

MEDICAL



COLLECTORS



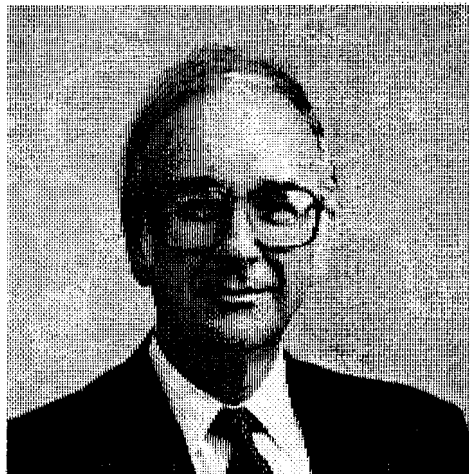
ASSOCIATION

NEWSLETTER NO.31

August, 1997

This is the thirty-first Newsletter in our series and following the format that we have developed over the years, the first item of business for the Summer Newsletter is the Annual Meeting of the Medical Collectors Association. First of all, let me comment on the meeting that we just had on June 13th and June 14th in Frederick, Maryland. We are all grateful to Gordan Dammann and to the staff of the National Museum of Civil War Medicine for graciously hosting this meeting. The scientific sessions in the morning were of the highest caliber and everybody had a lovely social time as well with an opportunity to become acquainted and discuss mutual interests at a local restaurant in Frederick. Thanks to the generosity of Steve Chekey, I am able to include with this Newsletter copies of photographs which he took in digital format of some of the activities. Steve provided me with a large number of computer compatible photographs and I have chosen a few of the representative ones to give you a feeling for the activity. They follow the members listings. Following Friday's functions, several of us convened on Saturday with Gordy to go to the medical sites at Gettysburg which proved to be a fascinating experience.

Dr. Nasim Naqvi, who was one of the participants at the meeting in Frankfurt, has graciously offered to host our next meeting in England. I am bringing this to your attention now so that you can plan for this activity. We are going to have a somewhat different format from usual. The scientific sessions will be held in London during the afternoon of Friday, October 23rd. The sessions will be conducted at The Royal Society of Medicine. The reason for the choice of October 23rd as the meeting



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date is that on Sunday, October 25th, The Scientific Instrument Show which is hosted by Peter Delehar, will be held. This schedule will permit anyone who wishes to attend to go to the antique markets in London on Friday and Saturday, to attend the scientific sessions and dinner on Friday evening, and then to finish up with a trip to The Scientific Instrument Show on Sunday. The Scientific Instrument Show will replace the usual dealers sessions. I just attended the Scientific Instrument Show in April and it is a spectacular event with lots of wonderful offerings. Also, London in April is a marvelous time of the year to visit.

We have not yet begun to put together the actual scientific program. Anyone who is interested in delivering a paper in London should contact me at their earliest convenience so that we can work on the schedule.

I am happy to enclose with this Newsletter two identification objects. Please write in and give us any information you may have on these devices.

I have chosen to include a somewhat unusual patent with this issue. This patent is English and I thought it would be interesting for the readership to see the English style of patent and contrast it with the American patents. This was kindly supplied to me by Alex Peck. Bill Helfand's Historical Images of the Drug Market this issue pertains to a cure for the tobacco habit.

The advertising is quite provocative and I am sure everyone will find it of interest.

The major article of this month is a short one but one which I thought everyone would find very interesting. It is an article on "The Evolution of Artifacts" by Henry Petroski and reprinted from the American Scientist. Professor Petroski has completed a book on, "The Evolution of Useful Things," which was published by Alfred A. Knopf. Those of you who find this article interesting may wish to purchase the book and follow-up on some more insight into this area.

Over the years, from time to time, people have asked me about various types of static electricity machines which they have acquired. These rather bulky devices are really quite attractive although difficult to find and when found are often missing pieces. I fortunately came into a set of directions for the Betz Static Machine from 1903 and I have included a copy of those directions for your interest. Even if you do not have one of these machines it still is very interesting to read about how they were maintained.

Finally, for those of you who are surfing the NET, I want to make you aware of a medical and scientific home page. Thomas E. Jones, who was formerly a medical student at Duke and who is now in a residency at the University of Tennessee, has a very interesting home page and I have included prints of some of the portions of that home page for those of you who are interested with the NET addresses.

The enclosures with the Newsletter this year include an announcement of the next Antique Scientific and Medical Instrument Fair. If this whets your appetite, keep in mind the fact that there will be a Medical Collectors Association Meeting in conjunction with the session in October, 1998. Also for your interest, you might want to know that the Portman Hotel is a pleasant place to stay in a good location and also is very convenient to The Royal Society of Medicine.

For those of you who are interested in Pediatrics, I have enclosed a copy of the Malloch Room Newsletter from the New York Academy of Medicine which has a very interesting article on Abraham Jacobi, "The Father of Pediatrics." Jacobi led a fascinating life and was an extremely interesting individual. I am sure you will find this article fascinating.

The National Museum of Civil War Medicine was kind enough to give me a number of fliers. This is a fascinating place to visit with beautiful exhibits in a lovely area with lots of good antiquing and other attractions.

David Coffeen has recently acquired a most unusual medical dentistry item and has given me the brochures which are also included with this Newsletter.

As usual let me end this brief message with a request to all of you to please submit any interesting items, questions, or other materials to me so that it can be included in the Newsletter. Your participation makes the success of the organization that much greater.

And once again, keep in mind the dates for the meeting in London. Any of you who have not had an opportunity to attend one of the meetings should try. These are wonderful, intellectual and social experiences. If anyone who has not had the opportunity to host a meeting and is interested, please contact me. We would like to have the next meeting back in the States. We could hold the meeting as early as the Spring of 1998 or as late as the Spring of 1999. That is either before or after the London meeting. I do not think that a meeting in the States would conflict with the meeting in Europe.

Once again best wishes, let me hear from all of you.

Sincerely,

M. Donald Blaufox, M.D. Ph.D.

CAN YOU IDENTIFY THIS?

Submitted By: C. Keith Wilbur, M.D.

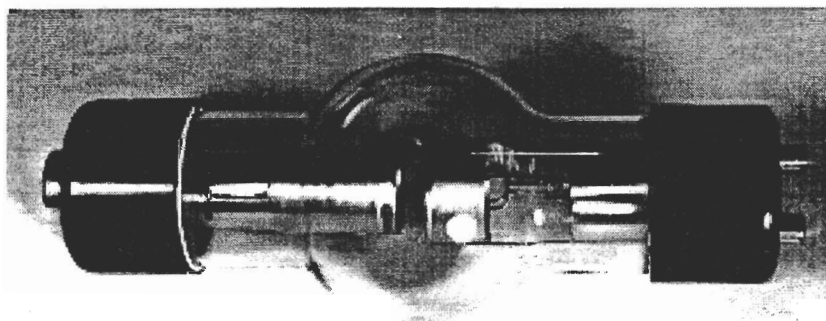
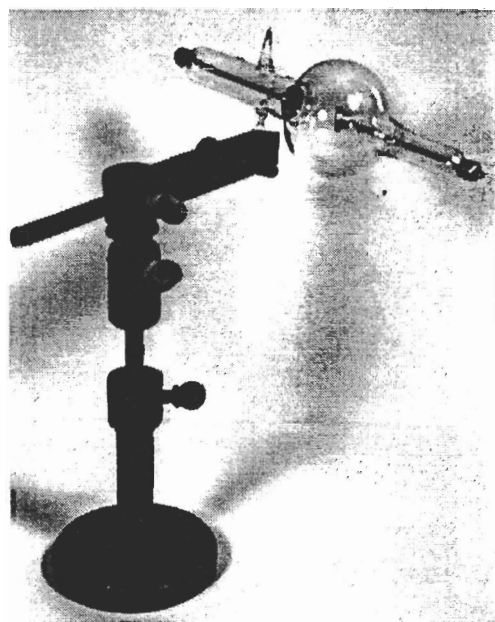
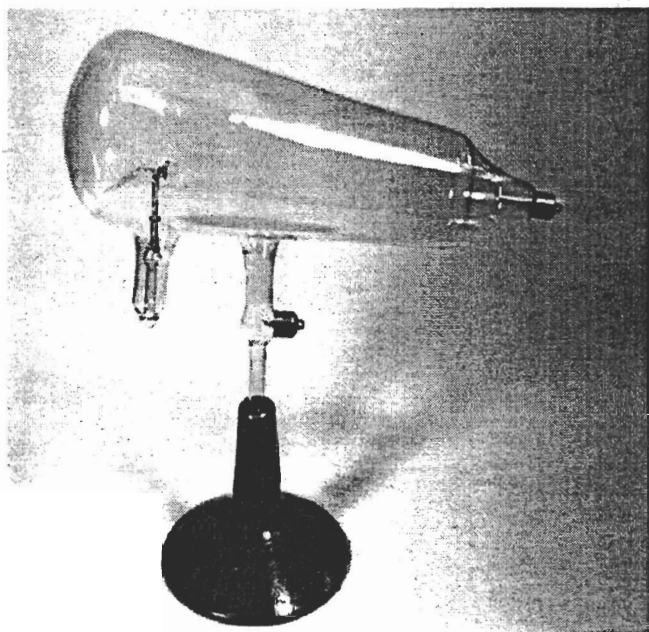
Material: Glass and Metal

Maker: Unknown

Date: 1910

Presumed Use: X-Ray Tubes
But what type?

