

Scientific American



AN ILLUSTRATED
JOURNAL OF ART, SCIENCE & MECHANICS

VOL. XLIV.



NEW-YORK
PUBLISHED BY MUNN & CO.

SCIENTIFIC AMERICAN

[Entered at the Post Office of New York, N. Y., as Second Class Matter.]

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY AND MANUFACTURES.

Vol. XLIV.—No. 1.
[NEW SERIES.]

NEW YORK, JANUARY 1, 1881.

[\$3.20 per Annum.
[POSTAGE PREPAID.]

BELL'S PHOTOPHONE.

During a recent visit to Paris, Professor Graham Bell favored *La Nature* with an extended account of the investigations and discoveries which led to and resulted from his late remarkable invention, the photophone. He also supplied our scientific contemporary with certain details not previously made public, together with drawings of his apparatus and experiments, the engravings of which we here reproduce, with *Nature's* translation of the text.

Our readers are already aware that the object of the photophone is the transmission of sounds both musical and vocal to a distance by the agency of a beam of light of varying intensity; and that the first successful attempts made by Prof. Bell and his co-laborer, Mr. Sumner Tainter, were based upon the known property of the element selenium, the electric resistance of which varies with the degree of illumination to which it is exposed. Hence, given a transmitting instrument, such as a flexible mirror, by which the vibrations of a sound could throw into vibration a beam of light, a receiver, consisting of sensitive selenium, forming part of an electric circuit with a battery and a telephone, should suffice to translate the varying intensities of light into corresponding varying intensities of electric current, and finally into vibrations of the telephone disk audible once more as *sound*. This fundamental conception dates from 1878, when in lecturing before the Royal Institution Prof. Bell announced the possibility of hearing a shadow fall upon a piece of selenium included in a telephone circuit. The photophone, however, outgrew the particular electrical combination that suggested it; for not the least of the remarkable points in this research is the discovery that audible vibrations are set up in thin disks of almost every kind of material by merely throwing upon them an intermittent light. With the photophone as with the telephone, there are instruments of different degrees of perfection. The original telephone of Philip Reis could only transmit musical tones, because it worked by rapid abrupt interruptions of the electric current; while the articulating telephone of Graham Bell was able to transmit speech, since by its essential construction it was able to send undulating currents to the distant receiving station.

We may in like manner classify the forms of photophone under two heads, as (1) articulating photophones, and (2) musical photophones. Up to the present time, Prof. Bell informs us, the simple receiving disk of ebonite or hard rubber has only served for a musical photophone; the reproduction of the tones of the voice by its means has not yet been demonstrated in practice—at least to his satisfaction. For while it produces unmistakable musical tones by the direct action of an intermittent light, in the experiments made hitherto with articulating instruments

have by necessity been so near to one-another that the voice of the speaker was audible through the air. Under these circumstances it is extremely difficult to say whether the sounds that are heard proceed from the diaphragm, or whether they merely come through the air to the ear, and if they come from the diaphragm, whether they are really the result of the varying light, and not mere sound vibrations taken up by the disk from the speaker's voice crossing the air. Prof. Bell hopes soon to settle this point, however, by appeal to experiment on a larger scale with the receiving

as an electric lamp, falls upon a mirror, M, and is reflected through a large lens, L, which concentrates the rays to a focus. Just at the focus is interposed a disk pierced with holes—forty or so in number—arranged in a circle. This disk can be rotated so that the light is interrupted from one to five or six hundred times per second. The intermittent beam thus produced is received by a lens, T, or a pair of lenses upon a common support, whose function is to render the beam once more parallel, or to concentrate it upon the disk of ebonite placed immediately behind, but not quite touching them. From the disk a tube conveys the sounds to the ear. We may remind our readers here that this apparent direct conversion of light into sound takes place, as Prof. Bell found, in disks of all kinds of substances—hard rubber, zinc, antimony, selenium, ivory, parchment, wood—and that he has lately found that disks of carbon and of thin glass, which he formerly thought exceptions to this property, do also behave in the same way. We may perhaps remark without impropriety that it is extremely improbable that the apparent conversion of light into sound is by any means a direct process. It is well known that luminiferous rays, when absorbed at the surface of a medium, warm that surface slightly, and must therefore produce physical and molecular actions in its structure. If it can be shown that this warming effect and an intermediate cooling by conduction can go on with such excessive rapidity that beams of light falling on the surface at

intervals less than the hundredth of a second apart produce a discontinuous molecular action of alternate expansion and contraction, then the mysterious property of matter revealed by these experiments is accounted for. However this may be, the musical photophone, as represented in Fig. 1, produces very distinct sounds, of whose existence and dependence for their production on the light the listener may satisfy himself by cutting off the light at any moment with the little opaque disk fixed on the end of the little lever just in front of the holes in disk, R, and which can be worked by a Morse key like a telegraph instrument, thus producing at will alternate sounds and silences. With this musical photophone sounds have been carried by an interrupted beam of light for a distance exceeding a mile; there appears, indeed, no reason why a much greater range might not be attained.

The articulating photophone is that to which hitherto public attention has been most largely directed, and in which a selenium receiver plays a part. Fig. 2 gives in diagram form the essential parts of this arrangement. A mirror, M, reflects a beam of light as before through a lens, L, and (if desired for the purpose of experimentally cutting off the heat rays) through a cell, A, containing alum water, and casts it upon the transmitter, B. This transmitter, shown again in

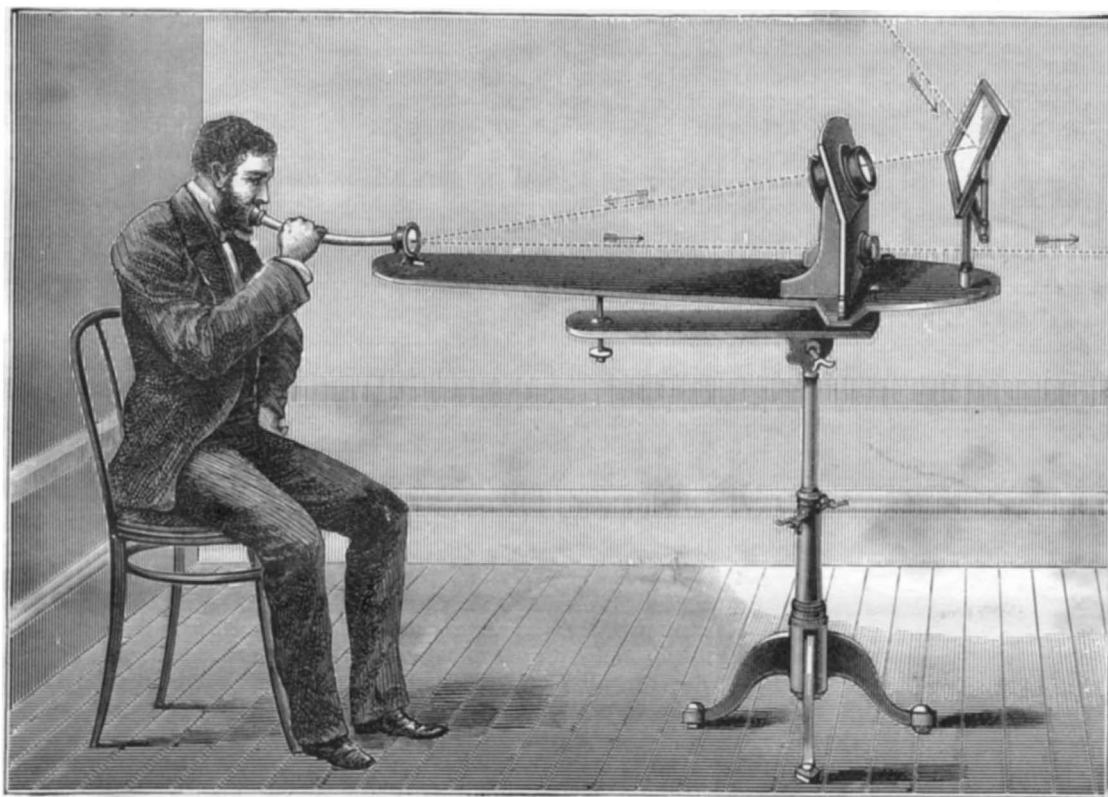


Fig. 5.—THE ARTICULATING PHOTOPHONE—THE TRANSMITTER.

Fig. 1, produces very distinct sounds, of whose existence and dependence for their production on the light the listener may satisfy himself by cutting off the light at any moment with the little opaque disk fixed on the end of the little lever just in front of the holes in disk, R, and which can be worked by a Morse key like a telegraph instrument, thus producing at will alternate sounds and silences. With this musical photophone sounds have been carried by an interrupted beam of light for a distance exceeding a mile; there appears, indeed, no reason why a much greater range might not be attained.

The articulating photophone is that to which hitherto public attention has been most largely directed, and in which a selenium receiver plays a part. Fig. 2 gives in diagram form the essential parts of this arrangement. A mirror, M, reflects a beam of light as before through a lens, L, and (if desired for the purpose of experimentally cutting off the heat rays) through a cell, A, containing alum water, and casts it upon the transmitter, B. This transmitter, shown again in

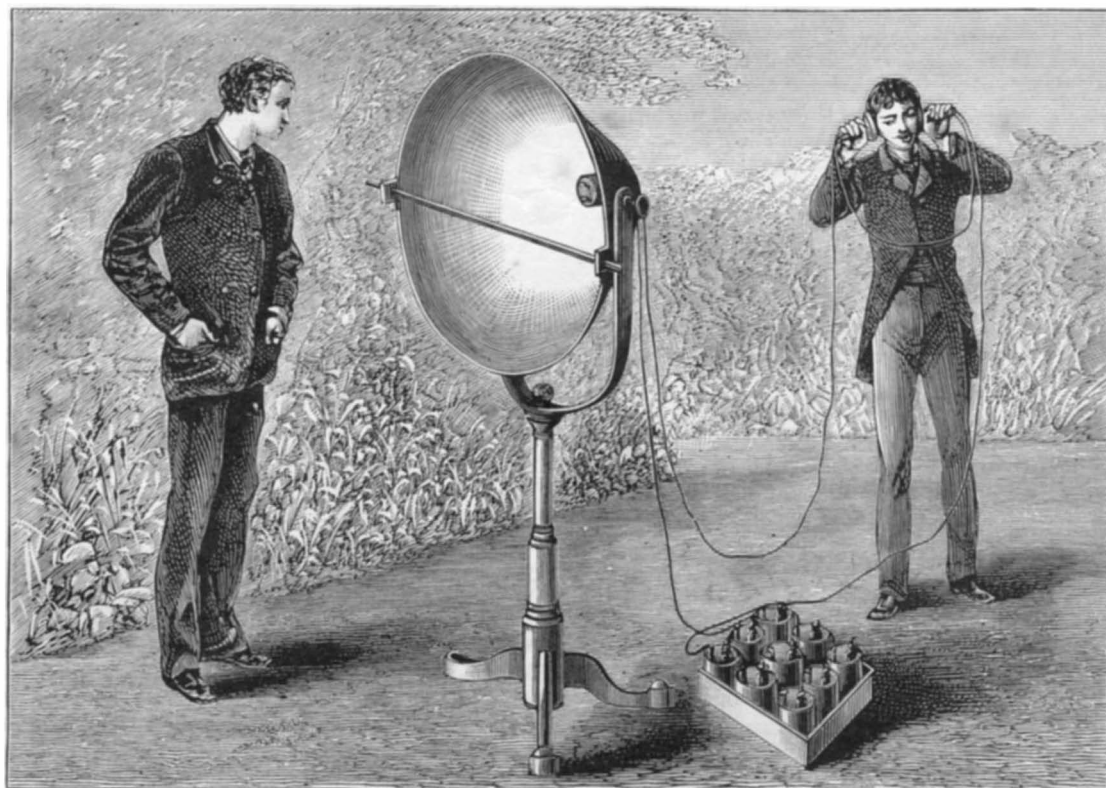


Fig. 6.—THE ARTICULATING PHOTOPHONE—THE SELENIUM RECEIVER.

[Continued on page 4.]

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT NO. 37 PARK ROW, NEW YORK.

O. D. MUNN. A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year, postage included. \$3 20 One copy, six months, postage included 1 60 Clubs.—One extra copy of THE SCIENTIFIC AMERICAN will be supplied gratis for every club of five subscribers at \$3.20 each; additional copies at same proportionate rate. Postage prepaid. Remit by postal order. Address MUNN & CO., 37 Park Row, New York.

The Scientific American Supplement

Is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, \$5.00 a year, postage paid, to subscribers. Single copies, 10 cents. Sold by all news dealers throughout the country.

Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT, will be sent for one year, postage free, on receipt of seven dollars. Both papers to one address or different addresses as desired.

The safest way to remit is by draft, postal order, or registered letter. Address MUNN & CO., 37 Park Row, N. Y.

Scientific American Export Edition.

The SCIENTIFIC AMERICAN Export Edition is a large and splendid periodical, issued once a month. Each number contains about one hundred large quarto pages, profusely illustrated, embracing: (1.) Most of the plates and pages of the four preceding weekly issues of the SCIENTIFIC AMERICAN, with its splendid engravings and valuable information; (2.) Commercial, trade, and manufacturing announcements of leading houses. Terms for Export Edition, \$5.00 a year, sent prepaid to any part of the world. Single copies 50 cents. Manufacturers and others who desire to secure foreign trade may have large, and handsomely displayed announcements published in this edition at a very moderate cost.

The SCIENTIFIC AMERICAN Export Edition has a large guaranteed circulation in all commercial places throughout the world. Address MUNN & CO., 37 Park Row, New York.

NEW YORK, SATURDAY, JANUARY 1, 1881.

Contents.

(Illustrated articles are marked with an asterisk.)

Table listing various articles such as Agricultural inventions, Air brake patents, Antidotes to arsenic, Arsenic, and notes to, Astronomical notes, Bell's photophone, Black dip for castings, Blood stains in evidence, Boiler, care of, Brass castings, to scale, Bridge bet. N. Y. and Brooklyn, Cliff town, another discovered, Cremation temple, Cure, new, for malaria, Dressing, glue, for wounds, Electricity, exhibition of, Elasticity, velocity of, Electro brass plating, Elms, large, growth of, Employers, responsibility of, Engineering inventions, Engine, road, novel, Exhibition of electricity, Freight traffic of the N. Y. C. R. R., Galvanized iron, Governor for waste water pipes, Growth of large elms, Health of cities, Heating, Prall system of, Hinge, improved, Hydrophobia 5 years after inocul., Ice cave in Montana, Inventions, agricultural, Inventions, engineering, Inventions, mechanical, Inventions, recent, Lead and silver, test for, Malaria, new cure for, Marine, commer. and naval, our, Mechanical inventions, Medicinal plants, disappear. of, Mount Baker an active volcano, Mucilage, (25), Pampas grass, Patent decisions, Patent royalties on shoe mach., Peaches, peeling, new process of, Photophone, Bell's, Piano strings, stretch of, Plating, electro-brass, Poisonous fly bite, Prall system of heating, Responsibility of employers, Road engine, novel, Scallops, Shoe machinery, pat. royal. on, Telephone circuit, arrangement of, Tangle, cremation, Tides, utilizing the, Waste water pipes, governor for, Watchmaking in France, Wheat, Am., possibilities of, Where our forests are going, Women, what they invent, Worthington, H. R., Death of.

TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 261.

For the Week ending January 1, 1881.

Price 10 cents. For sale by all newsdealers.

Table listing contents of the supplement such as I. ENGINEERING AND MECHANICS.—Improved Torpedo Boat Engines, Large illustration and 6 figures.—Perspective and sections of improved compound engines for French torpedo boats, The First Steamboat, Proposed Railways in Mexico, Northeastern Railway Bridge over the River Wear at Sunderland. Full page illustration, Salmon and Crossland's Stone Grinding and Polishing Machine, 1 figure, II. TECHNOLOGY AND CHEMISTRY.—Extraction of Grease from Wool, Review of the Most Important Changes in the Industrial Applications of Chemistry Within the Last Few Years.—General chemical treatment of textile materials.—Bleaching and the manufacture of chloride of lime.—Preparation of Dye Stuffs.—Artificial coloring matters.—Mordants.—Dyeing.—Calico printing.—Tanning.—India-rubber, gutta percha, etc., Scientific Notes.—Maize meal.—The diastasic power of barley.—Use of Fehling's solution.—Reducing powers of different kinds of sugar, Assembly of German Natural Scientists, Dantzig, 1880.—Dr. Kiel on acetol and grape sugar.—Dr. Scheibler on saccharine.—Dr. Blochmann on the flame of the Bunsen burner, etc., Ozone in the Air, A New Optical Milk Testing Apparatus, 2 figures, Easy Chemical and Microscopic Methods of Detecting Blood Stains. By Prof. D. S. KELLICOTT, III. NATURAL HISTORY, ETC.—The Animals of the Deep Sea, Dr. H. ALEX. PAGENSTECHER'S observations, Scale Insects. A valuable paper by Prof. COMSTOCK.—The natural history of the coccidia.—A second group of scale insects.—A third group of scale bugs.—The forms of scale bugs occurring on the Pacific Coast.—How the scale insect is spread.—Methods of preventing the pest. Remedies for exterminating the pests.—Smut on orange trees and oleanders, Cattle and Dairy Interests in Kansas, Some Natural History Notes Regarding the Jews, Mexicans as a Primitive People, A Newly Discovered Oasis. The remarkable district of Abunaim, in the Sahara, discovered by Dr. Gerhart Rohlf's, IV. ART, ARCHITECTURE, ETC.—Artists' Homes, No. 8. Mr. Val C. Princep's House, Kensington. Large illustration and 6 figures, Theories Regarding a Gradual Development of the Sense of Color, V. ARCHAEOLOGY.—Ancient American Pottery.—Contributions to the Archaeology of Missouri.—The Ancient Pottery of Southeastern Missouri, 23 figures, Ancient Warriors Uncovered. The Remains of the Theban Three Hundred, VI. MISCELLANEOUS.—A Miner's Daring and Endurance, How a Fast Racer Trots, The Tea Trade of the United States, The Egg Trade, Where the Oleomargarine Goes, The Tide of Immigration, The Population of the Earth, Continental Libraries.

PATENT ROYALTIES ON SHOE MACHINERY.

The shoe manufacturers of the United States, or at least a considerable proportion of them, have lately been finding fault with our patent laws and the way in which they are enforced, without, as we conceive, a just apprehension of the grounds on which their complaint is based. They recently held a National Convention of the trade in Philadelphia, for the discussion of this question, and matters related thereto, during the progress of which, notwithstanding that many untenable propositions were made, and very extreme opinions were put forward by individual members, it must be allowed that great good sense was manifested, the conclusions reached pointing in what was perhaps the only direction from which practically beneficial results might be reached.

For some years past it has been an extremely unpopular and up-hill work to endeavor to sell to shoe manufacturers a machine for which a royalty was charged on the work done to cover the rights of the patentee. There were many in the trade, including some of its most influential members, who took the position that, for any machine that was of decided advantage to them, they would be willing to pay a sufficient round sum down, and then be the owners thereof, to use as they saw fit, while they did not believe it was possible to offer them a machine the payment for the patent rights in which was to be made on the basis of a specified tax for each pair of shoes produced. There are, of course, twosides to this question. There are many manufacturers who would not be able to purchase outright a machine covering the introduction of valuable patents, but who would find it no tax, comparatively speaking, to pay such royalty as would be enforced upon all other users of the same improvement, and hence would become a regular item in the cost of production in all goods of the kind. In this way the royalty system, where all are taxed alike, places the small manufacturer on an equal basis with the producer possessed of unlimited means. Perhaps quite as common a ground, however, for the adoption of the royalty system in the introduction of any particular patented improvement, is the skepticism with which new inventions are sometimes looked upon when first brought to the attention of those practically engaged in the particular industry for which the improvements are intended. The old workmen are prejudiced against and look with distrust upon the innovation, so that, if they give to the inventor any credit at all, their allowance is so meager that it would hardly afford a basis for fixing any proper compensation for the improvement, and even this concession is frequently accompanied by the assertion that the patent is for something not new, or not entitled to the protection of a patent. The last question must, of course, always go to the courts for final decision, although the patent itself is prima facie evidence of its own validity. But the manufacturer who takes a machine on trial, the patentee to be paid by royalties, seldom binds himself to pay anything for the improvement unless he finds it valuable to him; in other words, he need not produce his goods with its aid, but may keep on according to his old methods, and so be free from all royalty payments. In this way many of the most valuable patented improvements have been introduced, and, with a little practice and the removal of first prejudices, been made to work successfully, the tax at first being so light as to seem insignificant. The inventor, in fact, has been to all the expense of perfecting his machine, device, or process, overcoming objections thereto, and proving its practical success, before obtaining any return for his outlay, and, therefore, according to all business principles, is entitled to a proportionate reward. There are many inventors and patentees who have traveled this road to meet failure only; many more have achieved a fair degree of success; the few who have won the grand prizes can be counted on the finger ends.

The boot and shoe trade affords one conspicuous instance of the splendid success of a patented improvement, as exemplified in the sole-sewing machine. It was only by a long course of experiment and the investment of a great deal of money that it was perfected; it did not easily obtain a first introduction, so the system of putting it in factories, and allowing the manufacturers to pay for its use a small royalty per pair of shoes made, was the only one then thought practicable, and certainly was at the time eminently satisfactory to the trade. Under the able management of one who was accomplished a mechanic as he was a shrewd business man, the machine almost revolutionized the boot and shoe manufacture, and has yielded magnificent profits to the patentee. This triumph, however, gave a strong encouragement to other patentees to adopt the royalty system, and the number has become so great as to cause much opposition to royalties in the trade; and this was a principal topic of discussion at the late convention in Philadelphia. The prime object in calling the meeting was to consult in regard to how much longer the royalties must be paid on the sole-sewing machine.

We noticed, a few weeks ago, the decision of Judge Blatchford, virtually affirming that the patents would hold good, and royalties thereon be collectible, till next August, but there are many in the trade who were not disposed to accept this as final. Ample discussion at the convention, however, showed the doubtful utility of any further contest on this point, as the representatives of the sole-sewing machine patents made it too clearly evident that they had the law on their side. Great as had been their profits, it was not denied that they had done a vast deal for the prosperity of the trade, particularly among small manufacturers;

but while they now stood, as a strong corporation, ready and able to meet the issues at law with the manufacturers, they were willing to confer and negotiate in regard to such future royalties as had not been decided upon in their favor by the courts. The convention thereupon appointed a committee of representative manufacturers to take charge of such negotiations, not only with this company, but with all others owning patents which were paid for by royalties, with power to commence legal proceedings should they deem such course advisable.

Patentees generally can certainly have no objections to negotiations looking to a settlement in cash in lieu of royalties for their rights, and such moderate action on the part of the convention is far more sensible than it would have been for its members to rush blindly into expensive and almost interminable litigation.

THE PRALL SYSTEM OF HEATING.

During their recent convention in this city the members of the American Society of Civil Engineers were entertained by the Prall Union Heating Company. The dinner was cooked throughout by superheated water; and whatever may have been the cost on the relative economy of the system, the cooking was accepted as unquestionably satisfactory.

That bread can be baked and meat roasted by hot water may seem quite incredible to those who think of boiling water only as commonly seen in open vessels. Under atmospheric pressure water can be heated no higher than 212°, far below a roasting temperature. But when confined there is no limit to the temperature it may receive save the weakness or strength of the containing vessel.

The Union Heating Company propose to supply heat and power to houses by a system of pipes circulating water heated under pressure to about 376°, that is, a pressure of about 160 pounds above the atmosphere. In being conveyed a mile in boxed pipes, under ground, the water, it is claimed, loses not more than 1°, so that a temperature of 375° can be maintained in the pipes of a cooking range, a heat sufficient for all culinary purposes. The heating of houses can be effected either by air currents circulating around hot-water coils, or by means of steam radiators, the hot water being converted into steam in small converting chambers.

In the operation of the system, central boiler stations will be established in districts of about one square mile area. The pipes conveying the superheated water from the central station and back again, are laid in the same trench, and are so connected as to allow a forced circulation. The return pipe conveys to the generator all the water not drawn off for domestic or other purposes, thereby saving all the heat not available for heating purposes or for steam power.

The alleged advantages of this system of circulating superheated water over systems of steam heating consist in the smaller size and cost of the service pipes; in the smaller loss of heat by radiation and condensation, owing to the smallness of the pipes; and the saving of fuel through the return of all the unused condensed water to the central generator.

At the trial station at 125th street about 3,000 feet of pipe have been laid. The water to be circulated is heated to about 342°, and is said to be driven through the system at such a rate that no water is allowed to be more than fifteen minutes away from the boiler. It is estimated that two or three cubic feet of water an hour will suffice for heating an ordinary city house, and that the cost to consumers will be much less than with any other system of heating. To determine this, however, we are inclined to think that something more than brief experimental trials, under the management of the company's engineers, will be necessary. However promising a system may be theoretically, serious difficulties are apt to be encountered when it is put to the test of practical use at the hand of ignorant and unskillful servants. In the ordinary use of steam at low pressure for domestic purposes, leaking joints and valves are a source of constant trouble; much more must they be troublesome under a pressure four or five times as great. At any rate the successful use of superheated water in the way proposed will necessitate a style of valve making and steam fitting marvelously better than builders and house owners are able to obtain now.

THE RESTORATION OF OUR COMMERCIAL AND NAVAL MARINE.

No question before the American people to-day presents so wide a range of problems of national interest, so many problems having a direct and vital bearing on the prosperity and security of the country as a whole, as that which seeks an answer in the restoration of the United States to their former and proper place among the commercial and naval powers.

Our industrial interests cry aloud for a reconquest of the sea by a commercial marine flying the Stars and Stripes. The security of our coasts, not less than the protection of the mercantile fleets which our enterprising traders are bound to set afloat before another generation passes, demands the speedy building of a navy commensurate in magnitude, capacity, and power, with our position as a nation among the ruling nations of the civilized world. The universal reign of arbitration and international peace is yet a long way off; and it will not do for the wealthiest country of the world to leave her great depositories of wealth open to sudden incursions from powers less peacefully inclined. Besides the consciousness of insecurity inseparable from a lack of means

of defense may cost in comfort if not in cash more than the needed defenses would.

We may take it for granted, therefore, that the American people, now that they are comparatively free from pressing demands upon their thought and means arising from internal complications, and now that they have become pretty generally aroused to a sense of their maritime weakness, will pay to naval affairs henceforth that attention which can mean nothing less than ultimate supremacy in this direction. When the American people make up their minds to do a thing it is done, and usually on a scale that is not niggardly or mean.

At this juncture it is timely, to say the least, to inquire what the rest of the world has been doing in naval matters during the period of our naval quiescence. We shall find, as will be shown elsewhere, that other nations have not been idle; indeed, the past ten or fifteen years have covered a period of greater activity in naval affairs than any corresponding period in the history of navies.

Within this period, as has been so forcibly expressed by Chief Engineer King, in his splendid work on the war ships and navies of the world, "all the navies of Europe have been undergoing reconstruction, while those of Asia and South America have been in great measure created. Never has there been a period in time of peace when such large expenditures were being made for naval purposes as at present, and never a period in the history of steam screw navigation when such radical changes were being effected in the construction of ships of war, in the mechanism of steam propulsion, and in the application of machinery to various purposes on board ship hitherto accomplished by hand. Never before have such vast strides been made in so short a time in the fabrication of great guns for naval warfare, necessitating, of course, the introduction of new mechanical appliances for working them; while the development of torpedo warfare and the newly invented methods of operating those dangerous weapons, promise to add to future maritime contests an element hitherto almost unknown."

In all this activity there has been a large measure of progress; chiefly, however, along lines of improvement first marked out by American inventors; a fact clearly recognized by Mr. King in his concluding chapter on the needs of our navy. The beautiful outlines of American fast sailing vessels were copied in Europe. The first war ship propelled by the screw was built in Philadelphia. Shell fire and subsequently heavy guns were first introduced here. The torpedo is an American invention, and so is the revolving turret for vessels of war. It remained, adds Mr. King, for European naval powers, having large appropriations at command, to develop and expand American inventions. The ideas for the present powerful mastless sea-going armored ships of the English grew out of the visits of our turret vessel Miantonomoh to British ports; and the unarmored fleet of fast ships, of which the Inconstant was the first in Europe, owe their development to the building of the Wampanoag.

It is not to be presumed that an approach has been made to the limit of possible improvement in war vessels and their equipment. And there is every reason to anticipate that when American inventors and shipbuilders again turn their attention to naval problems, the radical and daring novelties which made America the pioneer in the creation and development of the several types of modern war vessels and their equipment in use to-day, will be more than paralleled in the evolution of the war vessel of the future. In any case we shall have the advantage of the knowledge gained during the progress of the costly experiments made in Europe during recent years, both in teaching what to do and what to avoid, and our advancement should be correspondingly sure and rapid.

If we could be certain that our present peaceful career will continue unbroken—as we hope it may—for another score of years, some justification might be found for a continuance of the policy of inaction. Indirectly we cannot fail to be benefited by all the improvements, and the failures as well which Europe is making at such heavy cost in naval construction and armament, provided the improvements are not suddenly turned against us while we are unprepared to meet them. To rest, however, on such a precarious ground for idleness would be sheer foolishness, when we know that our coast defenses are antiquated and practically worthless for protection against a heavily armed and armored foe.

