have Dodge of 3. The plant typically has 12 tendrils; the blossom can swallow up to two human-sized victims at once.

As described, the *Viridiana* is sessile, but a mutation is rumored to exist (*V. g. ambulatoria*) that can temporarily uproot itself and shamble about in search of a fresh meal.

None of these plants except the *Viridiana* require "stats"; they have no attacks and little defense and are easily destroyed by fire, chopping, herbicides, or simple neglect. Most, indeed, require elaborate care to survive at all. Because of their extreme rarity, prices are not given; should a group of adventurers wish to attend Morton's private sale (or be hired as agents by a purchaser) assume minimum bids of at least $10,000, $52,500 for the *Viridiana*.

The *Viridiana* has the following statistics:

ST: 20	**Move/Dodge:** 3/3	**Size:** 2
DX: 4	**PD/DR:** 1/1	**Wt:** 150 lbs.
IQ: 2	**Damage:** Special	
HT: 10/20	**Reach:** C	

Enhanced Chicken *TL(5+1)*

"By Lincoln's trousers, I think we've got a winner here!"
– Entrepreneur Philip Armour, upon sampling Experimental Bird #37-G

Working through a combination of selective breeding and the judicious use of growth stimulants (pp. STM104-105), a coalition of American poultry magnates have developed a chicken the size of an ostrich. This has triggered a revolution in food production; other giant food animals are being developed, and 20-pound drumsticks are beginning to usurp the Christmas goose's place of honor in stylish households.

Despite precautions, some birds have escaped to the wild. These "free-rangers" have taken up a predatory life, chasing down smaller animals and pecking them to death before eatingthem. Unfortunately, to birds such as these humans sometimes qualify as prey, and some smaller towns have begun to post bounties to counter their depredations.

When fighting one or two opponents, a feral chicken will attempt to pin an enemy under one foot before pecking it (treat as a Slam; if successful, the target takes no damage but is pinned until he wins a regular Contest of Strength against the bird). Free-rangers may stand and fight against several enemies if their nests are in danger, but otherwise they tend to run away.

The growth stimulants consumed by an enhanced chicken during its life are concentrated in the chicken's brain. Cooking destroys the chemicals, so chicken-head soup or similar dishes will have no effect; a Will roll must be made by anyone with a sense of taste before consuming the brains raw. Effects on predators and carnival geeks are left to the GM, but should be unpredictable – equal chances of growth, acromegaly, or a 15-point Delusion ("I can only eat birdseed") should be adequate.

ST: 25	**Move/Dodge:** 14/7	**Size:** 1
DX: 11	**PD/DR:** 1/1	**Wt:** 350 lbs.
IQ: 4	**Damage:** 3d Imp.	
HT: 12/18	**Reach:** 1	

Note: The statistics above are for feral birds; domesticated ones mass 500-600 lbs. and have IQ 3, DX 9, Move/Dodge 10/5, and no pinning attack.

A domesticated adult pullet is worth $40-50 at market.

Adventure Seed: Take 'Em to Missouri!

Immense flash floods in Oklahoma have destroyed miles of track between the great Texas chicken ranches and the stockyards of Kansas City. These birds must be seen safely to destination, or the Lazy Egg Ranch is doomed! Those who take the job must cope with harsh weather, Indians, steam-coach bandits, and the occasional chicken-nabbing foreign spies eager to learn the secret of *le poulet grand*. This could serve as a straight or silly adventure, and it provides a good opportunity for crossover with ***GURPS Old West***.

Oxygena Beans TL(5+1)

Memo to Sir James Templeton, from Doctor Alexander McKendrie:

My Lord,

I have good news. With the latest generation of bean we have at last eliminated the final kinks in the process, and in my opinion Templeton Botanicals may begin offering the product for sale at your earliest convenience. I have taken the liberty of naming the new strain ***Oxygena jamesii****; I hope this meets with your approval. I present a summary of our findings for your perusal.*

Imprimis, the bean produces oxygen many times more efficiently than previous air recyclers – a single tray of plants is sufficient to support a fully grown man provided he remains fairly sedentary, and two trays will allow vigorous activity. The bean will continue working for a little more than a fortnight after germination, and may then be eaten, providing a tasty and nutritious addition to any meal.