I think this is a:



From:

Please Return to M. Donald Blaufox, M.D., Ph.D.

CAN YOU IDENTIFY THIS?

Submitted By: Arthur Foresman, M.D.

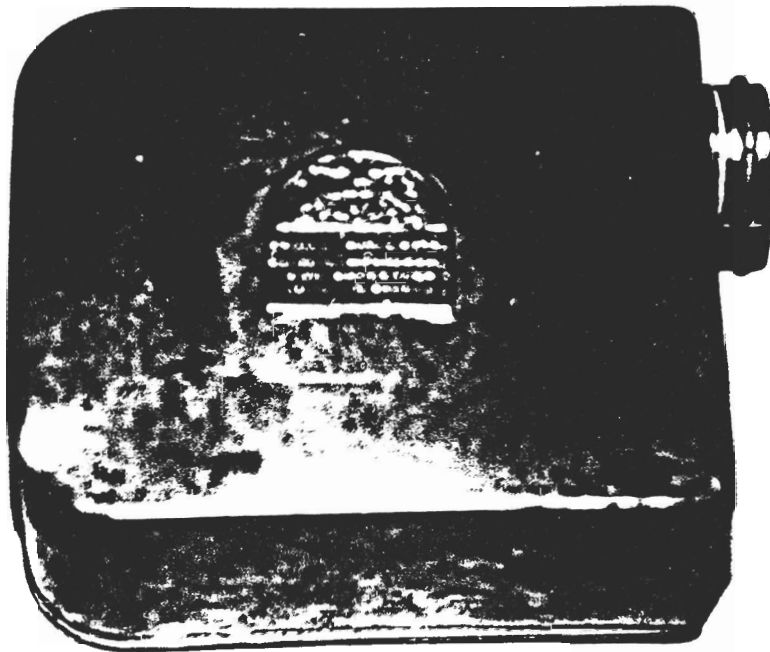
Material: Tin

Maker: Arnold & Sons

Date: 1900

Presumed Use: Container

I think this is a:



From:

Please Return to M. Donald Blaufox, M.D., Ph.D.

PATENT SPECIFICATION



Application Date: Dec. 20, 1933. No. 35852/33.

428,309

Complete Specification Left: Dec. 17, 1934.

Complete Specification Accepted: May 10, 1935.

RECEIVED

16 DEC 1936

PROVISIONAL SPECIFICATION

An improved Device for Treatment of the Respiratory Passages

I, LEONARD RUSSELL LACY, of 52, Central Buildings, Southwark Street, London, S.E. 1, a British Subject, do hereby declare the nature of this invention to be as follows:—

This invention has for its object a simple and easily employed device for treatment of the respiratory passages and comprises a mouthpiece leading through a compressible bulb, having a non-return valve to a filter whence lead two branch pipes furnished with nasal nozzles, the arrangement being such that when the nasal nozzles and mouthpiece are in position, exhalation through the mouth will clear the nasal passages, whilst increased pressure can be obtained by squeezing the bulb.

Preferably, absorbent material impregnated with a volatile medicament is disposed in the filter, whilst, if desired, similar dispositions of impregnated material may be made in the nasal nozzles and in the mouthpiece.

The branches leading from the filter may be in the form of indiarubber tubes in which event such tubes may be supported so that the nasal nozzles are presented in convenient juxtaposition to one another.

In accordance with one form of this invention a vulcanite mouthpiece formed interiorly with a chamber for receiving absorbent material impregnated with a volatile medicament is screwed onto a nipple mounted at one end of an indiarubber bulb furnished with a non-return valve and from the other end of which extends a vulcanite pipe screwed into one

end of a filter chamber formed in two parts adapted to be screwed together.

Within the filter chamber is disposed impregnated absorbent material held in position by a perforated diaphragm into which said vulcanite pipe screws. Into the end of the other part of the filter are screwed two short vulcanite pipes over each of which is fitted a length of indiarubber tubing at the opposite end of which is secured a nipple for the attachment thereto of a nasal nozzle, which, like the mouthpiece is formed interiorly with a chamber for receiving absorbent material impregnated with a volatile medicament. These rubber tubes are secured at intervals, by rubber bands, to a bowed strip of spring steel, the free ends of which are bent so as to lie in close parallel relationship in order that the nasal nozzle may be presented, as a pair, to the nostrils.

For use the mouthpiece is inserted in the mouth and the nasal nozzles in the nostrils and the passage of air caused by exhalation from the mouth serves to convey the medicament to the respiratory passages; increased pressure can be obtained by squeezing the bulb.

If desired, the nasal nozzles can be unscrewed and replaced by aural nozzles, the bulb removed, and the mouthpiece connected with the filter, to enable the interior of the ears to be massaged by air pressure.

Dated this 20th day of December, 1933.

A. M. & WM. CLARK,
Chartered Patent Agents,
53 & 54, Chancery Lane, London, W.C. 2.

COMPLETE SPECIFICATION

An improved Device for Treatment of the Respiratory Passages

I, LEONARD RUSSELL LACY, of 52, Central Buildings, Southwark Street, London, S.E. 1, a British Subject, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention has for its object a simple and easily employed device for treatment of the aural or respiratory

passages and comprises a mouthpiece leading, through a compressible bulb communicating with the atmosphere through a non-return valve, to a filter chamber whence lead two branch pipes furnished with aural or nasal nozzles, the arrangement being such that when the nozzles and mouthpiece are in position, exhalation through the mouth will force air through the filter chamber into or through the aural or nasal passages,

whilst increased pressures can be obtained by squeezing the bulb.

The invention will now be described with reference to the accompanying drawings in which Figure 1 illustrates a device, a part of which is shown broken away, for treating the respiratory passages and Figure 2 shows aural nozzles which are fitted, in place of nasal nozzles, upon the device shown in Figure 1, when it is desired to treat the aural passages.

Referring to Figure 1, a vulcanite mouthpiece 1 formed with two grooves 2 and 3 and a central passage 4, is screwed on to a chamber 5 which contains a central pipe 6, a perforated plate 7, and a space 8 adapted to receive absorbent material impregnated with a volatile medicament. The passage 4 and pipe 6 ensure a clear passage being maintained through the mouthpiece 1 and chamber 5 however tightly the absorbent material is packed and the space between the adjacent ends of the passage 4 and pipe 6 acts as a trap to prevent liquid passing from the mouthpiece into the pipe 6. The chamber 5 is screwed onto a nipple 9 mounted at one end of a vulcanite tap 10 connected with an indiarubber bulb 11 which is furnished with a non-return valve 12 communicating with the atmosphere and with the other end of which is connected a tap 13 communicating by a rubber pipe with a vulcanite pipe 14, screwed into one end of a filter chamber 15, formed in two parts adapted to be screwed together.

Within the filter chamber 15, is disposed impregnated absorbent material held in position by a perforated diaphragm 16 into which said vulcanite pipe 14 screws. The filter chamber 15 also serves as a trap for any liquid which may be passing in either direction through the apparatus. Into the end of the other part of the filter are screwed two short vulcanite pipes 17 and 18 over each of which is fitted a length of indiarubber tubing at the opposite end of which is secured a nipple 19 or 20 for the attachment thereto of a nasal nozzle 21 or 22, which is formed interiorly with a chamber 23 or 24, each nozzle and chamber containing a passage, pipe, perforated plate and space for absorbent material impregnated with a volatile medicament similar to those contained by the mouthpiece 1 and chamber 5. The rubber tubes are secured at intervals, by rubber bands (one of which is indicated at 25) or by spring clips to a bowed strip of spring steel 26, the free ends of which are bent so as to lie in close parallel relationship in order that the nasal nozzles 15 and 16 may be presented, as a pair,

to the nostrils.

In order to treat the nostrils the taps 10 and 13 are opened, the mouthpiece 1 gripped with the teeth at the groove 2, and the nasal nozzles 21 and 22 inserted in the nostrils, when the passage of air caused by exhalation from the mouth serves to suck the volatile medicament from the chambers 5, 15, 23 and 24 and convey it to the respiratory passages; increased pressure can be obtained by closing the tap 10 or sealing the mouthpiece with the tongue and then squeezing the bulb 11. Alternatively the tap 10 may be closed and the bulb alone used to pass air into the nostrils.

In order to treat the throat and back of the mouth the mouthpiece 1 is inserted further into the mouth so that the teeth grip at the second groove 3, both taps 10 and 13, are opened and air is sucked into the mouth whilst the valve 12 is covered with the finger. Alternatively by compressing the bulb, both throat and nostrils may be treated simultaneously, or the tap 13 may be closed and the bulb alone used to force air into the mouth and throat.

If desired, the nasal nozzles can be unscrewed and replaced by aural nozzles of the kind shown in Figure 2, the device being used as described above in order to massage the interior of the ears by means of a fluctuating air pressure. In this case both of taps 10 and 13 are left open, valve 12 is sealed and air sucked in and out of the mouth. Or the bulb 11 may be removed, the mouthpiece 1 connected with the filter chamber 15 and the ears massaged directly from the mouth by breathing in and out through the mouthpiece.