It is true that modern wars are not apt to be suddenly declared, and that much might be done in a few months to put our coast in a fair condition of defense. Still it must be borne in mind that many months are required for the construction of powerful cannon and fortresses, whether fixed or floating; and when the emergency comes we may not be called upon to meet a slow moving and honorable enemy, but a gang of dashing and irresponsible private adventurers, who might sail into any of our sea ports any day with a vessel so strong as to enable them to destroy property or levy tribute to a larger amount than the cost of a great navy.

That there is any need of our emulating England and France and Italy in the construction of enormous sea-going iron clads, costing millions each, is not at all apparent. Indeed it may rather seem that the line of experiment in that direction has already been pushed to the utmost extreme, and that the new conditions of naval warfare, as developed in great guns, torpedoes, and so on, demand a radically new departure in naval architecture. In any case it becomes our national government to make provision for such action in our public and private navy yards as shall invite our ship

builders and inventors to show what American genius can do to meet our peculiar needs in this direction.

ELECTRO-BRASS PLATING.

Many articles of bronze composition, of zinc, or cheap alloys receive a coating of brass by electric deposition, as a basis for the bronze luster, which is more easily applied and better retained by such a surface. The brass finish is also applied by this method to iron, steel, and composition wire.

The preliminary and finishing operations and the disposition of the baths are the same for brass as for copper deposits. Heat is applied for brass deposits by those who electroplate coils of iron of composition wire, etc., with this alloy. For other articles the baths used are not usually heated. The hot bath is usually contained in an oblong open iron boiler lined with sheet brass, while that for cold plating is generally placed in a wooden tank coated with gutta percha or asphaltum. The anodes are of plate or sheet brass joined together and arranged along the sides, all connected with the last carbon or copper of the same battery. The strength of battery current is regulated by the surface of the articles to be electroplated. The articles are suspended in the usual way—by copper or brass hooks to stout rods of the same metal, all connected with the last zinc of the battery.

THE BRASS BATHS.

Where the ordinary cheap commercial cyanide is employed the following answers very well:

Sulphate of copper	4 oz.
Sulphate of zinc	4 to 5 oz.
Water	1 gall.

Dissolve and precipitate with 30 ounces carbonate of soda; allow to settle, decant the clear liquid, and wash the precipitate several times with fresh water—after as many settlings. Add to the washed precipitates:

Carbonate of soda	15 oz.
Bisulphite of soda	7½ oz.
Water	1 gall.

Stir to effect solution of these last two, then stir in ordinary cyanide of potassium until the liquid becomes clear and colorless. Filter if much iron or iron oxide (derived from impure zinc salt and cyanide) remains suspended in the liquid. An additional half ounce or so of the cyanide improves the conductivity of the solution.

COLD BRASS BATH FOR ALL METALS.

Carbonate of copper (recently prepared)	2 oz.
Carbonate of zinc " "	2 "
Carbonate of soda	4 "
Bisulphite of soda	4 "
Cyanide of potassium (pure)	4 "
Arsenious acid	¼ "
Water	1 gall.

Filter if necessary.

The arsenious acid is added to brighten the deposit—an excess is apt to give the metal a grayish-white color.

MANAGEMENT OF THE BATH.

The losses of the bath are to be repaired by the addition of copper and zinc salts (and arsenious acid) dissolved in fresh cyanide, and water.

The operator determines the requirements from the rapidity of the deposit, its condition, color, and so on.

The difficulty in brass electroplating, especially with small baths, is in keeping the uniformity of the color of the deposit, as the electric current having to decompose two salts, each offering a different resistance, must, according to its intensity, vary the color and composition of the deposit. A feeble current principally decomposes the copper salt and results in a red deposit; while too great intensity in the current decomposes the zinc salt too rapidly and the deposit is a white or bluish-white alloy. If the deposit has an earthy or ocherous appearance, or if the liquid is blue or greenish, the solution is deficient in cyanide. When in proper working order the liquor is colorless. If the coating becomes dull and unequal, a slight addition of arsenious acid will usually improve it.

If the deposit is too red, use more battery power or add more zinc salt; if too white, decrease the current or add more copper salt. The specific gravity of the bath may vary from 5° to 12° Baumé; when it exceeds this latter gravity it should be diluted with fresh water to decrease the electric resistance.

If the brass deposit is irregular, remove the articles from the bath, rinse, scratch-brush, and put again into the bath until the color and thickness of the deposit are satisfactory. Scratch-brush again, and, if necessary, rinse in hot water, dry in warm white wood sawdust, and put in the stove room. The last three operations are indispensable for hollow pieces.

In the disposition of the brass plating bath it is always necessary to have all the articles suspended at about equal distances from the anodes.

The bath may be subdivided by several anodes, forming partitions, so that each loaded rod is between two anodes.

The anodes should always be removed when the bath is not in use.

In order that the brass electroplating of zinc or copper may be lasting the deposit must not be too thin, and must be scratch-brushed, washed in lime water, and dried in the stove room.

Generally ten to twenty-five minutes' exposure in the bath suffices in ordinary practice to throw on a good coating. Cast and wrought iron, lead, and its alloys require a bath richer in the metals than when brass plating zinc or its alloys.

The battery power should also be greater. For lead the bath works better warm (at about 90° Fah.). When once placed in the brass bath articles should not be moved about, as there is a tendency under such circumstance to the formation of a red deposit.

In brass plating wire the hot bath is usually employed. As before mentioned, the vessel containing the bath usually consists in an oblong open iron boiler, lined with sheet brass anodes, and heated by fire, steam, or hot water. A stout copper or brass rod in the direction of the length of the boiler rests upon the edges, from contact with which it is insulated by pieces of rubber tubing. The rod is connected with the zinc pole of the battery. The binding wires are removed from the coil, the wires loosened, and the ends bent together into a loop. The wire is then dipped into a pickle of dilute sulphuric acid, and hung upon a stout round wooden peg fastened in the wall, so that the coil may be made to rotate easily. After a scrubbing with wet sharp sand and a hard brush the coil is given a primary coating of copper. It is then suspended to the horizontal rod, where only a part of the coil at a time dips into the solution and receives the deposit; the coil is then turned now and then one-half or one-fourth of its circumference. By dipping the coil entirely into the liquid the operation is not so successful.

The wires are washed, dried in sawdust, and then in the stove room, and lastly, passed through a draw plate to give them the fine polish of true brass wires.

The temperature at which the hot bath is commonly used varies between 130° and 140° Fah.

Progress of the Great Bridge Between New York and Brooklyn.

The first shipment of the heavy steel beams for the superstructure of the East River Bridge has been received. Now that the requisite machinery has been made for turning out beams of the required size, the contractors claim to be able to produce them rapidly. The four great cables to be placed under the floor of the bridge from tower to tower, to strengthen the bridge against upward and lateral wind pressures, have also been received. They are regarded as the largest steel wire ropes ever made in this country. These ropes are made in seven strands each.

The central strand has forty-nine No. 11 wires, and the six strands surrounding and enveloping this have nineteen wires each, of Nos. 4, 5, and 7 gauge, making one hundred and sixty-three wires in all. Every wire put into these and all other ropes used in the bridge is tested in strength, elasticity, and tension. The strength must equal 160,000 pounds per square inch cross section. The stretch must be not less than four per cent, and the wire must stand being wound around an iron rod three times its own diameter without showing flaw or fracture.

The great ropes just received are each 1,550 feet in length, 3 inches in diameter, and their aggregate weight is 102,495 pounds.

Death of Henry R. Worthington.

Henry R. Worthington, one of the most prominent hydraulic engineers in this country, died Dec. 17, 1880, in this city, after a very brief illness, at the age of 63 years.

Mr. Worthington was a native of Brooklyn. He engaged in mechanical pursuits at an early age, and became a hydraulic engineer while a very young man. His success in his profession was marked, and he invented a number of important improvements in hydraulic machinery. He constructed the pumping machinery for the waterworks of a great many cities, including that for the new high service works at 97th street and Tenth avenue. He maintained an office at No. 239 Broadway, and was also President of the Nason Manufacturing Company, at No. 71 Beekman street.

He was Vice President of the American Society of Mechanical Engineers, which he assisted to found, and was a member of the Society of Civil Engineers.

The Freight Traffic of the N. Y. Central R. R.

The unprecedented activity of trade this fall is indicated by the unusual traffic of the great lines of railway. During the forepart of December 50 trains, of 38 cars each, passed eastward over the road; a total of 1,900 cars. For the West there was 40 trains, of 45 cars, per day; a total of 1,800 cars. For a week, going East, 13,300 cars; going West, 12,600 cars; a grand total of 25,900 cars. For a month, going East, 57,000 loaded cars; for the West, 54,000; a grand total of 111,000 cars for a month. These statistics are aside from the passenger traffic.

Mount Baker an Active Volcano.

On several occasions during recent years reports have come from Washington Territory that smoke columns and similar indications of volcanic activity had been seen on Mount Baker. A dispatch from Seattle, W. T., dated December 12, says that the mountain was then in eruption, and that a sharp shock of earthquake was felt the evening before.

THE AIR BRAKE PATENTS.—The suit brought by the Westinghouse Company against the Eames Vacuum Brake Company, of Watertown, N. Y., for an alleged infringement of air brake patents, was abandoned December 16, Westinghouse withdrawing the action and paying the costs.

THE ELECTRIC RAILWAY.—Messrs. Siemens and Halske have obtained a concession from the authorities for building an elevated electric railway in Berlin from Lichterfeld to Yeltow.

BELL'S PHOTOPHONE.

[Continued from first page.]

Fig. 5, consists of a little disk of thin glass, silvered on the front, of about the size of the disk of an ordinary telephone, and mounted in a frame, with a flexible India-rubber tube about sixteen inches long leading to a mouthpiece. A second lens, R, interposed in the beam of light after reflection at the little mirror, renders the rays approximately parallel. The general view of the transmitting apparatus given in Fig. 5 enables the relative sizes and positions of the various parts (minus the alum cell, which is omitted) to be seen. The screw adjustments of the support serve to direct the beam of light in the desired direction.

It may be well to explain once for all how the vibrations of the voice can affect the intensity of the reflected beam far away. The lenses are so adjusted that when the mirror, B, is flat (that is, when not vibrating) the beam projected from the apparatus to the distant station shall be nearly focused on the receiving instrument. Owing to the optical difficulties of the problem it is impossible that the focusing can be more than approximate. Now, matters being thus arranged, when the speaker's voice is thrown against the disk, B, it is set into vibration, becomes alternately bulged out and in, and made slightly convex or concave, the degree of its alteration in form varying with every vibration of the voice. Suppose at any instant—say by a sudden displacement such as takes place when the letter "T" is sounded—the disk becomes considerably convex; the beam of light will no longer be concentrated upon the receiving instrument, but will cover a much wider area. Of the whole beam, therefore, only a relatively small portion will fall upon the receiving instrument: and it is therefore possible to conceive that, if perfectly adjusted, the illumination should be proportional to the displacement of the disk, and vary, therefore, with every vibration with the utmost fidelity. The receiver of the articulating photophone is shown on the right hand side of the diagram (Fig. 2) sketched by Prof. Bell. A mirror of parabolic curve, C C, serves to concentrate the beam and to reflect it down upon the selenium cell, S, which is included in the circuit of a battery, P, along with a pair of telephones, T and T. Here again a general view like that given in Fig. 6 facilitates the comprehension of the principal parts of the apparatus. The sensitive selenium cell is seen in the hollow of the parabolic mirror, which is mounted so as to be turned in any desired direction. The battery standing upon the ground furnishes a current which flows through the selenium cell and through the telephones. When a ray of light falls on the selenium—be it for ever so short an instant—the selenium increases in conductivity, and instantly transmits a larger amount of electricity, and the observer with the telephones hears the ray, or the succession of them—hears, indeed, their every fluctuation in a series of sounds which, since each vibration corresponds to a vibration of the voice of the distant speaker, reproduce the speaker's tones.

The great difficulty to be overcome in the use of the selenium as a working substance arose from its very high resistance. To reduce this to the smallest possible quantity, and at the same time to use a sufficiently large surface whereon to receive the beam of light, was the problem to be solved before any practical result could be arrived at. After many preliminary trials with gratings and perforated disks of various kinds, Prof. Bell and Mr. Tainter finally settled upon the ingenious device to be described. A number of round brass disks, about two inches in diameter, and a number of mica disks of a diameter slightly less, were piled upon one another so as to form a cylinder about two and a half inches in length. They were clamped together from end to end, the clamping rods also serving to unite the disks of brass electrically in two sets, alternate disks being joined, the 1st, 3d, 5th, etc., being united together, and the 2d, 4th, 6th, etc., being united in another series. This done, the edges between the brass disks were next filled with selenium, which was rubbed in at a temperature sufficiently high to reach the melting point of selenium. After this the selenium was carefully annealed to bring it into the sensitive crystalline state. Then the cell is placed in a lathe and the superfluous

selenium is turned off until the edges of the brass disks are bared. Fig. 3 shows, in section, the construction of such a shell. Prof. Bell has also used cells in which the selenium filled only the alternate spaces between disks, the intermediate spaces being occupied by mica disks of equal diam-

great interest, especially to those who desire to repeat for themselves the experimental transmission of sound by light. The greatest distance to which articulate speech has yet been transmitted by the selenium-cell-photophone is 213 meters, or 233 yards. When sunlight is not available recourse must

be had to an artificial source of sufficient power. During the recent experiments made by Prof. Bell, in Paris, the weather has been adverse, and the electric light has been called into requisition in the ateliers of M. Bregnet. The distance in these experiments between the transmitting diaphragm, B, and the parabolic reflector, C C, of the receiver was fifteen meters, the entire length of the room in which the experiments were made. Since at this distance the spoken words were themselves perfectly audible across the air, the telephones connected with the selenium cell were placed in another apartment, where voices were heard without difficulty and without doubt as to the means

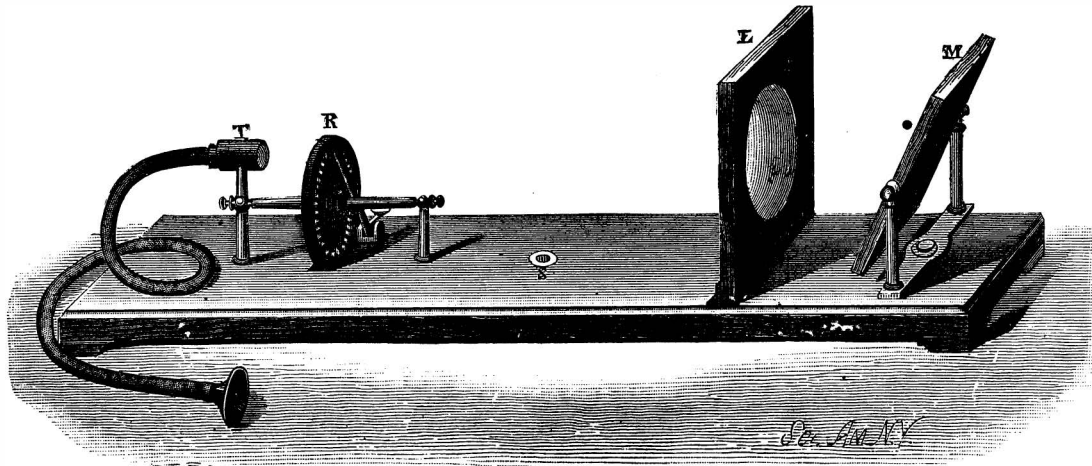


Fig. 1.—THE MUSICAL PHOTOPHONE.

ter with the brass disks. But this arrangement was in no way preferable, for in practice it was found that moisture was apt to penetrate at the surface of the bare mica, spoiling the effect.