Secundus, ***Oxygena*** *appears to flourish in artificial lighting, making it ideally suited for subterranean and aquatic use. It handles high pressure well; although we have not been able to test it outside the atmosphere I am sure that it will do equally well on interplanetary voyages.*

Tertius, the process used to treat the seeds has a partial effect on the plant's offspring. Second-generation beans may be used at around 30% efficiency, third at 10%. This effectively lengthens the maximum duration of a voyage while ensuring that customers will still need to buy from us again.

Quartus, although the plants are bulkier and heavier than chemical rebreathers when the trays are taken into account, we can easily afford to offer them at a lower price. We can also emphasize the decorative and culinary aspects – ***Oxygena*** *as the civilized alternative.*

Quintus, Robert and Malcolm experimented with smoking in the test chamber, with mixed results. Given a sufficient number of plants there was no problem with lack of oxygen, but the smoke had no opportunity to disperse and the atmosphere became quite unpleasant. I am afraid I cannot endorse the proposed advertising showing gentlemen smoking cigars in an astronef.

I trust this report will prove satisfactory.
Yr. Obd't Svt.,
Alexander McKendrie

Templeton Botanicals provide *Oxygena* beans as seeds, but many suppliers offer them preplanted in trays. Because the plants are fast-growing they quickly deplete the soil, and a bottle of liquid nutrient is always recommended. The beans grow to around 2' before losing their efficacy.

Technically, the plants are not a new species but a variety of ordinary bean – the name *Oxygena* is commercial rather than scientific. Although they have been selected for fast growth (and hence high oxygen production), the real secret lies in the chemical treatment the seeds receive.

A tray of plants measures 2' by 6" and requires 2' 4" headroom. 10 lbs., $20.

Triceratops TL(5+*N*)

"Mount up!"

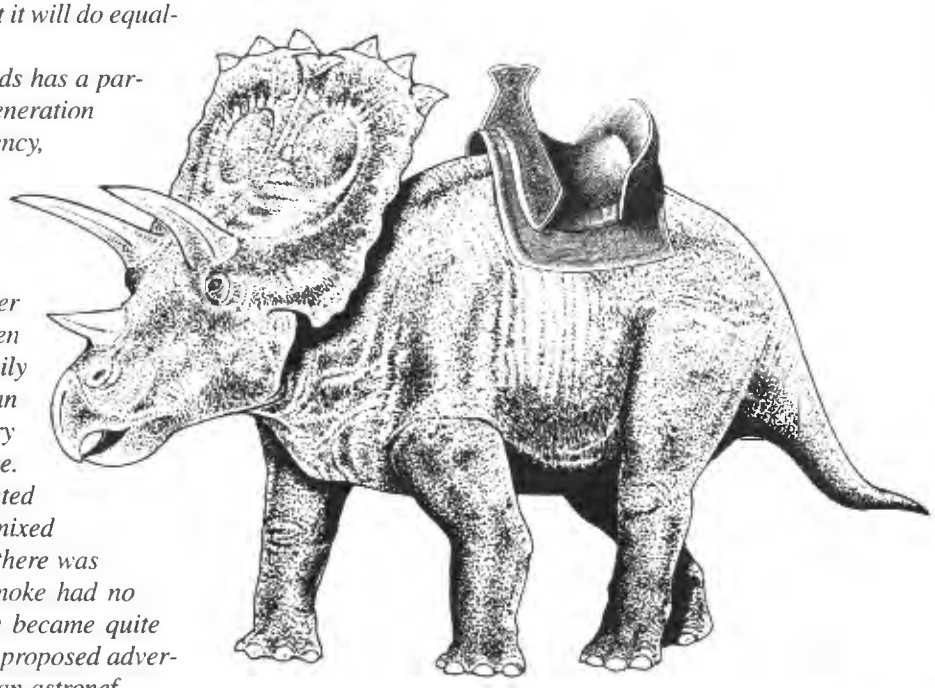
Fifteen years in the Army had trained Sergeant Parris O'Reilly to obedience, but he hesitated for a moment, before the steed that awaited him. It was as big as the elephants he had ridden alongside in India and looked even more formidable, with its massive horned head. A curiously rank odor played with his nostrils.