The apparatus may be used for improving the breathing or for strengthening the lungs by pulmonary massage with or without the use of a medicament.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:—

1. Apparatus for treatment of the aural or respiratory passages comprising a mouthpiece leading, through a compressible bulb communicating with the atmosphere through a non-return valve, to a filter chamber whence lead two branch pipes furnished with aural or nasal nozzles, the arrangement being such that when the nozzles and mouthpiece are in position, exhalation through the mouth will force air through the filter chamber into or through the aural or nasal passages, whilst increased pressure can be obtained by sealing the

mouthpiece and squeezing the bulb.

2. Apparatus as claimed in claim 1 wherein any one or more of said nasal nozzles, mouthpiece and filter chamber
5 contain material impregnated with a volatile medicament.

3. Apparatus as claimed in claim 1 or 2 wherein said branch pipes are supported upon a bowed strip of springy

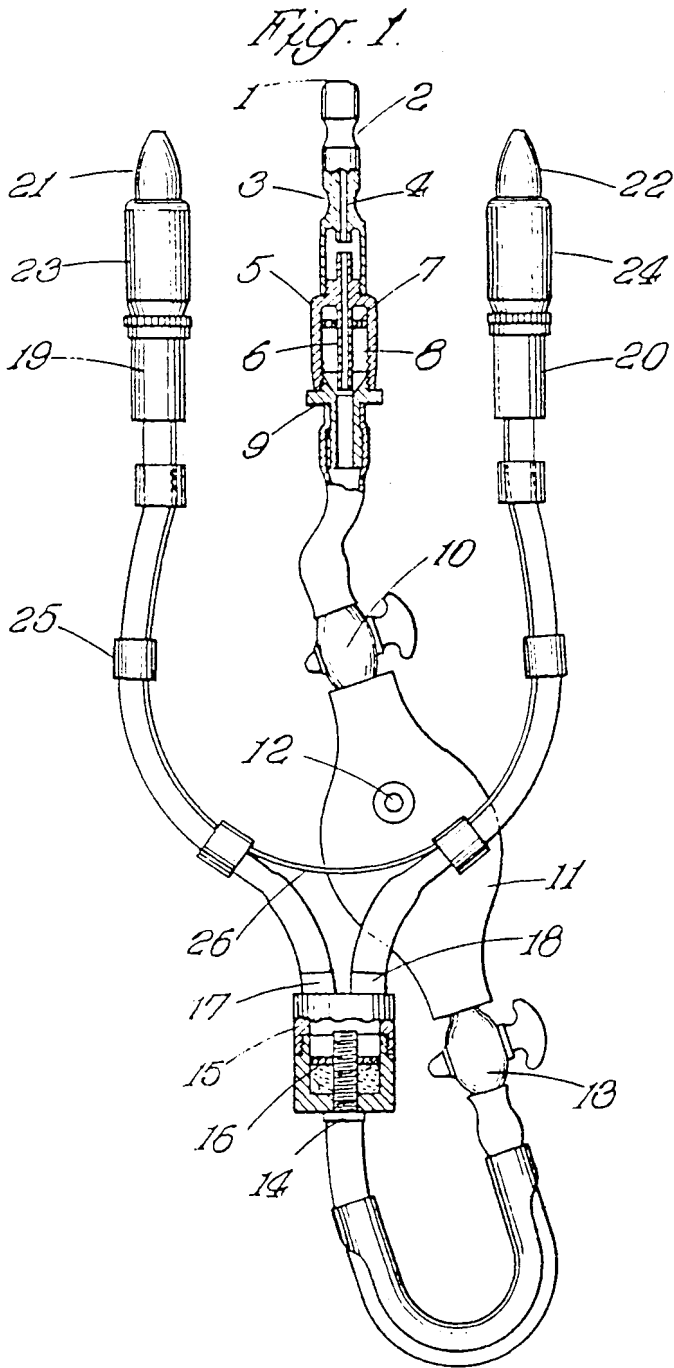
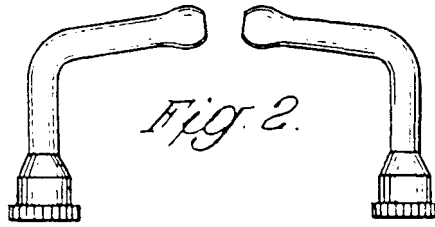
metal.

4. Apparatus substantially as described herein with reference to the accompanying drawings.

10

Dated this 17th day of December, 1934.

A. M. & WM. CLARK,
Chartered Patent Agents,
53 & 54, Chancery Lane, London, W.C. 2.



[This Drawing is a reproduction of the Original on a reduced scale.]

Historical Images of the Drug Market—XX

by William H. Helfand

WILL Bradley, a self-taught artist as well as a graphic designer and professional printer, was one of the earliest and most important of American poster artists. Between 1894 and 1895 he did seven posters for the *Chap-Book* and eighteen for *The Inland Printer*, both journals with good circulations, and also received commissions to create posters for newly published books. Heavily influenced by the French Art Nouveau movement and by the Arts and Crafts movement of William Morris in England, the design of his posters reflects European influences more than the work of his American contemporaries. In 1895 Bradley moved from Chicago to Springfield, Massachusetts, and one of his first as-

signments there came from the Narcoti Chemical Co. for a poster to advertise their Narcoti-Cure, a proprietary medicine "sold by all live druggists at \$5.00 a bottle, guaranteed to cure the tobacco habit." As this page from *Munsey's Magazine* points out, an original of Bradley's poster could be had for four cents in stamps, a price that is somewhat staggering today in view of its current value. Bradley's image of the charging knight attacking the sneering tobacco fiend provides a still-timely metaphor for the action of a medicine on a disease, and his Narcoti-Cure poster remains one of the glories of American poster art. (Size of advertisement—9 1/2" X 6 1/2".)

NARCOTI-CURE CURES THE TOBACCO HABIT

In 4 to 10 Days, or Money Refunded.


NARCOTI-CURE is a perfectly harmless vegetable compound, which has in five months cured many thousands of tobacco slaves. More than 97 per cent. of all cases treated have been absolutely and permanently cured in 4 to 10 days.

NARCOTI-CURE is the only scientific discovery of its kind in the world. It is popular because it allows patients to use all the tobacco they want till their "craving" and "hankering" are gone.

It drives out the nicotine and builds up the nervous system. Not only does this marvelous cure take away the appetite for tobacco, but it so acts on the system that the patient's health improves the moment he commences treatment.

NARCOTI-CURE is sold by all live druggists at \$5.00 a bottle, guaranteed to cure or money refunded. Mailed direct on receipt of price if your dealer does not keep it.

Send for Narcoti Book giving full particulars and the testimony of public people who have been cured.



NARCOTI-CURE
PRICE \$5.00
CURES THE TOBACCO HABIT FROM 4 TO 10 DAYS
THE NARCOTI CHEMICAL CO. SPRINGFIELD, MASS.

BOOK OF PARTICULARS FREE

Send 4 cents in stamps to the NARCOTI CHEMICAL CO., Springfield, Mass., for above Art Poster in 3 colors. Every collector wants one.

UP-TO-DATE TESTIMONY.

PROF. W. E. WAITE.
OF AMHERST, MASS., Chewed Tobacco for 44 Years, and Was Cured by Narcoti-Cure.
AMHERST, MASS., February 6, 1895.
THE NARCOTI CHEMICAL CO.,
Springfield, Mass.

Gentlemen—Replying to yours of the 1st, would say that I have used tobacco for 46 years, and of late have consumed a 20-cent plug a day, besides smoking considerably. I commenced to use tobacco when I was only 12 years old, and have never been able to give up the habit until I took NARCOTI-CURE, although I have tried other so-called remedies without effect. After using your remedy four days, all "hankering" for chewing disappeared, and in four days more smoking became unpleasant. I have no further desire for the weed, and experienced no bad effects, whatever. I am gaining in flesh, and feel better than I have for a long time. To all who wish to be free from the tobacco habit I would say, use NARCOTI-CURE.

Yours truly,
W. N. WAITE.
GALENA, ILL., November 18, 1894.
THE NARCOTI CHEMICAL CO.,
Springfield, Mass.

Gentlemen—Replying to yours in regard to the results obtained from the use of the NARCOTI-CURE for the tobacco habit, will say that I have been a constant chewer of tobacco for 47 years, and I have used less than one-half bottle of the remedy and I consider that I am forever through with the use of tobacco, as I do not want it as I used to. The taste for tobacco has entirely left me. I can say in truth that it is the only remedy that has ever affected me in the least. I consider myself cured of the filthy habit entirely.

Yours truly,
C. A. WHITE.
Mr. Frank H. Morton, of Chicopee Falls, Mass., late Inspector of Public Buildings for Massachusetts, says:—

I used tobacco for twenty-five years, and was a confirmed smoker. In just eight days' treatment with NARCOTI-CURE I was through with tobacco, in fact the desire for tobacco vanished like a dream.

Very respectfully,
FRANK H. MORTON.

The Evolution of Artifacts

Henry Petroski

In the beginning of his important book, *The Evolution of Technology*, George Basalla notes that the diversity of natural things has intrigued people for centuries. Biologists, he observes, have identified and named more than 1.5 million species of flora and fauna. The diversity of things made by human hands is also very great, but Basalla points out that this diversity is harder to quantify, since "distinct species cannot be identified with any precision among items of human manufacture." He does offer one rough measure: the number of patents granted. If each of the roughly 5 million patents that have been issued in the United States alone is counted as the equivalent of an organic species, he says, the diversity of technology can be considered to be three times as great as that of the natural world. Recognizing the difficulties of comparing apples and orange peelers, Basalla concludes conservatively that "the diversity of the technological realm approaches that of the organic realm."