Fig. 4 is a diagram which simply illustrates the action of

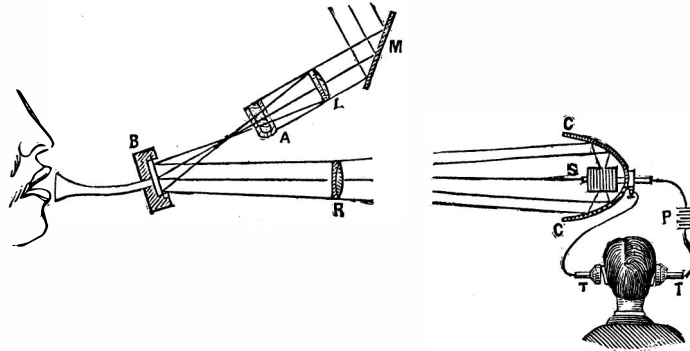


Fig. 2.—THEORETICAL DIAGRAM OF THE ARTICULATING PHOTOPHONE.

the selenium receiver, and shows, first, the way of connecting the alternate disks; and, secondly, that the current from the battery, P, cannot go round the telephone circuit without passing somewhere through selenium from one brass

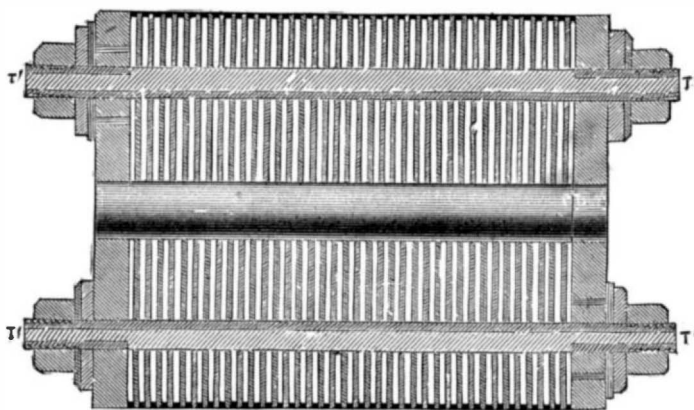


Fig. 3.—SECTION OF THE SELENIUM RECEIVER.

disk to the next. The special advantages of the "cell" devised by Prof. Bell are, that in the first place the thickness of the selenium that the current must traverse is nowhere very great; that in the second, this photo-electrical

of transmission. The transmitter shown in Fig. 7 consists of a fixed plate, P, provided with numerous slots and of a like movable plate attached to the diaphragm, L, mounted in a frame provided with a mouthpiece, E. The vibration of the movable plate varies the intensity of the light passing through it.

In Fig. 8 the transmitter is shown as used in combination with a collecting lens, L, in place of the parabolic reflector. In Fig. 9 a transmitter is shown which is based upon the effect of electricity on polarized light. A lens, L, throws the beam of a light, F, upon a Nicol polarizing prism, R, and the polarized beams traverse an analyzer, R'. A helix, B, is placed between the two prisms and in the circuit of an ordinary microphone, M. By speaking, the intensity of the current traversing the helix is varied, and this causes the plane of polarization of the rays to be turned more or less, and consequently more or less rays are extinguished by the analyzer, R'.

Of the earlier and less perfect forms of the photophone little need be said. One device, which in Prof. Bell's hands worked very successfully over a distance of eighty-six yards, consisted in letting the beam of light pass through a double grating of parallel slits lying close to one another, one of which was fixed, the other movable and attached to a vibrating diaphragm. When these were placed exactly one in front of the other the light could traverse the apparatus, but as the movable grating slid more or less in front of the fixed one, more or less of the light was cut off. Speaking to the diaphragm, therefore, caused vibrations which shut or opened, as it were, a door for the beam of light, and altered its intensity. The mirror transmitter of thin glass silvered was, however, found superior to all others; and it is hard to see how it could be improved upon, unless, possibly, by the use of a thin disk of silver, itself accurately surfaced and polished.

Whatever be the future before the photophone, it assuredly deserves to rank in estimation beside the now familiar names of the telephone and the phonograph.

Responsibility of Employers.

While a boy of 16 was at work upon a printing press in the press room of a New York paper the press was unexpectedly started. The boy sprang back from his dangerous position, and in so doing tipped over the bench he was standing on, causing him to fall against another press, which caught his arm and injured it so as to make it for ever useless. He sued the proprietor in the Superior Court and obtained a verdict for \$3,000 damages. The defense was that the accident was caused either by the negligence of the plaintiff or of a fellow workman, for which the proprietor was not responsible. In charging the jury, Judge Speir said that if the plaintiff or a skilled fellow workman were negligent the plaintiff could not recover damages; but that if the agent of the defendant employed persons not skilled in their work and the accident occurred through the negligence of one of such persons, the defendant was responsible. An appeal was taken from the judgment on the grounds that Judge Speir erred in thus charging, and in permitting the plaintiff to exhibit his mutilated arm to the view of the jury, thus arousing their sympathy. The General Term has affirmed the judgment in a long opinion written by Judge Freedman and concurred in by Chief Justice Sedgwick.

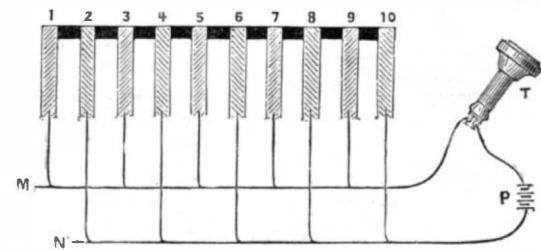


Fig. 4.—Diagram showing the action of the Selenium Receiver.

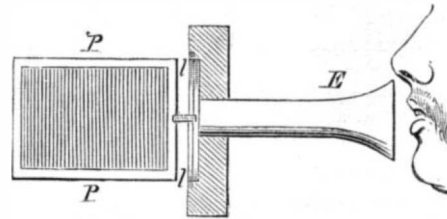


Fig. 7.—Slotted Transmitter.

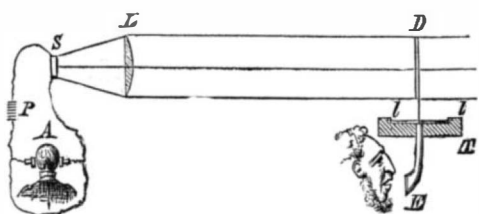


Fig. 8.—Condenser Receiver.

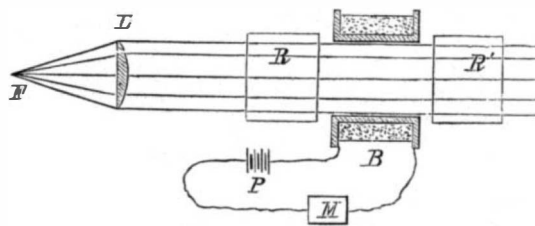


Fig. 9.—Polarized Light Transmitter.

action of light on selenium being almost entirely a surface action, the arrangement by which all the selenium used is a thin surface film could hardly be improved upon; and that, thirdly, the symmetry of the cylindrical cell specially adapts it for use in the parabolic mirror. These details will be of

Another Cliff Town Discovered.

The occurrence of ancient cliff towns, built upon or rather in almost inaccessible places along the precipitous sides of river canons in Colorado and New Mexico, was made known several years ago. Another very important discovery of this nature was made a short time since by Mr. James Stephenson, of the U. S. Geological Survey, in New Mexico. The city lies in a cañon thirty miles long, never before visited by white men, and is about forty miles from Santa Fe and ten miles from the Rio Grande. It consists of a succession of excavations in the solid rock throughout the length of the canon, making, perhaps, the largest cliff town yet discovered.

The houses are dug out of the rock side to a depth of from fifteen to twenty feet. Apparently they were excavated with stone implements. They are almost inaccessible from the plains. Mr. Stephenson, however, managed to clamber up the rocky precipice, and entered and examined a number of articles that he thought remains of their first possessors. A scientist who has traveled in that region and visited other caves and excavations of a similar kind says he is disposed to believe that they have been tenanted within modern times by Indians at war with other tribes, seeking safety and advantage over their enemies. He thinks the remains found there are the remains of the things these belligerents have used, eaten, or worn, and not the relics of the first owners of the rock houses.

The Utilizing of the Tides.

A Philadelphia engineer has invented, it is claimed, a machine by which the power of the tides can be utilized. Numerous plans have been proposed for the accomplishment of this most desirable end, but only under exceptional conditions have they been practical or economical. If the new device can harness the tide in an open channel, so as to convert any considerable portion of the vast power into working force, the inventor will rank among the great benefactors of humanity. Emerson says somewhere: Hitch your wagon to a star. A device for utilizing mechanically the free tides, as they sweep along our shores, would come next to that, since it would enable us, through converters and carriers of electricity, to hitch our wagons to the sun and moon.

CREMATION TEMPLE.

The engraving shows the Cremation Temple lately built in the beautiful cemetery of Milan by Mr. Albert Keller. This temple, built in the Greco-Doric style, is surrounded by columns and pilasters, and surmounted by a cupola, forming a chimney through which the products of combustion escape. The furnace is in the basement, and nearly in the middle of the building. The interior of the building is divided into four large halls, in the first of which the mourners assemble before the body is brought into the urn or cremation chamber; adjoining this hall there is a room in which the bodies in their coffins are awaiting cremation. The next apartment is a large storage room for coal and wood, and beyond this are the furnaces. In an adjoining hall the "Cremation Society of Milan" has its office, and transacts all its business.

Here is a curious collection of antique and modern vases, documents relating to cremation, models of furnaces, etc.

The cremating furnace is arranged transversely in the temple to permit of watching the entire operation through a small window in the side wall of the temple, as shown in the engraving.

The body is placed upon a grate, under which a basin is placed to receive the liquids and ashes that may drop down.

Two furnaces are now before the public, known as the Gorini and Venini furnaces, after the inventors.

The engraving shows Gorini's furnace, in which the flames and products of combustion pass over the body, thence down a flue and under the base upon which the body rests, thence up the chimney. The body, thus completely enveloped in the flames, is converted to ashes in from one and a half to two hours. Wood or coal may be used, and the expense is about one dollar.

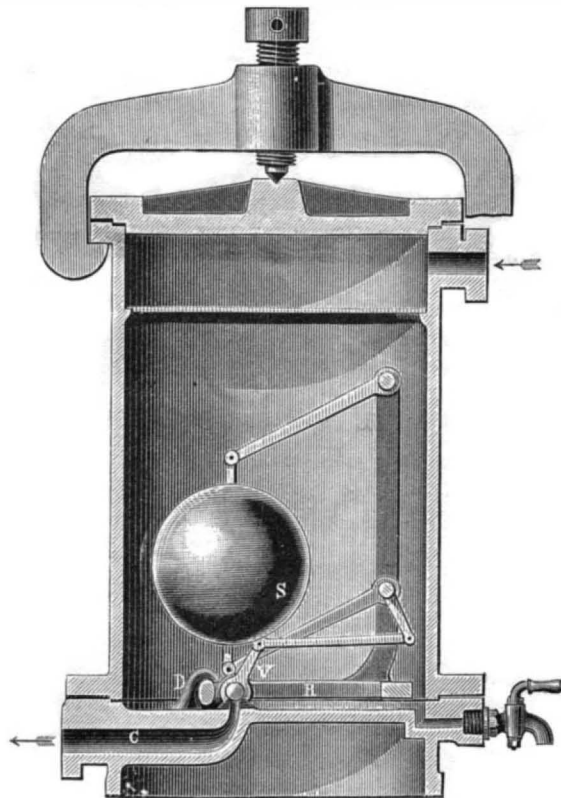
Mr. Venini's apparatus is more complicated than that of Mr. Gorini, but it transforms the tissues of the body into gases in a more perfect manner than any other furnace.

THE ELECTRIC LIGHTING.—The Commissioner of Public Works, New York city, has granted Mr. Edison a permit to introduce his system of electric lighting in the lower part of this city.

AUTOMATIC GOVERNOR FOR WASTE WATER PIPES.

The governor shown in the annexed cut, taken from the *Deutsche Gewerbe Zeitung*, controls the flow of the waste water from a surface condenser.

The valve, V, which closes the inner end of the outlet, C, is mounted in a frame, R, which has its fulcrum at D, and presses the valve upon the end of the outlet with considerable pressure, insuring a close joint, which is not affected by the accumulation of sediment. The valve is operated by a



GOVERNOR FOR WASTE WATER PIPES.

series of levers which are actuated by a float, S, which rises and falls with the water, and opens and closes the valve, V, accordingly. The apparatus is said to work equally well at low or high pressure.

Uncertainty of Blood Stains in Evidence.

The circumstantial evidence of minute blood stains in criminal cases has been made much of in several recent trials. The value of such evidence has been seriously questioned by Dr. Charles O. Curtman, of St. Louis, who shows that, even when the suspected blood has been shown to be unmistakably human, the accused may plead that the blood stains were caused by predatory insects. In his experimental investigations Dr. Curtman allowed mosquitoes to take their fill of human blood, then, after keeping them in close confine-

ment for periods of varying length, he killed them and examined the blood. In all cases, up to forty-eight hours after a meal, a large proportion of human blood corpuscles were unchanged and readily recognizable. The size and color of the corpuscles of mosquito blood are very different from human. As the result of more than a hundred careful measurements, he

gives the following sizes: Human blood (after imbibition by the mosquito) averages, in dilute glycerine, 1-3200 inch; in 80 per cent alcohol, 1-4000 inch. Mosquito blood averages, in dilute glycerine, 1-14000 inch; in 80 per cent alcohol, 1-18000 inch. In the case of bedbugs it was found that these insects digest blood much more rapidly than mosquitoes do. After twelve hours no trace of human blood was discovered.

An Ice Cave in Montana.

Two explorers named Lambert and Caruthers discovered, last summer, a large cave on the Dry Fork of Arrow Creek, in the Belt Mountains, in which was half an acre of solid ice of unknown depth. At the time of the discovery, about August 1, the ice was covered with ten inches of water, which prevented a thorough exploration of the cave. The *Fort Benton Press* says that the ice gives every indication of being in great body, and it is believed, from its appearance, and the fact that in the hottest season only a few inches of it was melted, that it is perpetual. The cave is described as being a great resort for game, as all kinds were killed close to its entrance.