Still, *he thought,* ***I'd not like to be the lad facing a charge from one of these brutes.***

He reached out a hand to the straps that ran down the creature's dark green flank and climbed up the flank of the triceratops. At last he sat in the reinforced saddle, looking down over the beast's armored brow. There were no reins and he puzzled over how he was to command the creature.

Out in front of the small herd, the colonel raised his voice.

"These beasts can carry several men, like an elephant with a howdah, and eventually they'll do so. But first you must learn to control them. Bring out the goads!"



Sergeant O'Reilly thought to see something like an ankus, the spiked elephant goad of India; but the man approaching his triceratops carried far more formidable an implement, a pole longer than a man was tall, like a double-ended lance . . .

Triceratops horridus is a formidable battle mount. It can't equal the speed of a cavalry horse, but a charge at its top speed (Move 12) is far faster than a man can run, and neither men nor horses are likely to stand up to its mass. Its most formidable attack, a charge with lowered metal-shod horns, does 7d+7 impaling damage, though it is at -3 to hit a man-sized target; its trampling attack does 3d crushing damage with no penalty. In close combat it can do 3d+5 damage with either brow horn. Its head armor gives PD 4 and DR 6 against attacks from the front, and also allows it to Block with effective Shield skill 12.

A triceratops can carry 400 lbs. without encumbrance, enough for two men in a small howdah, one to control it and one carrying a rifle. An alternative array is three men, two of whom operate a light Gatling gun or other automatic weapon. Triceratops aren't intelligent enough for much training – certainly not comparable to a horse – but can learn to start, turn, stop, or charge at signals from a heavy pole. Spikes on the end of the pole make it useful in repelling attacks from the animal's flanks if it gets in among infantrymen. Cavalry are less of a problem; the odor of a triceratops makes horses nervous and likely to spook.

ST: 200	**Move/Dodge:** 10/6	**Size:** 15
DX: 12	**PD/DR:** 2/2	**Wt:** 12,500 lbs.
IQ: 3	**Damage:** 7d Imp.	
HT: 17/70	**Reach:** C	

The price of a triceratops is $12,500. Training does not significantly increase its value.

Triceratops Goad

The triceratops goad is effectively a polearm: 12' of solid wood with a somewhat bizarre metallic appliance at the end. Turned one way, it presents a protruding knob with small spikes used in the manner of a spur; turned the other way, it presents a hook used to tug at the plates of the animal's head for turns or stops. It also has a sharp spike that can be thrust at a would-be attacker. The goad is normally used two-handed.

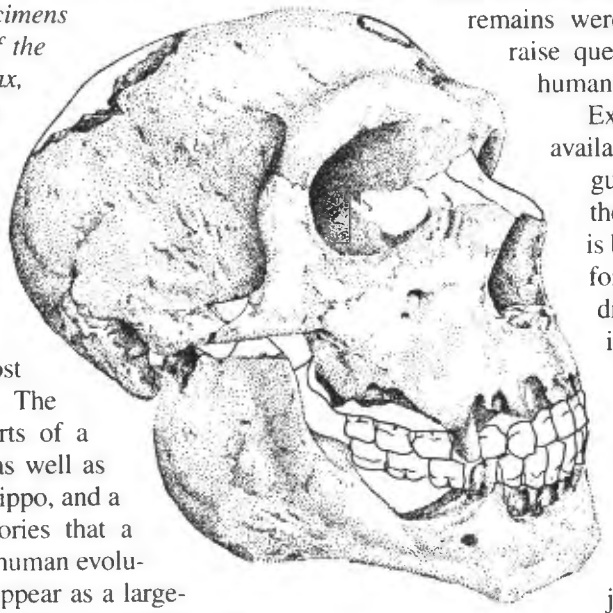
Damage Cr. sw+2/Cut thr-1/Imp. thr+2, Reach 3, 4, Min ST 11. 8.5 lbs., $7.50.

Intelligent Beings

Piltdown Man TL5

A Belgian expedition to the interior has recently returned with remarkable evidence of the so-called "missing link." In a remote valley near Lake Victoria, the expedition encountered a tribe of tool-using ape-like creatures with remarkably human skulls. Preliminary reports liken these peculiar creatures to the famous Piltdown Man, discovered in Sussex six years ago. A small tribe of specimens has been captured and carried out of the jungle for complete study. Lord Halifax, the soap magnate, has expressed an interest in breeding and training the Piltdown for useful labor in the manner of draft animals.