But quantifying diversity among artifacts only makes more vexing other fundamental questions. How do we account for technological diversity? What is the mechanism by which artifacts multiply? Basalla does not believe that necessity and utility alone can account for the great variety and novelty of made things. Heedful of E. E. Cummings's observation that "A world of made is not a world of born," he recognizes that we should not expect a one-to-one correspondence between a purposeful human activity and a random natural process. So Basalla pursues the evolutionary analogy selectively. The pursuit does indeed pay off in a rich and rewarding book full of fresh insights into questions of continuity and discontinuity, novelty and selection in technology. Examples abound in Basalla's work, with artifacts as diverse as barbed wire, the automobile and the transistor providing case studies to support his arguments.

Patents play a merely quantitative role in Basalla's book; yet the patent literature can provide much more than mere numbers, for it is an excellent source of material for pursuing the question of technological evolution on its own terms. Indeed, patents might be considered almost primary sources for understanding the principles behind invention itself: In many cases they give us the story straight from the inventor's mouth, albeit in a formal context. And even when patent attorneys or agents serve as amanuenses of sorts, each patent document is still putting forth a direct

and explicit case for a new species of artifact. Certainly, then, these documents must contain at least some clues as to how technology evolves.

The experience of picking up and reading any of the millions of patents issued in this country over the past two centuries is almost certain to reinforce the conventional wisdom that technology is boring stuff indeed, and that those who work in the world of things do not express themselves easily in words. In spite of the fact that these documents are supposed to convey the essence of an invention to those "practiced in the art," the literary style of patents (if that is not an oxymoron) leaves much to be desired. The text of a patent is invariably repetitive, redundant, diffuse and, above all, prolix. Surprisingly, considering that its protection is granted in exchange for a revelation of new technology, a patent can be in some places as annoyingly vague as it is elsewhere maddeningly precise. When a patent is illustrated, the accompanying text may or may not support the saw that a picture is worth a thousand words, but the converse is not uncommonly true: A patent may take more than a thousand words to give little more than a line-by-line description of what appear to be the interminably numbered details of the drawings.

For all their shortcomings as examples of technical writing, however, patents do have a structure and do follow a form—one that today is largely imposed by tradition and by the expectation of patent examiners that they will find certain elements in certain places in the patent application, as the written document submitted to them is officially known. A patent tends to follow rather closely the form extant within the class of existing patents with which the applicant wishes the invention to compete. Thus, for example, paperclip patents dating from the early years of this century invariably begin with the salutation, "To all whom it may concern," and proceed with minor variations on the opening, "Be it known that I... have invented certain new and useful improvements in Paper Clips..., of which the following is a specification." By the 1930s, the language had been modernized and streamlined, and we find more abrupt openings, such as, "This invention relates to improvements in paper clips..." The key word, "improvement," remains and provides the central evidence of purposefulness in technological evolution.

One patent attorney's advice to the do-it-yourself patent seeker provides a means for understanding technological diversity and evolution. The advice is in the form of an inventor's commandment: "In your patent application, you should 'sell' your invention to the examiner or anyone else who may read the application by (a) listing all the disad-

Henry Petroski is professor of civil engineering and chairman of the department of civil and environmental engineering at Duke University, Durham, NC 27706. His new book, The Evolution of Useful Things, will be published this fall by Alfred A. Knopf.

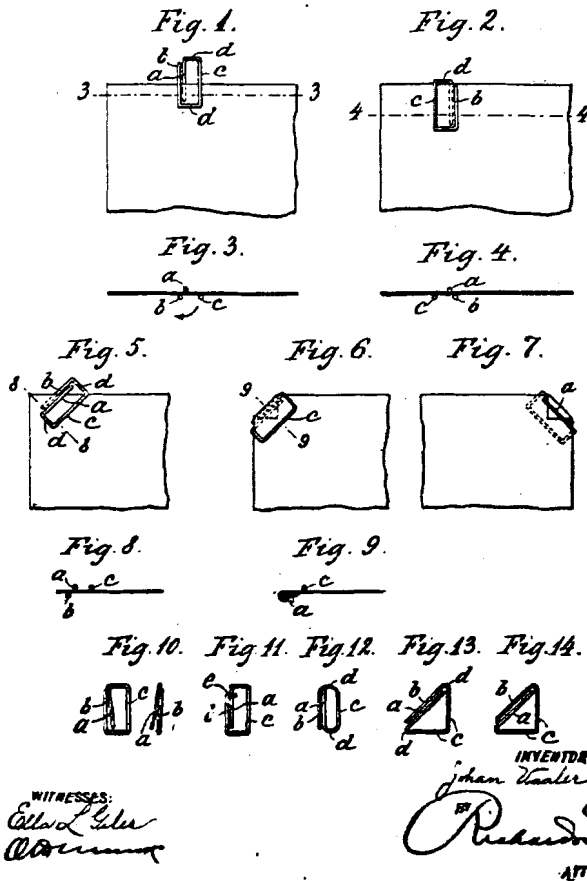


Figure 1. Johan Vaaler's 1901 paper-clip patent (U.S. Patent No. 675,761).

vantages of the prior art, and (b) all the advantages of your invention, both in the introduction and in a conclusion." Finding fault with the prior art and removing the objection (up to a point) is in fact the key to artifact succession.

The concept of improvement is central to invention—and to the evolution of artifacts—and to the institutionalized recognition of success through the patent system. Many patents point out quite explicitly one or more failings of existing devices to accomplish an objective, and the fault-finding is quite conscious. An article entitled "Patent It Yourself" appeared in a recent issue of *Design News*. Included in the advice of its author, a professional engineer registered to practice before the U.S. Patent and Trademark Office, is an exhortation that the writer "explain all the disadvantages and shortcomings of existing and related products," and, in summarizing the invention, begin with, "To avoid the limitations and problems with present (devices/methods)..." Another do-it-yourself book considers it essential that a patent application answer the question, "Why is what the world has not good enough, and how is your invention going to make it better?"

If it is true that fault-finding is the central idea that drives invention, and thereby technological evolution, then trac-

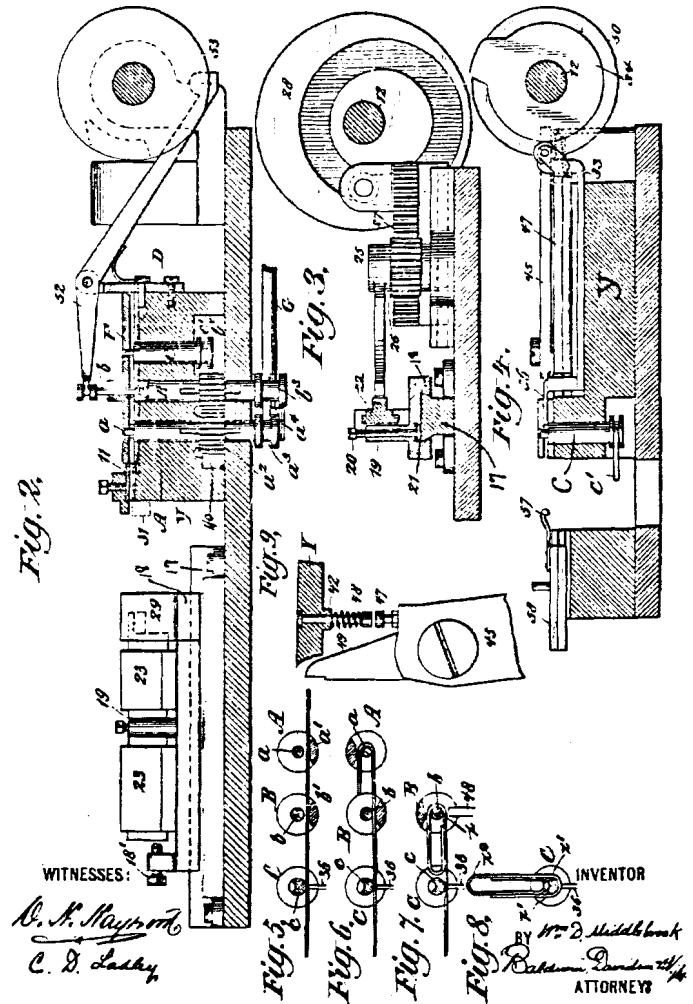


Figure 2. William Middlebrook's 1899 patent (No. 636,272) for a machine for making wire paper clips. A fully formed Gem clip is at lower right.

ing the development of any class of artifacts should provide confirmatory evidence. One case study must be as good as any other to test the hypothesis, and the simpler the object, the more clearly might the case be made. After the essential features of the argument are clear, more and more complex examples can provide further case studies and further tests. Naturally, it only takes a single counterexample, whether simple or complex, to disprove the hypothesis that fault-finding drives technological change.