Pampas Grass.

The cultivation of pampas grass, now so much used for decorative purposes, has become quite a profitable industry in Southern California. Three-quarters of an acre planted in pampas grass yielded, at 2½ cents per head, \$500. Another grower sold all he could raise at 7½ cents per head. Last year 10,000 heads or plumes of this grass were sold from that region.

ENGINEERING INVENTIONS.

A circulating device for steam generators has been patented by Mr. Dan Abell, of Carson City, Nev. This invention consists in combining with the feed water and circulation pipes of a steam generator a steam pump for keeping up a continuous and rapid circulation of the water within the space of the generator.

An improvement in that class of devices called "self-couplers" and "uncouplers," has been patented by Mr. Louis C. Slonecker, of Stauffer's Station, Pa. It consists of two spring-actuated spear-headed coupling pins or hooks, pivoted parallel with each other on either side of a vertically adjustable drawhead, and extending forward in front of the drawhead to couple with a like device.

An improved car truck has been patented by Mr. Edward P. Cowles, of Wequiock, Wis. The object of this invention is to provide running gear for a car or other vehicle designed especially to run on round rails, and to avoid the use of flanged wheels and the friction and abrasion caused by them. The invention consists of a car frame of novel design, provided with flat faced vertical wheels to run on the top of the track, and with inclined flat-faced guide wheels that run under the inside edges of the flat wheels squarely against the side of the track.

An improved propeller has been patented by Mr. Rio Gardner, of Westerly, R. I. The invention consists of a hub having short arms, and of blades united thereto by mortise and tenon joints and suitable bolts and screws.

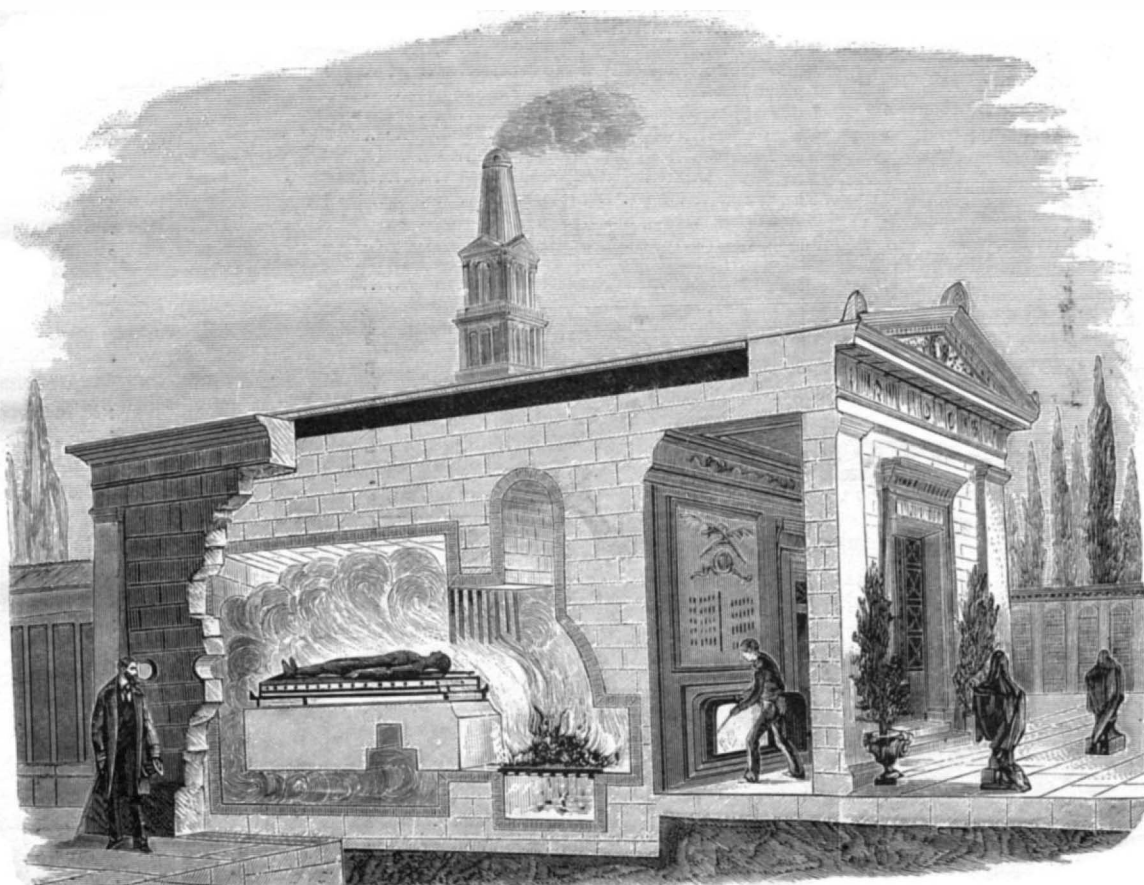
Mr. John Forbes, of Harrisburg, Pa., has patented a core box having a lid fitted for use as a sweep in striking the core and apertured to give access to the box; also, in the combination, with the core box, of flanged tubes for strengthening the legs of the core and giving vent.

Mr. William J. Watson, of Marion, S. C., has patented an improved stump puller, so constructed that it can be readily applied to the stumps and will be powerful in operation. The invention consists in providing a stump puller with a lever strengthened by a truss rod and stud, and having a clevis at its forward end for the attachment of the draught, and a chain at its rear to be attached to a stump, a swiveled standard for connecting wheels, and an axle with the lever to carry it, and a right angled lever for adjusting the carriage and fastening it in place.

Mr. George W. Veil, of Bucyrus, Ohio, has patented a machine for opening and grading tile ditches, so construct-

ed as to leave the bottom of the ditch straight and smooth.

An improved locomotive spark extinguisher has been patented by Messrs. G. A. Gunther, of Bath, and W. Kowalski, of Brooklyn, N. Y. The object of this invention is to deaden or extinguish sparks passing out through the smoke stack of a locomotive. The construction of this device is peculiar and cannot be readily described without engravings.



THE MILAN CREMATION TEMPLE.

ment for periods of varying length, he killed them and examined the blood.

In all cases, up to forty-eight hours after a meal, a large proportion of human blood corpuscles were unchanged and readily recognizable. The size and color of the corpuscles of mosquito blood are very different from human. As the result of more than a hundred careful measurements, he

THE GROWTH OF LARGE ELMS.

A Providence gentleman contributes to the *Journal* of that city an interesting description of the large elms in that neighborhood, with measurements of their girth and spread of limbs at different intervals of time. The latter facts are of more than local interest, since they give a clew to the rate of growth in old trees:

Of No. 1, an uncommonly beautiful tree, the girth at 5 feet from the ground was, in May, 1858, 13 feet 11 inches; in June, 1864, 14 feet 4 inches; in October, 1880, 15 feet 8 inches.

Of No. 2, the smallest circumference was, in May, 1858, 14 feet 9 inches; in June, 1864, 15 feet 2 inches; in October, 1880, 16 feet 6 inches.

Each of these trees gained 21 inches in girth in 21 years. The trees were probably set out in 1748 or 1749.

Of No. 3, at about 6 feet from the ground, the smallest place, the girth was, in May, 1858, 11 feet 11 inches; in October, 1880, 13 feet 4 inches; an increase of 17 inches in 22 years.

No. 4, a conspicuous elm on Congdon street, near Prospect Terrace, is, by its situation, symmetry, and magnificent Medusa-like head, perhaps the most remarkable tree within the old limits of the city. Its trunk is quite uniformly columnar. In January, 1858, it measured, 4 feet from the ground, 11 feet 8 inches; in October, 1880, 12 feet 10 inches; showing a growth of 14 inches in 22 years.

No. 5, perhaps the oldest tree in Providence, measured, at the smallest part between the ground and the branches, 11 feet and 5 or 6 inches in April, 1858; and 12 feet 9 inches in October, 1880.

No. 6, set out about 1790, measured at its smallest circumference, $3\frac{1}{2}$ feet from the ground, January, 1858, 11 feet; April, 1862, 11 feet 4 inches; in 1868, 11 feet 11 inches; October, 1880, 12 feet 11 inches. For 22 years it has gained a full inch of circumference annually; in its entire growth, the yearly gain has been about $1\frac{1}{2}$ inches.

No. 7 was set out in 1771, and shows signs of decay. The following measurements were made in July, 1858: Girth at the smallest place, $4\frac{1}{2}$ feet up, 11 feet 2 inches; at 1 foot up, 14 feet; from bough-end to bough-end, north to south, 110 feet, or a little more. Subsequent measurements of its girth, at $4\frac{1}{2}$ feet up, were: April, 1862, 11 feet 5 inches; in 1868, 11 feet 11 inches; November, 1880, 12 feet 3 inches.

No. 8, planted in 1786, is probably a century old. Its chief branch, spreading full 40 feet, shows marks of decay. The girth of this tree, at 6 feet up, was, in July, 1858, 9 feet 8 inches; in October, 1880, 10 feet 11 inches; a growth of 15 inches in 22 years.

Disappearance of Medicinal Plants.

At the recent meeting of the American Pharmaceutical Association, at Saratoga, the president, Mr. G. W. Sloan, in his annual address, spoke at some length on the growth and cultivation of medicinal plants in this country. He called attention to the fact that in California many native plants are disappearing before the incursions of herbaceous species introduced from Australia and Africa. He also discussed the effects of the destruction of forests in this country upon the production of native medicinal plants, commenting on the disappearance of many of the smaller herbaceous species and of shrubs, owing to the clearing away of the underbrush and the pasturage of the woodlands. An effort made in Illinois to raise from seed some of the plants used in pharmacy had met with but indifferent success. Yet, in botanical gardens, experience has demonstrated that almost every kind can be cultivated if judicious selection of the ground is made and close attention is paid to the habits of each plant. As the government shows no disposition to experiment in this direction, he thought the matter should be taken in hand by State Pharmaceutical Associations, in conjunction with State Boards of Agriculture, since the destruction of forests demands attention in respect to the extermination of medicinal plants, just as much as in other important particulars.

Where Our Forests are Going.

To make shoe pegs enough for American use consumes annually 100,000 cords of timber, and to make our lucifer matches, 300,000 cubic feet of the best pine are required every year. Lasts and boot-trees take 500,000 cords of birch, beech, and maple, and the handles of tools 500,000 more. The baking of our bricks consumes 2,000,000 cords of wood, or what would cover with forest about 50,000 acres of land. Telegraph poles already up represent 800,000 trees, and their annual repair consumes about 300,000 more. The ties of our railroads consume annually thirty years' growth of 75,000 acres, and to fence all our railroads would cost \$45,000,000, with a yearly expenditure of \$15,000,000 for repairs. These are some of the ways in which American forests are going. There are others; our packing boxes, for instance, cost, in 1874, \$12,000,000, while the timber used each year in making wagons and agricultural implements is valued at more than \$100,000,000.—*Fishkill Standard*.

The Possibilities of American Wheat.

Speaking of our gigantic crops of wheat, the *American Miller* remarks that few people, even in our own country, realize how inexhaustible our resources are for wheat growing. The total area of lands available for wheat culture in the United States is not less than 470,000,000 acres. Our entire wheat crop of the past year, phenomenal though it was, would not supply seed enough to sow so vast an area of wheat land.

Hydrophobia Five Years after Inoculation.

M. Colin related to the Académie de Médecine, at its last meeting, a remarkable instance of prolonged incubation of hydrophobia. The case was that of a man who died a few minutes after being admitted (on August 31) into the hospital, presenting maniacal excitation, expectoration, fear of drinking, and apprehensions, during more lucid moments, least he should injure those about him. The autopsy showed no lesions, but some small cicatrices were noted on the left wrist and in the front of the thorax. Further inquiries showed that the man had been ill two days only. On the first he complained of a severe pain in the hepatic region and extreme thirst, although he could not drink; as soon as he raised the cup to his lips he was seized with shivering and spasm. The next day he complained of severe sense of constriction in the pharynx and a feeling of a wish to bite. The symptoms thus seemed clearly those of hydrophobia. No history could be ascertained of a bite from a dog during the previous five years. On November 2, 1874, however, in Algeria, he had been bitten by a dog, which was attacking a comrade, to whose assistance he went, and who was also bitten. The latter had his wounds cauterized the next day, and died in eight days of hydrophobia. The patient of M. Colin was cauterized half an hour after the receipt of the bite. Some authorities, as Devergie, have maintained that the cases of prolonged incubation are really cases of "nervous hydrophobia;" but the symptomatology of such a case as this seems too precise for the theory that an attack so virulent could result from "nervousness." Hydrophobia is relatively common among the soldiers in Algeria, especially in the interior of the country, at the farms, where there are Arab dogs; and it is still more common among the civil population.

In regard to these prolonged periods of incubation in hydrophobia, of which this case presents an instance most remarkable, if not altogether beyond the reach of criticism, it is worth while to refer to one of the results obtained by M. Pasteur, of which we gave an account last week. It has long been a favorite explanation of these cases to suppose that the virus remained localized in the wound, developed there, and only caused the symptoms when, in consequence of some adventitious circumstance, it passed into the blood. M. Pasteur has shown that this explanation is, as regards some diseases, not a matter of theory but of fact. He has found that in the chronic cases of "cholera of fowls" the poison does develop in certain organs, and not, as in other cases, in the blood, and that when, after a variable period, the organized poison passes into the blood, severe symptoms come on rapidly, and the creature soon dies.—*Lancet*.

The Health of Cities.

Statistics compiled by the National Board of Health show that for the year ending October 31, 1880, the more important cities of the world rank as follows in comparative healthfulness. The death rate shows the number of deaths to each 1,000 persons during the year:

City.	Population.	Death rate.
Chicago.....	503,298.....	17.9
Philadelphia.....	850,000.....	18.3
St. Louis.....	333,577.....	18.8
Boston.....	375,000.....	20
Baltimore.....	393,796.....	20.9
London.....	3,254,260.....	21
Leeds.....	318,921.....	21.8
Glasgow.....	589,598.....	21.9
New York.....	1,203,223.....	23.4
Paris.....	1,988,806.....	24
Brooklyn.....	556,889.....	25.8
New Orleans.....	216,359.....	27.7
Lyons.....	342,815.....	27.7
Berlin.....	1,096,644.....	29.3
Dublin.....	314,666.....	32.9

Antidotes to Arsenic.

In the *American Journal of Pharmacy* for August, 1880, is an excellent method for preparing an antidote to arsenic, which is recommended by Dr. McCaw, a Canadian physician. The following is the formula: R. Tincture of chloride of iron, ζj ; bicarbonate of soda or potash, ζj ; tepid water, a teacupful. Mix.