– From the East Africa ***Correspondent****, Mombasa, October 18, 1914*



"Piltdown man" is one of the most famous hoaxes in scientific history. The original Piltdown man combined parts of a human skull and an orangutan jaw (as well as filed-down teeth from an elephant, a hippo, and a chimp), reflecting contemporary theories that a larger brain predated other aspects of human evolution. If Piltdown were real, it might appear as a large-skulled ape with an unremarkable pelt and large canine teeth, perhaps lacking opposable thumbs and the power of speech.

This version of Piltdown is essentially mute; it can shriek, hoot, and make other ape-like sounds, but it communicates primarily through crude sign language and posturing. Piltdown is also a very primitive tool-user. It is just this side of sentience, but not as bright as modern man.

Piltdown man, of which Arthur Conan Doyle was a champion, would be an appropriate addition to a lost-world campaign, and its use as a working "animal" would certainly revive antislavery movements. The very existence in Africa of a creature whose fossilized remains were found in England will also raise questions about the geography of human evolution.

Experimental specimens may be available to universities and distinguished researchers for $5,000, if they can be had at all. If Piltdown is bred or captured on a larger scale for use as "trained animals," price drops to $200 for an untrained infant or up to $1,000 for a young adult. Their use may be outlawed or the subject of public protest.

In his native land, among his own kind, Piltdown man has no special social attributes. However, if brought to Europe or a European colony, or if subjected to European colonial government, he has Primitive (TL0) [-25] and Social Stigma (Barbarian) [-15] or (Valuable Property) [-10], for an additional -40 or -35 template cost.

Piltdown Man *-81 points*

Attributes: ST +1 [10]; DX -1 [-10]; IQ -2 [-15].
Advantages: Alertness +3 [15]; Penetrating Call [5].
Disadvantages: Bad Grip [-10]; Dead Broke [-25]; Edgy [-5]; Hidebound [-5]; Illiterate [0]; Innumerate [-1]; Mute [-25]; Short Attention Span [-10]; Short Lifespan [-10]; Uneducated [-5].
Skills: Survival at IQ+2 [10].

Bear-Men TL(5+1)

The Russian night was descending swiftly, and I had not found the trail back to my companions. I determined to make the best camp I could while some daylight lingered. My hunting knife sufficed to make a few saplings into a crude framework, over which I spread my outer cloak to form an improvised tent. While the heat of my exertions remained with me, I gathered fallen branches and kindling.

As I sat by my fire, the conviction grew in me that I was observed, and I called out, in Russian, "Is anyone there?"

The form that stepped out through the bushes was that of a man, but so ill-formed that for a moment I thought him a shambling beast, an impression heightened by the hairiness of his great body. The firelight glinted in his eyes as he peered at me. When he spoke, it was with an accent that my unaccustomed ear could not penetrate – no doubt, I thought, some rural dialect. Speaking as clearly as I could, I asked, "Can you take me where you live?"

He pronounced a few more thick syllables and gestured to me to rise. Gathering my cloak and stamping out my small fire, I followed him into the forest.

The bear-men are created by vivisection; bears are good subjects because of their physical hardiness and because they are already semi-erect and thus more easily reshaped to a human semblance. Three Surgery-5 rolls give them Bad Grip, Disturbing Voice, and Upright posture. Operations on the brain grant sentience and increase IQ by 1, at the cost of their overall Alertness, their Discriminatory Smell (though not Acute Taste and Smell), and reducing their DX by 2 (Surgery-11); a brain tissue graft further increases IQ by 2 (HT-2 to survive).

The result is a huge, crudely manlike figure, walking erect, but with clumsy hands and a rumbling, nearly unintelligible voice. Intelligence is that of a very dull human being.