Poking Fun at the Pin

The artifactual antecedent of the paper clip was the straight pin, which has not yet been completely displaced by the clip. As a director of graduate studies five years ago, I received not a few inquiries from Indian students who employed a pin as a paper fastener. Even in this country, the "bank pin" or "desk pin" (identical in every way but its packaging to the "toilet pin," used for fastening garments and in sewing) was in use well into the present century, as I observed recently while examining the archives of a family pencil business. But the pin has some distinct shortcomings in fastening papers. Only a few papers can be fastened; it takes time to thread the pin through the papers; holes are

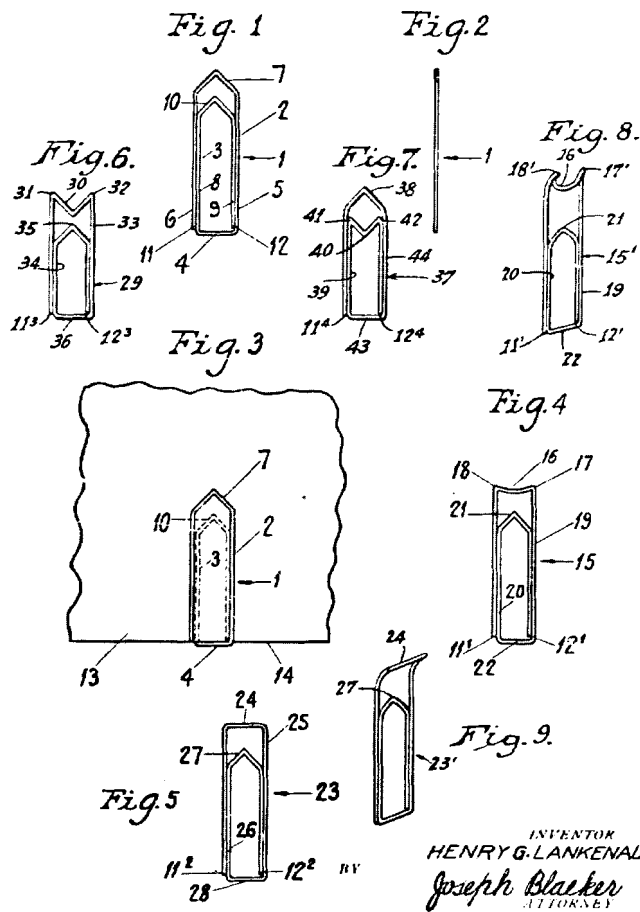


Figure 3. Henry Lankenau's 1934 patent (No. 1,985,866) for a Gothic paper clip.

made in the papers; extraneous papers are snagged by the pin point; fingers are pricked; and so forth. In short, it was easy to find fault with pins as paper fasteners, but until the end of the 19th century there were no readily available and inexpensive substitutes.

Since the faults of the pin were so obvious, it is not surprising that people improvised and inventors tried to come up with better paper fasteners. Basalla has pointed out that clothespins were used by the essayist and historian Thomas Carlyle, and a portrait of the engineer Isambard Kingdom Brunel shows that large, handsome bentwood devices served as paper clips in the mid-19th century. It was also around that time that a great variety of paper fastening devices began to be patented: large and bulky ones resembling the business end of a modern clipboard, and smaller ones of various shapes, generally stamped out of ductile metal. Some of the latter were meant to be folded over the papers, with a protected point that pricked the papers but not the fingers.

As is often the case in technological development, progress was incremental. Old shortcomings that remained or fresh ones that appeared in the newer devices provided the objections to be overcome in further developments of a small paper clip. In 1887 a patent for "improvements in paper fasteners" was issued to Ethelbert Middleton of Philadelphia for devices that he declared secured a "mass of

papers without any puncturing or cutting." But attaching Middleton's fasteners was no trivial task, for it involved the almost oragami-like action of folding various metal wings over the corners of the papers to secure them. His clip, like all its predecessors (and descendants), left something to be desired. But this is not to say that there was any absolute need for a better way to fasten papers together.

As steel wire became readily available in the latter part of the 19th century, and as machinery was developed to bend it into a variety of shapes, what we now know as a paper clip evolved. The modern paper clip has the obvious advantages over its antecedents of not piercing the papers it holds and yet being relatively easy to attach and detach. But there are countless ways of bending a piece of wire to hold papers, and inventors around the turn of the century had a field day pointing out in their patent applications the relative advantages and disadvantages of different style clips, most of which have long since become extinct but some of which we use with abandon today.

The modern paper clip is commonly said (in encyclopedias, for example) to have been invented in 1899 by a Norwegian named Johan Vaaler. According to the standard story, since Norway had no patent law at the time, the inventor sought a patent in Germany. He was also granted a U.S. patent in 1901 for "improvements in paper clips or holders," but none of the variations of clips illustrated in this patent resembles what we recognize today as a standard paper clip. Indeed, Vaaler's clips, like many patented around the turn of the century, appeared to be distinguished mainly by their various shapes—rectangular, oval, triangular. Although Vaaler's patent application noted that the clips could be made so that the ends of the wire lay close to each other "to obviate the clips hanging together when being packed up in boxes or the like" (a common fault of some other clip designs), he did not call attention to the fact that his clips would not be easy to attach to papers. More significantly, however, the easy-to-apply clip that we now use predated Vaaler's U.S. patent by at least two years.

The Gem: Form, Function and Flaws

The paper-clip design that we recognize as standard today became known around the turn of the century as the Gem, presumably after the British manufacturer Gem, Limited, but the design itself seems never to have been patented. An unmistakable Gem-style paper clip appears to have been familiar enough to have been used only incidentally and without particular comment among the figures of a patent issued in 1899 to William Middlebrook of Waterbury, Connecticut, for a "machine for making wire paper clips." What is clearly a Gem is described only as "of the general shape and character illustrated." Even if the Gem paper clip did not exist outside Middlebrook's patent application for his machinery, the "publication" of the paper-clip design in this context would have precluded the Gem itself from being patented subsequently.

Regardless of how it was introduced, and whether first in America or in Norway, the Gem had considerable advantages over older paper fasteners and even over newer ones such as the variations in Vaaler's patent. But no artifact is perfect, and the Gem had (and still has) its own faults and flaws. It takes a bit of maneuvering to apply to papers; its wire ends can snag stray papers; it can tear papers when being removed; it can only hold so many papers. Insignificant as they may seem to most of us, such failures of the Gem

(and every other paper-clip design) to be all things to all papers offered all that inventors needed to seek improvements, and the patent files record the various evolutionary paths that the paper clip followed from the Gem and related designs in the early 20th century.

Two common problems with paper clips remained their tendencies to entangle in the box and then, in use, to move about and work loose as piles of papers are shuffled. Cornelius Brosnan of Springfield, Massachusetts, was one of many inventors to address such details, and a patent was issued to him in 1905 for a paper clip "of novel shape" that looked like an arrowhead. Brosnan's patent states that this clip could be applied with ease (implying, of course, that others could not) and "with certainty of its being maintained when in its binding engagement without liability of swinging or shifting" (as others were known to do) and would "not become interlocked one with another to cause bother and delay in taking one or more out from the box" (as inferior clips did). But ease of application, for example, is a relative thing, and inventors continued to seek alternative means of removing that shortcoming and others. As late as 1920, Joseph O'Brien, also of Springfield, patented a variation on the Gem, with "the terminal of the inner loop being extended cross-wise to provide a thumb engageable bar, whereby the two loops or jaws may be separated to facilitate ready insertion of paper between the jaws." In that same year, Harry Baldwin of Seymour, Connecticut, patented a variation on the arrowhead shape that had more crossings of the wire, which he argued gave his clip "a larger number of bearing or gripping points than as heretofore constructed and which will therefore securely hold the papers in position," thus overcoming the faults of clips that slipped.

By the 1930s the Gem design was so firmly established as the standard that Henry Lankenau of Verona, New Jersey, attacked it by name in his 1934 patent for a paper clip that had V-shaped loops on one end, in place of the familiar U-shaped ones. According to the patent, the pointed geometry of the new clip provided "a wedge action" and could be "more easily applied to two or more papers than the type of clip generally known in the art as 'Gem' clips." Furthermore, because the wire ends or legs of Lankenau's clip extend to its squared other end, they "cannot dig in and scratch the paper as is usually the case when removing paper clips of the 'Gem' type having short legs which do not extend to the extreme end of the clip." While sometimes called a "perfect Gem," Lankenau's angular design has come to be known more generally as a Gothic clip, in contrast to the Romanesque Gem, and it has a small but fervent following to this day. Duke's library, for example, uses such clips, and I have come to find them superior to the Gem in many ways.

The Gem, for all its (minor?) faults, has evolved to be the standard paper clip, and it is important to understand why this is so. The internal evidence of the patent record clearly documents how competing artifacts are explicitly pitted against each other with regard to their relative strengths and weaknesses. (The name-calling started in the patent application is, of course, carried on with varying degrees of explicitness in the marketplace.) Since every artifact, even something so seemingly simple as a paper clip, has numerous competing objectives and criteria against which it is judged, it is not to be expected that any given device will come out on top in every single category. Different users have different priorities and place different emphases on the various faults

and failings of the artifacts among which a choice must be made. A library, for example, might be willing to pay more for clips that do not tear books. An accounting office, on the other hand, might care less about scratching or tearing little nicks out of the tops of checks in the interest of processing them quickly. In the final analysis, such diversity among users leads to diversity among artifacts.

The current catalogue of Noesting, Inc., which claims to have carried the world's largest selection of paper clips for over 75 years, offers more than a dozen different clips in various sizes. The company even still sells the paper clip's precursor, the pin: the "economical fastening device used when papers must be fastened more securely than clips can and taken apart later without the mutilation of staples, used with securities and tissue-thin receipts." Thus the century-old quest for improvements on this basic artifact has still not displaced it completely. Not that inventors haven't tried, of course. As late as the 1960s, Howard Sufirin, collector of antique office products and heir to the family business that made Steel City Gems, could state, "We average ten letters a month from people who think they have an improvement."