Dr. McCaw gives a preference for this antidote over all others for two reasons: first, it formed the surest antidote; second, the ingredients are always accessible. That the ingredients are always accessible, the reader will readily see; that it is a sure antidote, I proved by the following experiment: Having prepared the antidote as above described, I let it drain on a filter for a short time, and then mixed a portion of the magma left on the filter with a solution of arsenic containing about half a grain. After stirring the mixture and filtering, the filtered liquid gave no evidence of the presence of arsenic by Marsh's test. This showed the antidote was a sure one.

I was also induced to test the efficacy of another antidote, viz., the freshly prepared sesquioxide of magnesia,* recommended by Bussy. ("U. S. Dispensatory," 14th ed., p. 30.) I dissolved an ounce of sulphate of magnesium in a small quantity of warm water, and added aqua ammonia to saturation, which threw down the proposed antidote. After draining for a short time on a filter, a portion of the magma was mixed with a solution of arsenic, and the mixture stirred and filtered. The filtered liquid gave no evidence of the presence of arsenic by Marsh's test. This would seem to show that the sesquioxide of magnesia is another sure antidote to

*The author probably means the hydrated oxide, $Mg H_2O_2$, as we know of no sesquioxide of magnesium.—Ed. P.

arsenic, and the fact that the ingredients, Epsom salts and hartshorn, are so often found in the family, gives it an advantage over the antidote recommended by Dr. McCaw.—*Phil. Hoggan, in Pharmacist*.

MECHANICAL INVENTIONS.

Messrs. William G. Wilson and George S. Darling, of Chicago, Ill., have patented improvements in shuttle races for sewing machines. These improvements relate to circular race-ways for oscillating shuttles, and are designed to guide and steady the shuttle as it starts forward and insure its entering the loop of thread.

Mr. William E. Hill, of Big Rapids, Mich., has patented an improved machine for rolling and turning logs upon saw mill carriages and logways, turning the logs upon the head blocks, and pressing them back against the knees. It is simple, convenient, and effective.

An improved support for carriage tops, which can be adjusted forward and backward, as also sidewise, has been patented by Mr. Patrick B. Collins, of South Boston, Mass.

An improvement in bicycles has been patented by Mr. Henry W. Britton, of Stoughton, Mass. The object of this invention is to furnish bicycles so constructed that the rider can adjust his seat to keep it in proper position over the large wheel when riding upon inclined ground.

Mr. Jacob R. Scott, of Nyack, N. Y., has patented an improved machine for sewing boots and shoes, in which the stroke of the needle is automatically varied by the variation in the thickness of the material, so that each stitch will be drawn tight. The invention consists in devices operated by the presser foot to limit the upward stroke of the needle, and in a spring device attached to the horn for retaining the looper in the proper position relative to the needle. The needle bar is hung on a rocking lever supported on a vertical standard which rests at its lower end on a beveled slide block. The slide block is connected by a crank lever with the presser foot, so that the slide block is moved thereby to raise and lower the needle-carrying standard. The horn is fitted with a piece forming the bed and containing the looper.

An improved machine for grinding planer knives has been patented by Mr. Charles J. Le Roy, of Palestine, Texas. This invention relates to an apparatus that may be securely attached to the frame of a wood planing machine for grinding the revolving knives of the planer without removing the knives from its shaft or the shaft from its bearings upon the frame of the machine.

An improved saw-filing machine has been patented by Mr. Philip Bossert, of Lebeck, Mo. The invention consists in pivoting the file holder to a bar adapted to slide horizontally in a swinging frame that is pivoted to a carriage which slides parallel to the saw clamp.

An improved hub for vehicle wheels has been patented by Messrs. Alonzo Gandy and John R. Shugert, of Freeport, O. The object of this invention is to construct a hub for a vehicle wheel so that the box cannot move lengthwise or turn in the hub after the spokes are set, and so that the spoke tenons shall be protected from the contact of the hub or collars.

Mr. Francis Murphy, of New York city, has patented an improved apparatus for forcing exhaust steam from engine into boiler. The invention consists of two vertical cylinders with pistons, each having two suction and two discharge openings. The suction pipes connect with a closed tank, into which the engine exhausts; a check valve prevents the passage of the exhaust steam back to the engine.

Mr. George William Curtis, of Philadelphia, Pa., has patented an improvement in the class of car couplings in which the ordinary closed oval link is employed in connection with a coupling hook, which is pivoted and adapted to slide within a draw head.

Watchmaking in France.

Besançon almost monopolizes the watchmaking of France, all but 2,488 of the 444,798 watches manufactured last year coming from that town. Of the Besançon watches, 149,907 were gold and 292,403 silver, the whole being valued at over \$4,000,000, half of which represents labor. Nearly all these watches are sold in France. The foundation of the watch trade at Besançon dates from the close of the last century, when a number of workmen from the Swiss side of the frontier, persecuted for their political opinions, took refuge there and were induced to remain. Since then this industry has continued to prosper; but it was not until after the conclusion of the treaty of commerce in 1860 that the business assumed anything like its present proportions. There is a school for teaching watchmaking at Besançon; but though liberally endowed by the municipality, it is said not to be well attended.

What Women Invent.

Some one who has taken the trouble to count the patents issued to women finds that the number for the year ending July, 1880, was seventy, or ten more than the average. Most of the inventions of women have to do with household appliances. Among the past year's are a jar lifter, a bag holder, a pillow-sham holder, a dress protector, two dust pans, a washing machine, a fluting iron, a dress chart, a fish boner, a sleeve adjuster, a lap table, a sewing machine treadle, a wash basin, an iron heater, sad irons, a garment stiffener, a folding chair, a wardrobe bed, a weather-strip, a churn, an invalid's bed, a strainer, a milk cooler, a sofa bed, a dipper, a paper dish, and a plaiting device.

DECISIONS RELATING TO PATENTS, TRADE MARKS, ETC.
United States Circuit Court.—Northern District of New York.

BIGNALL vs. HARVEY et al.—PATENT FOR COOLING AND DRYING MEAL.

Blatchford, J.:

This suit is brought on reissued letters patent granted to John Deuchfield, January 16, 1872, for fourteen years from April 20, 1858, for an improvement in cooling and drying meal.

1. A printed publication, in order to defeat a patent, must furnish such clear and definite information as to enable a skilled person, beyond any reasonable doubt, by following them, without aid from anything not known when they were made, to construct an apparatus like that patented.

2. A patent granted to a person of one name and reissued under a different—as granted to Deuchfield and reissued to Deuchfield—is a question of identity merely, and proof is always competent in such a case.

Infringement of the first claim of the reissue is proved and not contested. As the patent has expired, there can be no injunction, but the plaintiff is entitled to the usual decree in other respects in regard to said first claim.

The same decision is made in the cases of the same plaintiff against Thomas Elwood and others, Henry Roder and others, and Sidney R. Brown and others.

United States Circuit Court.—Eastern District of New York.

CLARKE, TRUSTEE, vs. JOHNSON.

Benedict, J.:

This is an action for an account and an injunction to restrain the defendant from making a certain form of disk used for valve seats in steam joints, upon the ground that such manufacture infringes a patent issued to Nathaniel Jenkins, August 3, 1869, known as reissue No. 3,579, and now owned by the plaintiff.

1. Reissued letters patent No. 3,579, granted to Nathaniel Jenkins, August 3, 1869, construed to be for elastic packing composed of four-tenths refractory earthy or stony matter mixed with rubber prepared for vulcanization by using less than twenty five per cent of sulphur, and then vulcanized, whence results a material composed of forty per cent and over of refractory matter held together by a skeleton of soft rubber.

2. The patent is not infringed by valve seat disks containing sulphur in excess of the above proportion, whereby vulcanite is formed when the compound is subjected to a vulcanizing heat.

3. Although it is known that both rubber and vulcanite become soft at the temperature at which steam packings are used, it does not follow that the employment of vulcanite for rubber as the skeleton of a packing is a mere substitution of material, particularly in view of the different qualities presented by packings made by the two methods.

4. In *Jenkins vs. Walker* (1 O. G., 359) the excess of sulphur united with lead or litharge to form refractory material, and in *Jenkins vs. Johnson*, the excess of sulphur was taken up by the oxides of lead or iron in a similar manner.

Held that the plaintiff has failed to prove infringement, and the bill is dismissed with costs.

United States Circuit Court.—Northern District of Illinois.

ROBERTS vs. SHELDON et al.—TRADE MARK FOR NEEDLES.

Blodgett, J.:

1. The word "Parabola," registered June 27, 1871, by Robert J. Roberts, of New York, as a trade mark for needles, held to be not descriptive, but an arbitrary term adopted by complainant to distinguish his needles from those of other manufacturers, and his right to so select and apply it affirmed.

2. The use of it by another manufacturer, prefixed by the manufacturer's name, would be, in accordance with a former decision of the court, "that any prefix or suffix used with the trade mark would not give others the right to use it in connection with the manufacture of similar goods," an infringement of the exclusive right of the complainant to use that term to designate goods of his manufacture.

I shall order an injunction on the complainant's filing a bond in the penal sum of \$5,000, conditioned for the payment of any damages which the defendant may sustain by reason of the issuing of the injunction, and also require complainant to put in his proof within thirty days after the answer in this case is filed as a condition of the granting of the injunction.

United States Circuit Court.—District of California.

THE GIANT POWDER COMPANY vs. THE CALIFORNIA VIGORIT POWDER COMPANY et al.

Field, J.:

1. Reissued letters patent granted to Alfred Nobel, March 17, 1874, for explosive compounds, declared to be invalid.

2. A reissue can only be had when the original patent is inoperative or invalid from one of two causes—either by reason of a defective or insufficient specification or by reason of the patentee claiming as his own invention or discovery more than he had a right to claim as new—and even then only where the error has arisen from inadvertence, accident, or mistake, and without any fraudulent or deceptive intention.

3. The power to accept a surrender and issue new letters patent is vested exclusively in the Commissioner of Patents.

He must judge of the sufficiency of the original specification, whether the same is defective in any particular, whether such defect was the result of an unintentional error, and, if so, to what extent a new or additional specification should be allowed to describe correctly the invention claimed.

4. But this does not preclude the examination by the court of the original and reissued patents, to see whether or not they disclose on their face a case in which the Commissioner has no jurisdiction to act, or a case in which, by his determination, he has exceeded his jurisdiction; if so, the reissued letters patent must fall.

5. The record of a judgment of a judicial tribunal may be in all cases examined to see whether such tribunal had jurisdiction of the subject matter and of the person of the defendant, and if such jurisdiction be wanting the judgment is ineffectual for any purpose.

6. Whenever it appears, on a comparison of the two instruments, that the original patent is valid, it is clear that the Commissioner has exceeded his jurisdiction, and the reissue is without authority of law.

7. When it appears, upon comparison, that the specification of the reissue only differs from the original in containing an invention of broader scope, it is clear that the original patent must be valid if the reissue would be.

8. If the original patent is valid to the extent of its claim, a reissue is without authority of law.

9. Where an invention was described in one portion of the specification as compounded of the explosive substance nitro-glycerine and an inexplusive porous substance, and in another portion of the specification a more detailed description of the porous substance was given without mentioning its inexplusive character: *Held*, that the two passages are to be read together, and that the invention is a compound of nitro-glycerine with an inexplusive porous substance of the character described.

10. Where the original patent described a compound consisting of two ingredients, one of which was an inexplusive porous substance, a reissue covering all porous substances, whether explosive or inexplusive, which would form with nitro-glycerine a compound equally safe for handling, is void as for a different invention.

11. Case of *Russell vs. Dodge* (3 Otto, 463) commented on and approved.

The complainant is the holder of a patent bearing date March 17, 1874, for an alleged new explosive compound known as "dynamite or giant powder." For some time since its issue the defendants have been engaged in making, selling, and using an explosive compound averred to be substantially the same as the compound described in the patent. This suit is brought for the alleged infringement, with a prayer that the defendants may be required to account and pay over to the complainant the income and profits obtained by them from this violation of its rights, and be restrained from further infringement.

The compound patented is claimed to be the invention of Alfred Nobel, a distinguished engineer of Sweden. His invention, whatever may have been its extent, was assigned to one Bandmann, in April, 1868, and in May following a patent for the same was issued to him for the term of seventeen years. Soon afterward Bandmann assigned his interest to the complainant, the Giant Powder Company, a corporation created under the laws of California, and in October, 1873, this company surrendered the patent and obtained reissued letters for the residue of the term. In March, 1874, this reissue was also surrendered and new letters patent were issued, for the infringement of which the present suit is brought.

The bill alleges that the surrender of the original letters, the first reissue, its surrender, and the second reissue were each made for "good and lawful cause," but it does not specify what that cause was. The allegation will, however, be taken to be that the cause was one for which the statute authorized a surrender and a reissue. The bill also alleges that each reissue was for the same invention described in the original patent.

The answer denies both of these allegations and avers that the original letters and the first reissue were not surrendered because they were invalid by reason of a defective and insufficient specification arising from inadvertence, accident, or mistake, without any fraudulent intention on the part of the patentees, and charges that they were surrendered upon false representations with the intent to interpolate and obtain in reissued letters claims and grants for more than was embraced by the invention of Nobel described in the original patent, and that the reissued letters were not for the same invention, but for another and different one. And the defendants insist that for this and other reasons the reissued letters are invalid.

The Commissioner is an officer of limited authority, and whenever it is apparent upon inspection of the patents that he has acted without authority or has exceeded it his judgment must necessarily be regarded as invalid. His action must be restricted to the particular cases mentioned in the statute that only authorizes a reissue when from an unintentional error in the description of the invention the patent is invalid or inoperative, or when the claim of the patentee exceeds his invention. It is not sufficient that the patent does not cover all that the patentee could have claimed if his specifications had come up to his invention. If he has invented or discovered something beyond his original specifications and claim, his course is not to endeavor to cover it by a reissue, but to seek a separate patent for it.

The statute authorizing a reissue was intended to protect against accidents and mistakes, and it is only when thus restricted that it can be regarded as a beneficial statute. If a patentee does not embrace by his specifications and claim all that he might have done, and there has been no clear mistake, inadvertence, or accident in their preparation, the presumption of law is that he has abandoned to the use of the public everything outside of them, or at least has postponed any additional claim for further consideration.

Looking at the original patent and the reissued patent and the specifications annexed to them, we find that the material difference between them is as to the extent of the invention. The original patent covers a compound of nitro-glycerine and an inexplusive porous absorbent which will take up the nitro-glycerine and render it safe for transportation, storage, and use without loss of its explosive power. The reissued patent enlarges the scope of the invention so as to embrace a compound of nitro-glycerine with any porous substance, explosive or inexplusive, which will be equally safe for use, transportation, or storage.

The specifications annexed to the original patent were clear and sufficiently explicit for the compound composed of nitro-glycerine and the inexplusive porous substance mentioned, and the claim was only for a composition of matter made of the ingredients, in the manner, and for the purposes described in them. There was therefore nothing to correct in a reissue, according to the decision in *Russell vs. Dodge* (3 Otto, 463). The claim was as extensive as the invention specified, and there is no pretense that this was not sufficient to cover a compound of nitro-glycerine with inexplusive porous absorbents.