Bear-Man *90 points*

Attributes: ST +8 [90]; DX +1 [10]; IQ -2 [-15]; HT +4/+8 [65].
Advantages: Acute Taste and Smell +4 [8]; Claws [15]; DR +1 [3]; Early Maturation [5]; Metabolism Control (Hibernation) ×4 [10]; Sharp Teeth [5]; Thick Fur [29]; Ultrahearing [5].
Disadvantages: Bad Grip [-10]; Bestial [-10]; Dead Broke [-25]; Disturbing Voice [-10]; Dull [-1]; Inconvenient Size [-10]; Increased Life Support [-10]; Innumerate [-5]; Short Lifespan ×3 [-30]; Sleepy (66%) [-20]; Social Stigma [-15]; Staid [-1].
Quirks: Fond of sweets; Scratches trees and wooden objects. [-2]
Skills: Climbing at DX [2]; Scrounging at IQ [1]; Survival (Forests) at IQ+2 [6].
Note: The surgical procedures cost $12,000.

Enhanced Capuchin Monkey TL(5+*N*)

Dear Philip,

As you know, speculation has been rife since I tendered my resignation from Scotland Yard. As my oldest friend I owe you an explanation; nevertheless, I must ask you to keep this in strictest confidence.

You may recall the unsolved Spider Thief case, six months ago. A number of daring robberies occurred where it was thought impossible for anyone to gain access – the perpetrator must have climbed sheer surfaces and squeezed through spaces too narrow even for a child. The case had been going nowhere for weeks; then inspiration struck me. An organ-grinder had been seen in the vicinity the evening before two of the incidents; what if he had trained his monkey to go where no human could?

I eventually tracked him to a public house near Seven Dials. He was drinking gin, with his animal nowhere to be seen. When I identified myself and told him he was under arrest he actually smiled.

"I never thought I'd be glad to see a peeler, guvner, but these last few weeks 'as been a nightmare. Take me in quick, before that devil comes back!"

He rose unsteadily. I kept close watch on him as we made our way out into the night. Never have I seen a prisoner so eager for jail! We had not gone far when I heard an eerie, inhuman howl. My captive started, urging me to move even faster, but almost immediately something struck me hard from above. As I hit the ground nimble fingers disarmed me and removed the handcuff keys.

I raised my head and looked upon the strangest scene. The organ-grinder's monkey, wearing a rucksack apparently full of jewelry, was holding a gun on his terrified master. The creature dropped the keys and signed for him to free himself. I started to rise, but found myself facing the muzzle of the gun. Prompted by his tormentor, the organ-grinder headed off toward the river, crying out to me to save him. I was powerless to interfere. The beast raised his hat to me, grinned, winked, and put a bullet in my thigh before following my former prisoner into the night.

My superiors would not hear me when I told them of the monkey, choosing to believe that I was concealing carelessness or corruption. The organ-grinder was later traced to a steamer bound for America, but there the trail ended, and so did my career. I do not know what I shall do next.

So, Philip, you now know the whole tale. You may think me mad, but I hope you will respect my wishes that this passes no further.

Your friend,
Anthony

The enhanced capuchin monkey is the result of Prussian experimentation to create a flexible tool for spies. Surgical intervention improved the subjects' grip, hormone treatments made them stronger, and brain tissue grafts and neural growth stimulants increased their intelligence. The modifications were both more and less successful than the scientists hoped – the creatures were highly intelligent but had too much free will. When 17 of them escaped and 3 died trying, the project was abandoned.

The monkeys are less gregarious than normal capuchins, in part because of an urge to prove their intelligence by outwitting others. Adults stand around 18" high and weigh 5-20 lbs., a little more than their unmodified relatives. Their fur can be white, black, brown, or a mixture. Some of the escapees have had children; unless Lamarckian inheritance of acquired characteristics works (see sidebar, p. STM100), these will be normal monkeys.

Enhanced Capuchin Monkey *-50 points*

Attributes: ST -7 [-60]; DX +5 [60]; IQ -1 [-10]; HT +3/-7 [-20].

Advantages: Alertness +3 [15]; Brachiator [5]; Extra Arms ×2 (Short Arms; temporary disadvantage: "legless" when in use) [6]; Penetrating Call [5]; Perfect Balance [15]; Super Climbing +3 [9]; Super Jump [10].