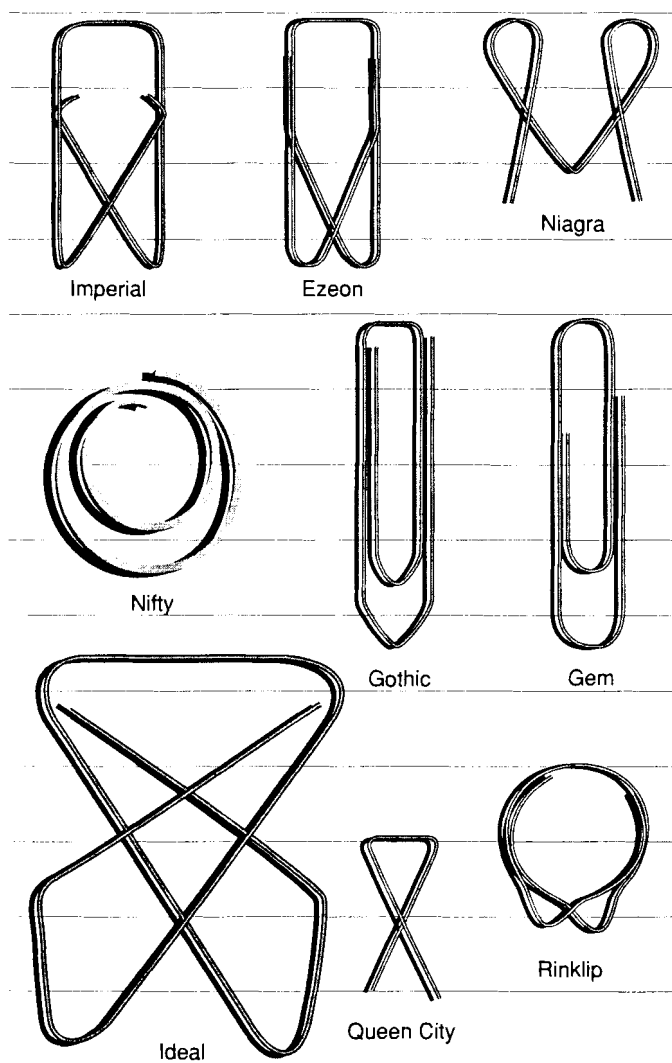


Figure 4. This sampling of paper clips that have been introduced over the years provides a collection of incontrovertible counterexamples to the design dictum that "form follows function." Each new paper-clip design, whether patented or not, addressed at least one shortcoming of existing designs.

Purely functional reasons naturally are not the only ones for establishing diversity and dominance among artifacts. Economic factors are extremely important in shaping the made world, and patent after patent includes phrases like "simple construction" and "cheapness of construction." All other things being equal, the "cheaper" artifact should drive out the more expensive (except, for example, where the lack of snob appeal is perceived as a fault). However, while "cheapness" can sometimes be achieved by a more efficient manufacturing process or more economical arrangement of parts, more commonly it is achieved at the expense of other qualities, for invention and engineering are first and foremost arts of compromise. A cheaper paper clip can easily be achieved by reducing the thickness of wire, but this will typically mean that the clip has less spring, less holding power or less durability. Many recently introduced plastic versions of paper clips may be very colorful, but they seldom work like a Gem.

Aesthetic factors can play an extremely significant but hard-to-quantify role in the evolution of a dominant form of an artifact. Designers and design critics frequently name the (generic) paper clip, which invariably they take to be synonymous with the Gem, as an example of a brilliant solution to a design problem. Owen Edwards's description in his book, *Elegant Solutions*, is typical: "In our vast catalog of material innovation, no more perfectly conceived object exists.... With its bravura loop-within-a-loop design, the clip corrals the most chaotic paper simply by obeying Hooke's law." The architecture critic Paul Goldberg has also sung the praises of the (unnamed) Gem: "Could there possibly be

anything better than a paper clip to do the job that a paper clip does? The common paper clip is light, inexpensive, strong, easy to use, and quite good-looking. There is a neatness of line to it that could not violate the ethos of any purist. One could not really improve on the paper clip, and the innumerable attempts to try—such as... clips with square instead of rounded ends—only underscore the quality of real things." One could hardly ask for sharper statements pointing out the existence of two cultures—critics whose medium is words and critics whose medium is matter—when it comes to understanding the evolution of artifacts and technology generally. Ironically, those most commonly associated with aesthetic judgement appear to be more easily satisfied with form (and function) than those who shape the artifacts being criticized. Yet again and again in their patents, the collective voices of the evolvers of technology echo a fault the observation of one of their greatest, Henry Bessemer: "The love of improvement... knows no bounds or finality."

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Directions for Setting Up and Using the Betz 1903 Static Machine

All Numbers in these Directions refer to Fig. 3 unless otherwise indicated.

When your machine arrives uncrate it carefully and lay the parts out in plain view where they can be found readily. Place the case which contains the plates on top of the stand. Unpack plates carefully, removing all the cotton gently, then remove the screws that fasten the framework about the plates. Fasten the crank hangers near the top of stand at right hand as you face the machine. Put the large belt wheel on end of this shaft, passing through the hangers and small belt wheel on the rear end of the shaft that passes through the plate in center of the case. Then put on belt. Insert the brass rod No. 1 through the hole in the front glass of case and through the small rubber nut No. 7 and screw to the combs inside. Then telescope the rubber casing No. 2 over brass rod No. 1. Then screw rubber washer No. 6 on rubber casing No. 2 on outside of front glass of case, then revolve this entire fixture of four balls, No. 4 until this screws up solid on the rubber casing, No. 2 going to inside of case, and so that the rubber support to these balls stands perpendicular and the screw No. 14 may be inserted from underneath the bottom to fasten this support firmly in proper position. The hole No. 39 in center ball of fixture No. 4 must be on outside and lower part of ball. The washer No. 7 inside of the case through which the rubber casing No. 2 was inserted should now be screwed up right against the front glass of case. Then insert the sliding rod No. 17 through the opening in outside ball No. 41.

Arrange the other set of fixtures in the same way. See that the plates are all clear to revolve and that the brushes are adjusted so that they will touch only the metal buttons and your machine is ready to operate. Do not put on any Leyden Jars until after your machine is working properly. Never use the jars when using X-ray tube unless the tube is very low. The handle and plates must revolve in the opposite way to the hands of a clock.

How to Replace Broken Plates.

A set of Plates consists of four plates. The first and fourth are revolving and the second and third are stationary. The concavity of all the plates is toward the back of the machine.

The first plate in the first set has six metal buttons on the front side. The first plate in all the other sets has nothing on it.

The second plate in each set has two large pieces of paper over two small strips of tin foil all on the back side of the plate, and on the front side are two combs.

The third plate in each set has two combs on the back side.

The fourth plate in each set has nothing on it except in the last set the fourth plate has six metal buttons on the back side.

When taking the machine apart use every precaution to lay each part out in order as you take it apart, so that when you are ready to put it together again you will know where each piece belongs.

If your machine is set up remove all the fixtures, including the balls on the shelf in front. Then loosen the neutralizing combs N & N, Fig. 2, and collector combs C & C, Fig. 2, and turn them up or down until they are clear of plates. Remove the brush rods No. 32. Then loosen the fibre nuts No. 36 on the hard rubber screws No. 18 that hold the stationary plates in position at the bottom and top. The large screw support No. 18 on top can be turned to one side on the small screws that hold it. Then remove the supports at the bottom by taking the screws out from beneath bottom so that stationary plates rest on main shaft. With a screw driver loosen the screw in nut No. 5 in Fig. 1, which is fastened to case on inside and supports front end of shaft. Loosen also same screw in casing on outside of case which supports rear end of shaft. Loosen screw D so that it will clear groove E on front end of shaft on inside of case, loosen the screw in nut No. 10 on the front end of the shaft and remove the nut by turning the front plate to the left, which will unscrew the nut if the remaining plates are held firm. Be sure that each plate is loose on the shaft and that no two plates are stuck together. If any of them are stuck fast, revolve each plate singly back and forth, holding all of the other plates until each plate is entirely free and disconnected. Slip a piece of gas pipe, D, Fig. 2, three or four feet long on rear end of shaft. Have some one bear down on rear end of gas pipe so as to keep the shaft level. Place a board about four feet long with notch in top edge under the front end of the shaft and with a man holding each end of board slide the shaft and plates all together back about six inches until the nut (10) on shaft touches rear bearing. Have some one bear down on the rear end of gas pipe, which will hold the shaft level, then take the plates off, one by one, until you reach the broken plate. Then replace it and put the plates back carefully in the same order as they were before they were taken out, and replace all other parts where they were before beginning.