Now, reading the history of the labors of Alfred Nobel to utilize the explosive power of nitro-glycerine and render it safe to transport, handle, and use—the experiments he tried, first, to explode the nitro-glycerine in mass; then, in consequence of the dangers attending its use, to prevent its explosion when handled; the patents he obtained in Europe; his experience in the use of gunpowder and other explosives with nitro-glycerine—it is impossible to believe that he intended anything different from the natural meaning of the term he used. He knew well the danger attending the use of nitro-glycerine with explosive absorbents, and in limiting his claim to its use with inexplusive absorbents we must presume that he at that time intended to abandon all claim to compounds of a different character, or at least to leave such claim open for further consideration. If we read his own language in an application made three years afterward for a new patent for a compound with explosive absorbents presented to the Commissioner of Patents by the complainant, and therefore adopted and approved by it, there can be but little doubt on the subject. Soon after the new patent was obtained the application for a reissue was made, evidently that it might reach back to the date of the original patent and cover inventions of other parties during the intermediate period, or that which had gone into public use.

It nowhere appears that he had any knowledge or belief when the first patent was issued that the admixture of nitro-glycerine with explosive substances would produce a safety powder. That was a discovery which he did not make or claim to have made. So when in his specifications he mentions charcoal as an absorbent, he observes that it has the "defect of being itself a combustible material."

To our mind, looking at the history of the invention and reading the specification of the patent in its light, it is clear that the inventor used the word "inexplusive" in its natural and ordinary sense, and that the attempt to limit that meaning is an afterthought of his assignees, desiring to bring within the reach of the patent, compounds in no respect within his contemplation. In other words, the reissued letters cover a compound not claimed by Nobel and not embraced in the original patent.

It follows that, in our judgment, the complainant has no just cause of complaint against the defendants, and its suit must be dismissed with costs; and it is so ordered.

AGRICULTURAL INVENTIONS.

Mr. Abram H. Smith, of Wauseon, O., has patented an improved hay elevator, so constructed that it may be easily operated, and will not allow the loaded fork to settle down or sag while being carried from the barn floor to the mow.

An improved plow truck has been patented by Mr. Henry C. Strong, of Mauston, Wis. The object of this invention is to furnish trucks for moving plows from place to place in manufactories, warehouses, salesrooms, and upon farms. It is so constructed that the plows can be easily moved without danger of breaking, marring, or wearing them.

An improved corn planter has been patented by Mr. Theodore T. Daniels, of Morrison, Ill. This invention relates to an apparatus which may be attached to corn planters of various descriptions for the purpose of opening furrows for the reception of the corn dropped from the seed box.

An improved plow attachment for cultivators has been patented by Mr. Homer J. Potter, of Centralia, Kan. This invention consists in a novel construction, arrangement, and combination of devices connected with a plow beam, whereby provision is made for attaching the plow beam to a cultivator after the cultivator beams have been detached.

A combined cultivator and cotton-chopper, so constructed as to scrape, chop, and dirt a row of plants at each passage across the field, has been patented by Mr. James W. Gilbert, of Hoboken, Ala. This machine can be easily controlled by the plowman.

An Improved Glue Dressing for Wounds.

Cabinet makers and wood workers generally are familiar with the uses of glue in dressing tool cuts and other slight wounds incident to their calling. The glue pot is always handy in their shops, and a glued rag answers as well as the best adhesive plaster.

In a recent paper before the Philadelphia Academy of Surgery, Dr. Hewson recommends the addition of acetic acid to the glue, and a little attar of roses to cover the odor of the glue and the acid. This compound spread on paper or muslin makes, he says, a good substitute for adhesive plaster for surgical use. It is easily and quickly prepared simply by putting into a vessel of boiling water a bottle containing one part of glue to four, by measure, of the acid, and letting the bottle remain in this bath until the glue is fully dissolved and mixed with the acid. Common glue may be used and official acetic acid, to be had at any drug store. The mixture should be kept in a wide-mouthed bottle, well stoppered by a long cork, which can always be removed by heating the neck of the bottle. Care should be taken to keep the mouth of the bottle clean by wiping it well with a cloth dipped in hot water. A bottle of this cheap and easily prepared dressing would be a good thing to have at home as well as at the workshop.

A New Cure for Malaria.

There is at least poetic justice in a story that comes from British India, tending to show the power of locomotives (when properly approached) to drive away the malaria which railways, or rather railway construction operations, have so long been charged with causing.

A poor villager of Kattywar had been afflicted for a long time with remittent fever, and no amount of idol worship and penance availed to arrest the malady. At length a friendly neighbor advised him to approach the "Bhoot" in the newest shape in which the former had seen him recently taking his daily run in that part of the province, chafing and fuming. The fever-stricken villager consequently traveled a distance from home, and at sight of a railway locomotive, fell on his knees, tendered an offering of corn and sweets, and extolled its might. The devil was appeased; the worshipper found himself rid of the malaria.

NOVEL ROAD ENGINE.

We have on several occasions illustrated steam road wagons which promised well, but for one reason or another have failed to come into anything like general use. We now give an engraving of a carriage using neither steam nor solid fuel, consequently avoiding the necessity of carrying water and coal. The fuel, which is at the same time the motive agent, is common illuminating gas, which is mixed with a certain proportion of air, and exploded in the cylinder in the manner common to well known gas engines. The engine is secured to a frame, which is supported at the rear by the axle, and in front by a caster wheel, whose frame is provided with a lever moved by a rack and pinion, the shaft of the pinion being provided with a hand wheel, which is turned one way or the other in the operation of guiding the carriage.

The box upon which the passengers sit contains a weighted bellows filled with gas, which is admitted to the cylinder through a valve working across its forward end. The vehicle is provided with a brake which is within easy reach of the driver.

The engine can be instantly stopped and started, and its speed may be varied by varying the amount of gas admitted to the cylinder. A skilled engineer is not required to operate it, as the management of it is very simple. The inventor prefers to use high wheels similar to velocipede wheels, and to connect the piston of the engine directly with a crank formed in the axle, but he is not confined to this construction.

This novel vehicle was recently patented by Mr. C H Warrington, of West Chester, Pa.

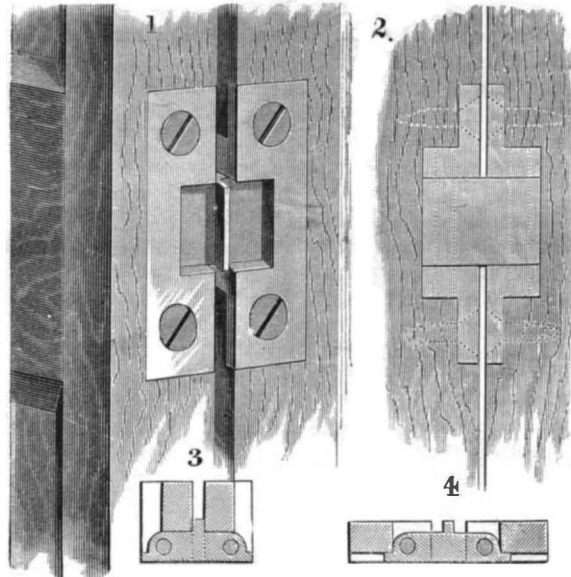
International Exhibition of Electricity.

The *Journal Officiel*, of October 26, publishes a letter from the Minister of Post Offices and Telegraphs to the President of the Republic of France, asking that dignitary's co-operation in organizing an International Electrical Congress, which shall be under the auspices of the government in order to give the enterprise that character of independence which is an essential condition of success. The design of the proposed

exhibition is to bring together from every source every species of apparatus which is designed to develop, transmit, and utilize electricity. It is proposed to hold the exhibition, if it can be organized, in the Palace of the Champs Elysees from the 1st to the 15th of November of 1881.

IMPROVED HINGE.

The hinge shown in the annexed engraving may be set in flush with the door and jamb, thus doing away with the projection so objectionable in the ordinary hinge. Fig. 1 shows the position of the hinge when the door is open. Fig.

**MORGAN'S IMPROVED HINGE.**

2 shows the hinge with the door closed. Fig. 3 is a horizontal section of the hinge closed, and Fig. 4 is a section showing it open.

The two leaves, attached respectively to the door and jamb, have each two flanges, between which a connecting link is hung with joint pins. The link has at its center a vertical flange stop, against which the leaves of the hinge strike when the door is closed; it also has flanges at its ends, against which the leaves strike when the door is opened.

It is a simple matter to apply this hinge, as it is always set in flush with the edge of the door and jamb.

As the door is opened the leaf attached to it turns on the link until the door stands at right angles with the jamb, when the leaf strikes the flange on the side of the link, and both link and leaf move together until the door is open. This hinge can be used to advantage on flat surfaces, such as

**WARRINGTON'S ROAD ENGINE.**

piano covers, writing desks, and cabinet furniture. This invention was lately patented by Mr. John T. Morgan, of New Brunswick, N. J., who may be addressed for further particulars.

New Process of Peeling Peaches.

In certain California peach-drying establishments the work of peeling the peaches has been much simplified by the following process: A crate filled with fruit is dropped into a vat containing hot lye, and there shaken. It is then removed to a tank of pure cold water and the lye is washed away. The skins of the fruit by this process become so separated from the pulp that they are drawn off with one motion of

the hand. This saves much time, labor, and expense. The new process causes the fruit to dry more readily, and a very slight loss in weight results.

RECENT INVENTIONS.

Mr. John L. Volkel, of Sulphur Springs, Mo., has patented an improvement in breech-loading firearms adapted for rapid firing. The inventor dispenses with a separate device for extracting the shells, and uses a swinging lever carrying the breech block, that is formed to receive the cartridge and retain it while being fired. The cartridge is thrown out by the act of opening the breech.

A churning apparatus, so constructed as to give a very rapid motion to the dasher by a slow movement of the driving power, has been patented by Mr. Charles B. Davidson, of St. Joseph, Mo.

Mr. Lewis A. Fish, of Faribault, Minn., has patented a simple and convenient device especially adapted for use in flouring mills and feed stores and granaries for holding bags open for filling and conveying them, open or closed, from place to another.

A plow so constructed that the share or point will have a rocking movement while drawn through the ground, to cause it to more thoroughly loosen the soil, has been patented by Mr. Henry F. Edey, of Bridgetown, Island of Barbadoes.

A razor, which is provided with detachable blades, which can be easily removed and replaced, has been patented by Messrs. C. J. J. Sadler, of Milford, Pa., and P. C. Sadler, of New York city.

An improved adjustable wrist-pin, which is simple, convenient, and effective, and prevents noise and irregular motion, has been patented by Mr. Lafayette Thomas, of Marshall, Mo. The invention consists in a wrist-pin formed of a cylinder attached to the pitman and fitting into the cap-shaped head of a pin that passes longitudinally through the cylinder, the pin being held in the desired position by a screw nut provided with teeth in which a sliding spring catch takes and prevents the nut from rotating.

A machine for flattening and sharpening plow colters has been patented by Mr. John T. Duff, of Allegheny, Pa. This invention consists in a novel arrangement of flanges for clamping the colter, and rollers for beveling its edge.

Mr. George H. Williams, of Fort Smith, Ark., has patented a machine for making bricks, so constructed as to mould the bricks, press them, and deliver the pressed bricks upon off-bearing belts automatically. It is simple in construction and rapid in operation.

A cheap automatic cut-off, to regulate the flow of water from the roof of a building into a cistern, for the purpose of directing the first washings of the roof from the cistern, has been patented by Mr. Dennis Brady, of New Orleans, La.

A shank support and protector for boots and shoes has been patented by Messrs. Edson P. Hadley, of Shelburne Falls, and Thomas Joyce, of Buckland, Mass. The object of this invention is to prevent the boot or shoe from ripping at the shank, and by protecting the shank to prevent it from being cut or worn by shoveling, spading, or any pedal labor, or from being burned when the wearer rests his foot on the cope of the grate or stove for warming.

Mr. Ira E. Davenport, of Mechanicsville, Vt., has patented a brake for bob sleighs which consists in a novel arrangement of levers and devices connected therewith, whereby the brakes are applied to the front sled by the momentum of the rear sled when the speed of the team is checked or when holding back in going down hill.

Mr. Charles G. James, of Petaluma, Cal., has pa-

tented an improved stock car which is simple in construction, and in which the stock can be housed and fed conveniently.

Frank W. Wardwell, of Cambridge, and Charles E. Lettenmayer, of West Lamerville, Mass., have patented an improved book cover protector, which is simple, cheap, and easily applied.

Messrs. Charlton Patterson and Herman L. Abrahams, of Russell, Kans., have patented a sulky plow in which the adjustable axles can be raised and lowered to regulate the depth at which the plow works in the ground without throwing the wheels out of line, and without affecting the set and gather of the axles.

An improved machine for covering telegraph cables and wires with insulating material and with a leaden protecting envelope, has been patented by Edouard E. Berthoud, of Cortailod, and Arnold F. Borel, of Boudry, Neuchatel, Switzerland.

An ellipsograph, so constructed that it may be adjusted to describe ovals of different sizes with parallel curves without disturbing the guide pivots, and to cut ovals with their edges straight or beveled in either direction, as desired, has been patented by Mr. Edward L. Gaylord, of Bridgeport, Conn.

An improved ash sifter, which is simple in construction, and which operates without permitting the dust of the ashes to spread as with the ordinary ash sieve, has been patented by Messrs. Augustus F. Morse and George F. McIntosh, of Hallowell, Me. The invention consists in a box provided with a hinged sieve lid provided with a spring bar for holding the ash pan in the box when the lid is closed. The box is provided with a shaft mounted in a larger box provided with a suitable lid, and with an opening in the bottom through which the ashes can drop into a barrel or other receptacle upon which the large box is placed.

An improved suspended or swinging cradle has been patented by Mr. Robert S. Marshall, of Allegheny, Pa. It consists in combining with a cradle a table and two curved connecting rods.

An improved gag runner for harness has been patented by Mr. William H. Chapman, of Middletown, Conn. The invention consists of an elbow stud projecting at right angles from near the tip of the gag runner loop, and having its free end extended above the loop tip.

An improvement in suspenders has been patented by Mr. M. G. Gunning, of Amesbury, Mass. The invention consists of a pair of suspenders formed of the shoulder straps passing through and crossing each other in a slide made of two diamond shaped pieces of material united at the angles. The slide moves up and down and adjusts itself according to the position of the body.

An improved receipt book holder, which is especially designed for the use of weighers or other persons that must have the receipt book in a handy and convenient place, has been patented by Mr. Robert B. Dickey, of Waco, Texas.

Mr. Henry Dunphy, of New York city, has patented an improved wash board, whose frame is provided with a soap shelf, a series of polygonal rollers, and a series of brushes alternating with the rollers, so that the dirt may be quickly removed from the clothes, and the clothes made to move easily over the wash board.