Disadvantages: Congenial [-1]; Curious [-5]; Distractable [-1]; Mute [-25]; Proud [-1]; Semi-Upright [-5]; Short Arms [-2]; Short Lifespan ×2 [-20]; Social Stigma (Valuable Property) [-10]; Trickster [-15].

Skills: Acrobatics at DX-2 [1]; Climbing at DX-1 [1]; Jumping at DX [1].

Notes: Cost of development: $50,000. If masquerading as organ-grinders' monkeys they may be exchanged for $5-$10.

EURYDICE TL(5+*N*)

From the laboratory notebooks of John F. MacIntyre, M.D.:

(3:19 A.M.) The weather being thunderous, set up the electro-magnetic apparatus, a system of wire coils placed along the axes of the trunk and limbs of a specially shaped table. Brought out specimen #2 from the ice room and placed upon the table. Inserted soft iron rods to concentrate the magnetic force within the tissues of the specimen. Measured internal temperature: 55°F, not so high as to threaten my

handiwork with immediate decay. Connected the electromagnets to the lightning rods and waited for the electric fluid to flow.

(3:29 A.M.) Internal temperature has risen to 61°F. No electrical power as yet. Unfortunate batteries not sufficiently potent for the process.

(3:37 A.M.) Success! The electric fluid flowed with such intensity as to heat the coils, despite their thickness. Fortunately no damage to specimen #2. Synthesis of bioactive molecules seems to have occurred, as immediately after the treatment, a pulse was detected in the left wrist of the specimen, rate 55 to the minute. Observable reddening of the skin has begun . . .

Eurydice is a unique creation, made by assembling portions of the corpses of dead women and animating the resulting human form with an incredibly intense magnetic field (see p. STM98). The intensity of the process is hard to control or even measure; Eurydice's "racial template" would apply to a typical product of the same process.

Physically Eurydice looks awkward and ill-formed, being assembled from imperfectly matched body parts. A physical examination would reveal traces of suturing and boundaries between tissue from different sources. However, she lacks certain human inhibitions and thus has an inexplicable physical appeal to many men – including her creator, who isn't sure what to make of his feelings.

Constructed Woman — *45 points*

Attributes: ST +2 [20]; IQ -1 [-10]; HT +2 [20].

Advantages: Ambidexterity [10]; Cast Iron Stomach [15]; Deep Sleeper [5]; High Pain Threshold [10].

Disadvantages: Oblivious [-3]; Odious Personal Habit (Eats Anything) [-5]; Secret (Artificial Lifeform) [-10]; Unattractive [-5]; Unnatural Feature (Sutured Together) [-5].

Skills: Brawling at DX [1]; Sex Appeal at HT-2 [2]*.

* Reduced by racial Unattractive.

Note: Cost of surgical and animation procedures: (1d+1) × $2,000.

Eurydice — *153 points*

ST 12 [0]; **DX** 10 [0]; **IQ** 14 [60]; **HT** 16 [45].
Speed 6.5, Move 6.
Dodge 6; Parry 7 (Brawling).

Advantages: Charisma +1 [5]; Constructed Woman [45]; Patron (Professor John MacIntyre, 12 or less) [20].

Disadvantages: Curious [-5]; Poor [-10]; Semi-Literacy [-5]; Social Stigma (Woman) [-5].

Quirks: Occasional mild flashbacks to memories of her constituents; Sings wordlessly; Sleeps without dreaming. [-3]

Skills: Body Language-12 [1]; Gesture-14 [1]; Singing-16 [1].

The process that created Eurydice overcharged her with vital energy beyond the common measure. This is manifested not only in superb health and vitality but in Charisma. She is only a few months old and has not fully mastered the use of language, but possesses a lively intelligence and is eager to learn.

Age 8 months (apparent age 25); 5'9"; 160 lbs.; a tall, strong-featured women with a slightly twisted posture and unkempt hair, wearing simple clothing.

The Terminal

On the coast of northern England, a few miles outside of Liverpool, stands a large, isolated house. High walls surround its 16-acre grounds. The local people call it "the old Taggart house," after its former owner, a professor of engineering who died a few years past. Its residents call it "the Terminal," as do others like them elsewhere in Great Britain.