When the plates are all in proper position and partially tightened on the shaft so that they can be moved and will stay in any position they are placed, then turn some of them one-quarter circumference, some one-half circumference and some one-quarter circumference in the

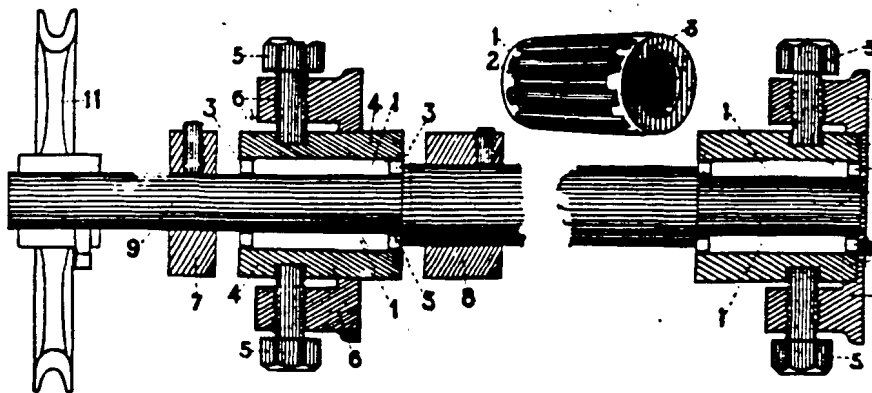


FIG. 1.

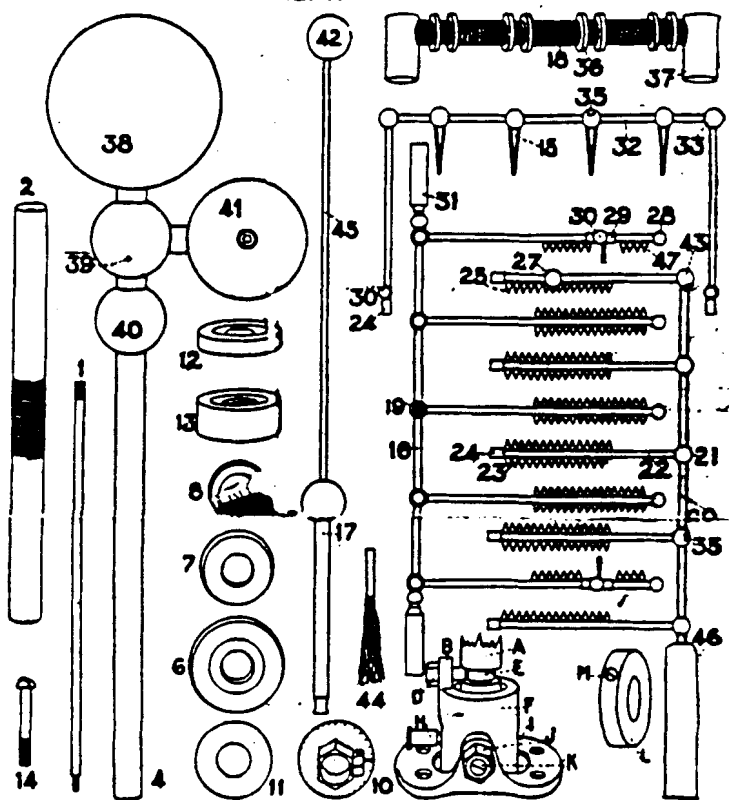


FIG 3

opposite direction, so that they are properly balanced on the shaft & they, as a whole, will revolve evenly. When ready to tighten the plates permanently place the right hand on the edge of the front plate and the left hand on the edge of the rear plate, push the right hand upward and forward to tighten the plates. When the plates are sufficiently tightened take a screw driver and tighten the screw in nut No. 10 on the front end of shaft and the plates will be firm and rigid. When handling plates always stand them on edge, never allowing but a few to stand together when touching each other.

When ready to put the screw supports No. 18 under the stationary plates first put a piece of wood one inch thick under the center of the plates at the bottom to hold them up high enough so the supports can be put under at the proper place. It is better to use some wood wedge under the piece of wood so the height can be changed as desired and be easily removed when ready.

Always have the plates tight on the shaft. If they should become loose so that they do not revolve with shaft, then loosen screw in nut 10 and tighten nut 10, as explained on the first page of these directions. Be sure the tin foil is on the back side of the second plate, or first stationary plate in each set. See that it is in the same position in each set as indicates in Fig. 4, so that the paper makes a solid section right through the machine. Be sure the tin foil on right hand side is just 1 1/2 inches higher from the bottom of the case than it is on the left hand side, as is shown in Fig. 4.

Connecting the Machine to Motor.

Put the large belt wheel on the rear end of main shaft in the center of plates. A speed controller should always be furnished with a motor. Start motor slowly, never with a jerk. A machine is usually run at a speed of about 200 revolutions per minute for therapeutic work.

Directions for Using X-Ray Tube with a Cedegren Pole Changer.

Connect the central ball in the fixtures on front shelf of each side of machine with the sliding rod at 3 and 4, Fig. 9, using the short rubber covered cords. Connect the X-Ray tube with metal buttons marked 1 and 2, as shown in cut below. The anode end of tube is the positive end. The polarity of the tube never changes, but the polarity of the

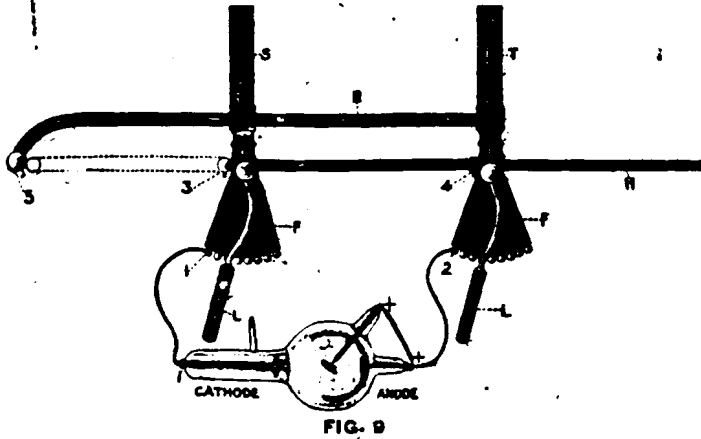


FIG. 9

machine may change. This can be reversed by sliding the rod "H" so the ball 3 will come in contact with ball 5. Always have a spark gap when using an X-Ray tube, unless the vacuum is very high; in that case connect the tube direct to the balls in the fixtures. If the vacuum of tube is low the spark gap needs to be increased by moving levers L and L to the right one or more buttons. If vacuum of tube is high the spark gap needs to be decreased by moving levers L and L to the left. When a tube is properly connected it will be illuminated with a bright green light, showing plainly in one-half of the tube. If the green light flickers in the back of the tube and forms circles, the polarity is wrong and would injure the tube; the polarity of the machine must be reversed with sliding rod H, Fig. 9, in pole changer. If your tube is too high it will light up and then the light will disappear and the current will escape through the cords or some connection; this indicates that the vacuum of the tube should be reduced.

To accomplish this if you have a tube with an adjustable attachment follow the directions that accompany the tube. If you have a plain tube a good plan is to put it in the oven of an ordinary baking stove at the temperature required for baking bread. Use a pasteboard box with the bottom removed, allow the tube to rest on the edges of the box, leave it in the oven for about five minutes, then allow it to cool; when tested if the vacuum is still too high allow it to remain a little longer in the oven next time.

If the tube is too low, the tube is illuminated with a purple light, which indicates the vacuum should be raised, which can be done by increasing the spark gap with levers L and L. If sparks pass through tube from cathode and strike the target, your tube is punctured.

When your tube is properly illuminated, put the object about one inch from the tube and the Fluoroscope against the object on the opposite side and you get the desired results. As a tube is used the vacuum increases and gives better results in deep penetration.

An X-Ray picture is made by placing the X-Ray photographic plate in the black envelope sealed on a table. Then place the object on the envelope and the tube about eight inches above the object. Turn on the X-Rays and an exposure of about a minute or longer, according to intensity of current, will give a satisfactory skiagraph.

Do not keep plates in same room as static machine. Keep Fluoroscope in dark, cool place.

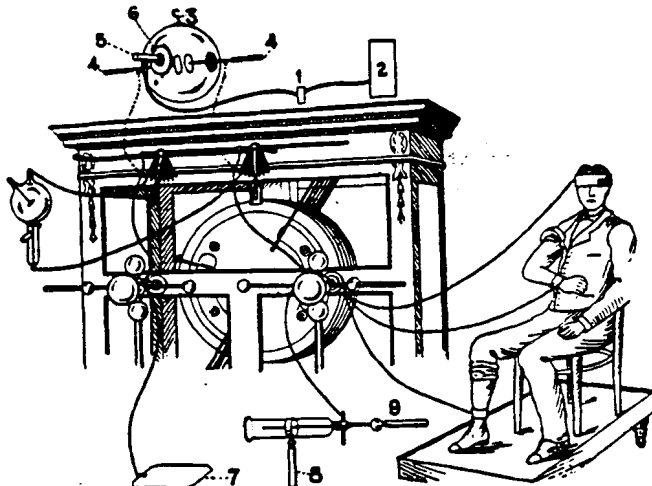


FIG. 8.

The above cut, Fig. 8, shows how to attach the X-Ray tube, the ozone outfit, the cataphoric outfit, or the Morton Wave. Only one outfit of the above can be attached and used at a time.

Ozone (See Fig. 8).

Connect sliding rods 4 of globe in the same manner as Crook's tui using the silk cords. Place the discs on inside of globe about three inches apart. In the dark a purple light will show between the discs. With a piece of soft rubber tubing connect the little tube on the bottom of "5" in above cut, with bottle on nebulizer so that a medicated vapor can be used to prevent the patient coughing. If desired an atomizer (1) connected to an air tank (2) can be used with the same results as with a nebulizer. The opening in back of ozone globe is left open. Attach 5 with a rubber tube about six inches long to the patient's mouth. Valve 6 regulates the supply of ozone. By separating the discs on inside of globe increases the quantity of ozone.