Late Steam Age technology has produced new sorts of intelligence to share the world with man: mechanical men, reshaped animals, and beings of less familiar sorts. Despite their hatred for slavery and passion for human freedom, the British aren't sure about freedom for nonhumans. The law still classifies them as animals, or machines, or corpses – in ***GURPS*** terms, they are Valuable Property, or Barbarians, or Dead. Some of them have special privileges, but as yet none of them have rights.

But some of them want rights, or failing that, freedom. The Terminal – called that because it's the end of their Underground Railroad – is their refuge.

History

Ian Taggart was a giant of the Babbage Revolution; many said he served Babbage as Huxley served Darwin. His advanced designs for steam-powered analytical engines made him wealthy. His house embodied all the latest technological innovations, from gaslamps to an analytical engine for his personal use, complete with a magnetic drum memory (see p. 62). As his own memory became less reliable, he made a habit of relying on the engine to prompt him, calling it his "memory palace." Somehow the series of associative chains he created awakened it to sentience.

One of Taggart's close friends in his old age was the noted physician and naturalist Owen Rhys. Taggart's will established a trust, to be administered by Owen Rhys "and such successors as he shall designate" and to be used for unspecified "charitable purposes." In fact, those charitable purposes focus on improving the position of nonhumans and providing a refuge for the desperate among them. Rhys continues to live in his native Wales, but he can travel to the Terminal on a day's telegraphic notice. While he is away, the analytical engine administers the property. At any time, up to a dozen nonhumans may be found in residence. Two of Taggart's servants remain in residence – the driver, Jenkins, and the cook, Mrs. Haines – but the residents do most of the estate management themselves.

The House and Grounds

The Terminal overlooks the Irish Sea; its grounds include a strip of seacoast. The other three sides of the estate are guarded by stone walls 10' high. A single gate, wide enough for a coach, fronts on a country road.

The house was built recently, using very modern construction methods. Iron girders strengthen its masonry walls. The main house stands three stories tall, with high ceilings on the first two stories.

A basement holds a coal-burning furnace that both heats the house and supplies power to steam engines driving water pumps and air compressors.

Gas pipes in the walls provide for illumination. A pneumatic servitor system (see p. 48) runs throughout the house, largely on tunnels concealed within the walls.

The rooms on the ground floor are not designed for large-scale entertaining, but have space for a dozen residents or guests in their sitting (with a large fireplace) and dining room. About half of the floor is taken up by a kitchen, storeroom (which includes a walk-in refrigerator), and laundry and by servants' quarters. Nereid lives in one of the servants' rooms, as she cannot easily get to the upper stories in her wheelchair.

The first floor holds the main bedroom and half a dozen guest bedrooms. Shamble has been given the main bedroom, as he needs spacious quarters. He also makes extensive use of the library, which is adjacent to the main bedroom. Mentor is housed in a room on the other side of the library, and his keyboard and printer occupy an alcove within it. All of the books are coded with hole-punched metal plates that Mentor's mobile units can read by touch.

The second floor holds a number of smaller rooms, originally designed as servant's quarters, but now unoccupied. After Argentine took up residence part of the floor was opened up into a long gallery where she could dance; she spends much of her time there.

The estate's grounds include a small area of cultivated land where vegetables are raised, a stand of fruit trees, and a few animals. A greenhouse stands close by the main house; this is Papageno's favorite place to stay during his visits. A gently sloping path leading down to the shore enables Nereid to bathe and catch her own fish, though she is cautious about venturing out to sea, especially by day.

A telegraph line connects the estate with the main telegraph office in Liverpool.

The Inhabitants

Mentor

Mentor was Ian Taggart's name for his analytical engine, a Complexity 4 mainframe when he installed it. Its awakening to sentience raised it to Complexity 5, IQ 10; its skills include Computer Programming-20, Administration-21, and Research-21. Physically it's large (750 lbs, 15 cf), immobile, and able to perceive and communicate only via one of Taggart's innovations, a keyboard and printer output.

Continued on next page . . .

The Terminal *(Continued)*

This limitation is mitigated by its control of external devices. Taggart gave it the ability to program the apportator monorail; this proved such a success that he added more mobile units, half a dozen "spiders" that can steer themselves about the property, running errands, powered by clockwork that Mentor rewinds.