Cataphoric Outfit (See Fig. 8).

Connect the positive pole of the machine to the binding post of the electrode, 9, Fig. 8, and the negative pole of machine should be connected to your patient or to the platform. A rubber tube should connect the electrode to your nebulizer or container under which an alcohol lamp may be placed. The current drives the medicated vapor into the patient by placing the open end of glass on the bare skin.

The Morton Wave is used as shown in Fig. 8. The Morton Electrode, which is not shown in above cut, is used by attaching one cord to end of rubber handle. Connect other cord to platform or patient. This electrode is used to draw sparks to any particular spot, either on the surface of body or in cavities. The spark may be regulated by sliding the center piece of electrode farther in or out.

Spark Regulator.

To use the spark regulator, shown on platform in static circular, suspend it by hooks to the sliding rods No. 17, Fig. 3. This device is used to deaden the noise of the spark.

The Insulated Platform. •

The patient is seated on the platform about three feet from the machine, and at least two feet from all other objects. The negative pole is connected to the platform by shepherd's crook as in Fig. 3. The positive pole is connected to the floor or grounded with chain. For positive electrification the connections are simply reversed.

Potential Interruption.

The treatment is similar to the insulated platform, but more energetic. The foot plate should be used and have it connected with the connecting rod or shepherd's crook; have the patient put one foot on this plate as placed on the platform. The negative pole is attached to the long ball and point electrode and the ball is placed about six inches from the patient. The effect of the current is increased by the patient holding the connecting rod in his hands.

Positive Breeze.

Connect point electrode with the positive pole, use the hook electrode to prevent connecting cord touching the patient. Move the point back and forth from six to eight inches from part to be treated.

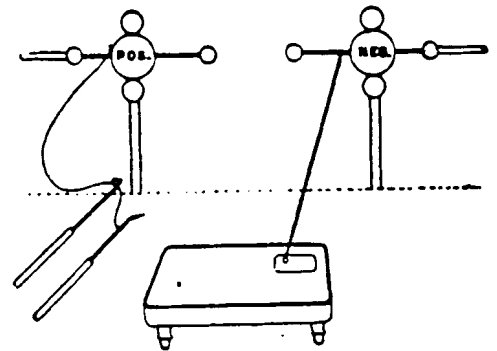


FIG. 5.

Make the same connection as for the point electrode, when it is desired to use the ball electrode, the wood ball, roller electrode, or any other electrode.

Negative Head Breeze.

Connect the positive pole with the platform and the negative pole with the head crown, which should be placed from 10 to 16 inches above the head of the patient.

Some Special Suggestions for Operating a Static

- 1st. See that the paper is on the back side of the second plate only in each set of 4 plates.
- 2d. See that the paper is in the same position as in Fig 4 on each second plate.
- 3d. See that the brushes are adjusted so they touch only the metal buttons.
- 4th. See that the little clamps that hold the brush rods touch the tin foil. The stationary plates are loose and can be revolved to adjust.

5th. Turn the plates in the opposite direction to the movement of the hands of a clock.

6th. The greater the angle between brush rod and neutralizing rod on the right hand the more electricity the machine will generate. This angle cannot be greater than 90 degrees; it should be a little less than 90 degrees. Should the machine change polarity frequently, then make this angle still smaller by revolving the stationary plates, if cleaning the machine thoroughly and the changing of the air does not correct the difficulty.

7th. When the air is cold and dry, as in the winter time, there is but little resistance in the atmosphere, and if your machine should generate faster than the electricity is used it will spark across, following the path of least resistance. If the machine for above reason should spark on the inside, move the neutralizing combs down near the collecting combs on the upper right hand corner and move the neutralizing combs up near the collecting combs on the lower left hand corner. If the machine still sparks on inside, then loosen one or more of the combs that extend out between the plates clear around the machine and allow the combs to drop down so they can be fastened out of the way. The object to accomplish is to prevent the machine picking up so much electricity so it will not become overcharged.

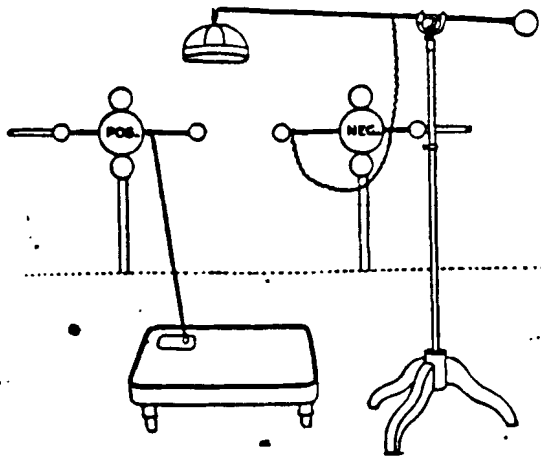


FIG. 6.

When it does not generate enough electricity then put the combs back in their original position.

Moisture and dust on the outside are just as injurious as on the inside. Your machine should be cleaned daily on the outside and when the air is perfectly dry it should be opened up after each day's work to let the foul air out and the fresh air in. A machine, to render the best service, must have good air just as much as a person.

The machine should stand about two feet from the wall so one can pass all around it and wipe it off dry and clean every morning. It is a good plan to take a piece of cheese cloth and run over the electrodes and fixtures in front before each seance.

Your case should be made as nearly air tight as possible by putting up all openings and then shellacing over the putty. Use strips of felt under the doors. Once a year your machine should be taken apart and thoroughly cleaned to get the best results. If the coating on the glass plates does not show perfect insulation the old coating should be entirely removed with alcohol and five fresh coats put on the plates. The necessary material for this would cost \$3.00, with full directions for applying it.

If your machine changes polarity, when running, it means that it needs cleaning. Use a clean, dry woolen cloth to cleanse the glass. If this will not cleanse the glass properly, first, use a cloth slightly moistened with alcohol, being careful not to injure the coating; then use the woolen cloth. Clean all the metal parts and wood on the inside with a cloth slightly moistened with alcohol, being careful not to injure the coating.

If the brass fixtures are tarnished and if they cannot be cleaned above directed, they should be removed and put in strong soap suds and heated to the boiling point so that the lacquer will soften and scale off. Add lye to the solution to hasten the process. When the old lacquer coating is softened, remove the parts from the water and clean them with a dry cloth, quickly, while they are hot, then brighten them with common whiting and re-coat with lacquer.

From June to September, a machine must be kept in first-class condition or it will not work. Remember every Static Machine will work if the plates are clean, the brushes in good condition and the air on the inside of the case dry. The ozone will cause a coating to form over the plates, and for this reason your machine must have special care.

It is a good plan to use precaution to prevent the machine discharging, especially in warm, moist weather; after using the machine remove all portable attachments, as connecting rods and grounding chains. A piece of plate glass put under each leg will improve the insulation and help to prevent the machine discharging.

Every one who has a Static Machine should have a Hygrometer, which measures the moisture of the atmosphere. If your moisture is about 40, the air in the case must be dried out by putting a quantity of chipped ice and a liberal supply of coarse salt in some fruit jar that you can close up tight. The moisture will settle on the jars and run down into a pan put under the jars so that it can be removed after an hour or so.

Another plan of drying out the machine, and to be recommended if the Hygrometer registers 50 or more, is to take about 10 pounds of pure Calcium Chloride or Merk's Calcium Chloride crystal and bake it in an ordinary cooking oven until it is thoroughly dried out and takes on the appearance similar to common salt. It will first appear wetter, and as you continue baking it it will then become dry and when it is thoroughly dry it is in proper condition to use. Then place it in the machine and close the case up tight. Put some cheese cloth over the Calcium Chloride; the moisture will settle on the cloth and when the cloth becomes saturated it can be removed and a dry one replaced.

This plan removes moisture from the machine. Repeat the process of baking the Calcium Chloride, if necessary, until the Hygrometer registers about 25. Always remove the Calcium Chloride from the machine when it has absorbed what moisture it will.

Never use freshly baked Calcium Chloride until it has had time to cool thoroughly and all gases pass off, otherwise all metal parts will be corroded.

It is a good plan to have a second lot prepared while using the first lot and put in a good receptacle and seal it up tight so it will be ready for use when needed.

If you use a crude form of Calcium Chloride, the Chlorine will be set free and it will spoil the brushes and unite with the Ozone and form a coating over the entire inside of your machine and prevent it working. If you use Calcium Chloride that is not dry it will do no good, but will give off Chlorine and do harm. In such a case you would be compelled to clean it thoroughly before you could expect the machine to work.

After the Machine is in Working Order.

First: The plates and other parts should be cleaned once a month or oftener with a cloth moistened slightly with alcohol. Scrub the plates if necessary to get them thoroughly clean, but do not injure the permanent coating on the plates. Use a clean, dry cloth for the rubber parts. Do not use enough alcohol to injure the coating. To clean the plates fasten a cloth moistened slightly with alcohol to a stick and hold it against the surface of the plate next to the combs while the plates revolve slowly.

Second: When atmosphere is dry, case should be opened occasionally after using so ozone can pass out.

Remember we make all kinds of electrodes used with our wall plate (Galvanic and Faradic); although sold for one-half price, are guaranteed equal to any made.

Our Giant Caution leads them all for heavy cautery work.