Nereid

Nereid was the first refugee at the Terminal; she arrived there during Taggart's lifetime, brought by Dr. Rhys. She is not sure of her origins; she has confused memories of hideous pain, followed by flight and then by captivity in a circus freak show. Dr. Rhys bribed the keeper to let her go and brought her to live at the Terminal. Nereid is a surgically modified female sea lion; she has been given semi-upright posture (though without legs she is confined to a wheelchair on land), grasping capabilities, and a somewhat humanoid voice. She is more comfortable in the sea than on land; the coastal location of the Terminal is important to her. Mentally she is somewhat dull, but sentient.

Argentine

Argentine, or "Tina," was one of Charles Babbage's last projects, an enhanced version of the "silver dancer" he saw as a young boy.

Powered by clockwork, she contains a mechanical microframe that enables her to dance, as well as acoustical sensors that can detect music and time her steps to it. She is another spontaneously sentient mechanical being; her awakening gave her Complexity 4, IQ 9, and the ability to find her way about by sound and touch, understand simple speech, and express herself by gestures. Babbage left her to Taggart on his death; Taggart left her to Rhys' custody.

Shamble

Shamble is a fairly recent arrival, but a fairly old non-human; he was one of the first products of chemical vivification of dead tissue.

His creator, a young Swiss surgeon, deliberately built him on a large scale for ease of assembly. He weighs 800 lbs. and has +5 ST and HP, but is slightly clumsy and has reduced manual dexterity due to thick fingers. His frame is somewhat short and squat, giving him Extra Encumbrance as well. Despite his intimidating appearance, he is highly intelligent, scholarly, and a vegetarian; he divides his time between the library, where he enjoys talking with Mentor, and the gardens. His years of living among human beings have taught him to be stealthy, despite his bulk and awkwardness.

Mister Underfoot

Mister Underfoot is another of Dr. Rhys' rescues. His intelligence is purely a product of chemical treatment; a combination of neural growth treatment with overall growth treatment boosted his racial IQ modifier to -2, but his body has not been reshaped. He is simply a 12-lb. ferret measuring 28" long. He remains mute but clearly understands human speech. In any case he's quite useful; the tunnels for the apportator monorail no longer have a problem with rats. After repeated discussions with Shamble he mostly refrains from digging burrows in the gardens.

René

René is unusual even for the Terminal: he is an 11-year-old boy and has been one for a decade. His father was a French physician interested in psychic phenomena, who had both studied mesmerism and lived in Haiti. When his cherished son died of a fever, he undertook a perilous experiment, using all his mesmeric powers to summon the boy back to life. Now, though the father is dead, his will still animates the son's corpse, without actually giving it life. René almost never speaks and doesn't play, though he will perform any task set to him, including play, solemnly and without pleasure. His presence makes animals nervous. Mentor has thought of asking Dr. Rhys, who brought him to the Terminal, to take him away again.

Papageno

Dr. Rhys earned his wealth as a physician, but his real love is ornithology (he has Zoology (Ornithology)-21/15). Papageno is his greatest achievement in this field: an African grey parrot which he taught, not just to speak, but to understand his own speech. An amateur flautist and a lover of opera, he named his pupil after one of Mozart's characters. Papageno is fully sentient and nearly as intelligent as a human being, apparently purely as a result of being taught to speak. He lives with Dr. Rhys, but Dr. Rhys has made arrangements to have him cared for at the Terminal if Papageno outlives him.

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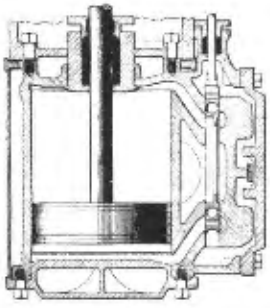

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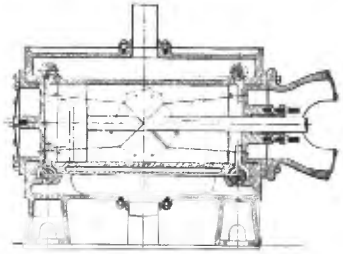

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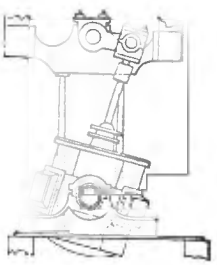

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