An improved churn dasher staff, which is simple and convenient, has been patented by Mr. Lloyd T. Reid, of Rockport, Ky. The invention consists in a dasher staff which is flattened so as to be elastic or flexible at or near the middle of its length or is provided with an elastic piece at the point.

An improved ironing machine has been patented by Mr. John Vandercar, of West Troy, N. Y. This machine is designed especially for use in laundries for smoothing and drying collars, cuffs, and other articles. It is so constructed that the articles to be operated upon will be fed automatically into and through the machines.

A simple and automatic apparatus for leaching ores and other substances on a large scale, has been patented by Messrs. Rudolph Schulder and Edward H. Russell, of West Jordan, Utah Territory. The invention consists of a circular frame supporting the filter and moving on a circular track above an inclined circular table, and of three stationary rollers designed to elevate and depress the filter at certain points as it revolves, of a device for feeding the substance to be leached upon the filter; there is a device for applying the leaching solvent, and a precipitating tank for containing the solution passing through the filter.

An improved lantern hanger for carriages and wagons, which is both simple and convenient, has been patented by Mr. Edwin Lufkin, of Monroe, Me. The invention consists in a wire frame held to the dashboard by a spring arm, and provided with hooks for supporting a lantern and reflector.

Mr. Francis J. Crowley, of Gloucester City, N. J., has patented an improved apparatus for stretching, smoothing, and drying printed cloth, so that crimps, wrinkles, or creases are prevented from being formed in the fabric before it passes to the drying cylinders.

A combined wrench and screwdriver, which is simple in its construction and can be conveniently folded to be carried in a pocket, has been patented by Mr. John K. Collins, of Lebanon, N. H.

An improved gate has been patented by Mr. King A. Scott, of New Douglas, Ill. The invention consists in a novel arrangement of levers and devices connected therewith, whereby the gate may be opened and closed by a person on horseback or in a carriage by the manipulation of handles attached to the levers.

Mr. Juan F. N. Macay, of Charapoto, Ecuador, has patented a process of producing at one operation modified hydrated ferric oxide ($Fe_2O_3 \cdot OH_2$) and cupric chloride ($CuCl_2$) by the mutual reaction, in the presence of the air, of cupric oxychloride and solution of ferrous chloride.

SCALLOPS.

BY A. W. ROBERTS.

Scallop shells are best known to those who live far inland, as their beauty of form brings them into use for various kinds of ornamental work. The appearance in the shell is shown in Fig. 3, which represents one of nearly full size. For ornamental purposes much smaller ones are used, as they have the advantage of possessing more brilliant colors when young. To see the animal in all its wonderful

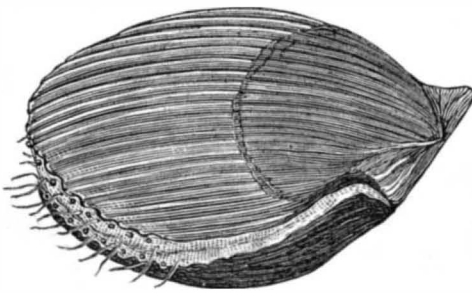


Fig. 3.—Animal in Shell, displaying Eyes and Tentacles.

beauty it should be placed in an aquarium or other vessel of sea water. When all is quiet it will open its shells as far as the connecting "mantle" will allow, and this will be seen to be studded with brilliant blue spots which glow like opals. Whether these brilliant spots are really eyes or not has not been clearly ascertained.

The scallop is capable of changing its position, and does so by the forcible ejection of water from a given point.

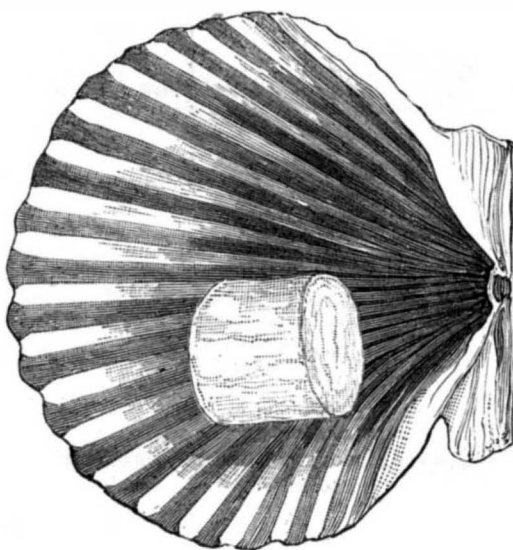


Fig. 2.—Showing Edible Muscle.

This mode of progress is analogous to that employed by the larva of the dragon fly. In Fig. 1 a number of scallops are shown moving about in the water, the drawing of which was taken from a tank at the Aquarium, which was labeled the "dancing scallops," as the scallops were constantly dancing up and down in the water in their peculiar zigzag motions. At one time the scallop shell was worn as a token that the wearers had performed a pilgrimage and paid their devotions to the shrine of St. James of Compostella. The story which connects the scallop shell with St. James is very curious, but too long to be repeated here.

The scallop as seen in the New York market consists of a short creamy white cylinder, and it is a great mystery to many how this can be a shell-fish. This cylinder is the only part of the scallop that can be eaten (the "mantle" or "rims" being very bitter and pungent when cooked, and as far as I know have no other use than that of baiting lobster

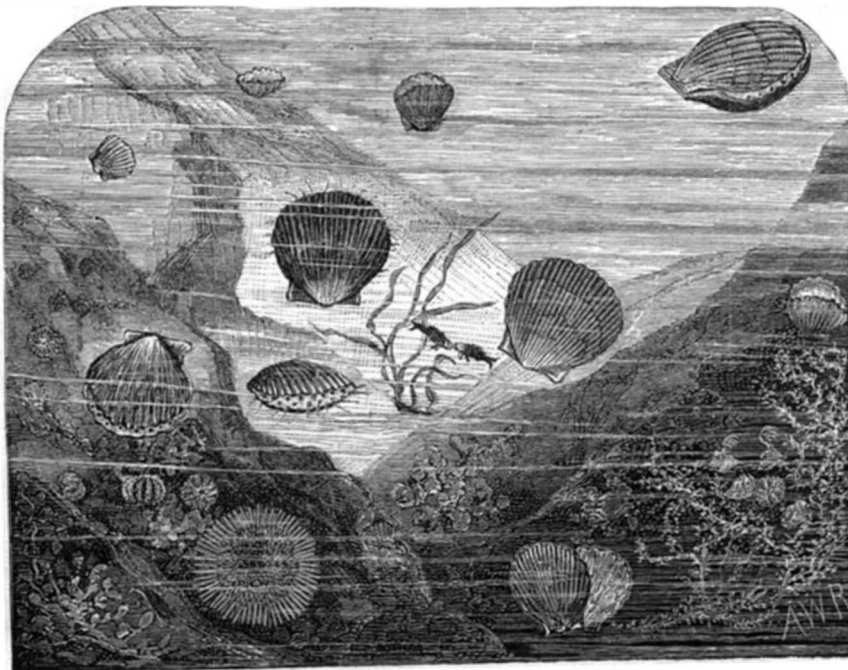


Fig. 1 —SCALLOPS DANCING.

and eel pots), and consists of the strong muscle that holds the shells together. This is shown in Fig. 2 in its natural position, the rest of the animal being removed. This muscle corresponds with the eye of the oyster, but is much larger in proportion to the size of the animal, it having a similar fibrous structure. It has a remarkably sweet taste, much like that of the flesh of crabs, and is highly relished by many, though not considered as particularly digestible.

The scallop is found in abundance in many localities on our coast from Cape Cod to Florida, particularly in sheltered muddy places.

Astronomical Notes.

OBSERVATORY OF VASSAR COLLEGE.

The computations in the following notes are by students of Vassar College. Although merely approximate, they are sufficiently accurate to enable the observer to recognize the planets.

M. M.

POSITIONS OF PLANETS FOR JANUARY, 1881.

Mercury.

On January 1 Mercury rises at 6h. 34m. A.M. On January 31 Mercury sets at 5h. 25m. P.M.

Mercury will approach the sun until the morning of the 26th, when it will reach superior conjunction.

Venus.

Venus sets on the 1st about 8 o'clock P.M. Early on the evening of the 3d Venus will be not far from the moon. On January 31 Venus sets soon after 9 P.M.

Mars.

On January 1 Mars rises at 6h. 4m. A.M. On the 31st Mars rises at 5h. 43m. A.M.

Jupiter.

On January 1 Jupiter crosses the meridian about 6 P.M. On January 6, between 9 and 9:30 P.M., the moon passes north of Jupiter about 7° in declination.

On January 31 Jupiter sets at 10h. 29m. P.M.

Making our observing hour between 8 and 10 P.M., we find from the "American Nautical Almanac" that on January 1 the first satellite will be invisible, having disappeared in occultation. On January 2, about 10 P.M., the second satellite will disappear in occultation.

On January 8, at a little before 10 P.M., the first satellite disappears in occultation; on the 9th, between 9 and 9:30 P.M., the first satellite comes off from the face of the planet. On January 10 the third reappears from eclipse about 9 P.M.

On January 11 the second satellite, having disappeared in transit before 8 P.M., is invisible.

On January 16, about 9 P.M., the first will pass on to the face of Jupiter.

On January 17, about 8 P.M., the third satellite reappears from occultation; and a little before 10 P.M. the first reappears from eclipse.

On January 20 the second satellite will be hidden in eclipse until nearly 10 P.M.

On January 24, between 8 and 9:30 P.M., the first satellite disappears in occultation, and at about 9:30 P.M. the third also is occulted.

On January 27 the second satellite is invisible, being behind the planet.

Saturn.

On January 1 Saturn will pass the meridian at about 6:30 P.M. On the 31st Saturn will set at 11h. 10m. P.M.

On the evening of January 7 Saturn will be seen near the moon in right ascension, but nearly 8° south of it in declination.

Uranus.

Uranus rises on January 1 at 9h. 47m. P.M., and on the 31st at 7h. 45m. P.M.

Neptune.

Neptune passes the meridian on January 1 at about 7h. 52m. P.M., and on January 31 at about 5h. 54m. P.M.

A Poisonous Fly Bite.

John Story, a warehouse laborer in this city, recently died of malignant pustule caused by the bite of an insect which looked like a fly.

Story was at work in a tobacco warehouse, and, while handling a bale of Havana tobacco, he felt a sharp pain in the left side of his neck. Instantly he clapped his hand on the spot, and a winged insect, which he took to be a gnat, flew away.

The pain was but temporary, and he paid no attention to it until the following day, when an inflamed pimple had formed on the spot where he had been bitten. This pimple annoyed him considerably, and he tore it open.

The next day the spot was very much inflamed, the inflammation extending in a circle as large as a silver quarter about the wound. The circle quickly enlarged, the inflammation increased, and Story became frightened and called in a physician, who recognized the wound as a malignant pustule, which would undoubtedly prove fatal.

The skin about the wound burst, and the inflammation extended along the neck toward the head, and the lower portion of Story's face was swelled to twice its natural size. Symptoms of blood-poisoning showed themselves, and the patient lingered in great agony for two or three days, when death ended his sufferings.

class establishments) somewhat above concert pitch, and are kept there by repeated tunings, until the piano-forte has settled and the strings have fully stretched, which is known by the instrument remaining at precisely the same pitch for some time.

(13) G. R. B. asks: 1. Can you inform me if an induction coil is required with the pan telephone described on page 162, No. 11, current series of the SCIENTIFIC AMERICAN? A. Yes.

(14) R. R. R. writes: In the Faradic battery operated by an open Smee's cell, I believe the primary wire of the induction coil is composed of two layers of No. 16 or No. 14 cotton covered copper wire.

(15) "Honolulu" writes: I saw a notice in SCIENTIFIC AMERICAN some time ago of the application of electricity to growing crops.

(16) A. G. N. asks: What style and size battery would be the most economical to run one electric light on the incandescent principle?

(17) W. A. McA. writes: I have a specimen which I think contains lead and silver. Will you give in the Notes and Queries of the SCIENTIFIC AMERICAN the most simple tests by which these two metals may be made to tell their presence?

(18) F. D. C. asks (1) how to saw petrified wood or other flinty material for sleeve buttons.

(19) "Subscriber" asks how to make a black ink suitable for staining leather.

(20) V. B. H. asks for a good black paint or something else that will answer to black small castings by dipping them in something that will varnish.

(21) L. C. C. asks: 1. Can you inform me where to purchase the ammonia used by the ice machines (not the common aqua-ammonia), think it is called gaseous ammonia, which is liquefied by pressure?

(22) G. W. L. asks what the difference is between tin crystals and tin salts, as used in dyeing.

(23) E. A. J. asks how to remove the scale from brass castings, to give a surface on which solder may be flowed with a hot copper.

(24) F. R. G. asks how to paint a smoke stack on a small portable engine.

(25) H. M. A. asks: What is the best "stickum" for labels on boxes, also labels on casks: something to make them stick and not cackle or wash off easily?

starch about equal to the glue taken, first having boiled it with water sufficient to form a paste. It works better when warm.

(26) W. J. H. asks if there is any preparation for polishing or staining India-rubber.

(27) H. F. P. asks how to make gold ink for writing and printing.

(28) H. L. S. asks: 1. Is there any known substance that if a thin piece of it, say like a piece of paper, window glass, or tin, were placed between a permanent magnet and piece of soft iron would prevent the magnet from attracting the iron?

(29) W. E. M. asks: Can you inform me of any metal or alloy that will dissolve by the application of some of the acids (such as sulphuric, hydrochloric, or nitric), and at the same time the acid used to be incapable of any action on fatty substances (such as oils)?

(30) J. E. S. writes: I wish to make a hollow prism to hold carbon bisulphide, but have not found a cement that will resist it.

(31) J. E. S. asks: Is there any rapid and practical purpose by which bright copper can be made to acquire the dark rich color that is seen on copper coins unused for many years?

(32) T. R. W. asks: What will take aniline violet and aniline black ink stains out of linen and bleached cotton fabrics?

(33) A. L. H. asks: What effect does galvanized iron pipes have on drinking water—good or bad?

(34) J. C. asks: 1. How can I harden plaster of Paris after making a mortar out of it with water?

(35) M. C. S. asks: What substances are best to absorb the moisture in a refrigerator?

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

C. S. C.—It carries principally of sulphides of copper, and possibly carries a trace of gold.—J. W. M.—A silicious kaolin.

INDEX OF INVENTIONS FOR WHICH Letters Patent of the United States were Granted in the Week Ending November 30, 1880, AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.] A printed copy of the specification and drawing of any patent in the annexed list, also of any patent issued since 1866, will be furnished from this office for one dollar.

Accountant instrument, mechanical, H. Johnson 234,875 Aerial apparatus, F. W. Brearey 234,947 Aeriform fluids, apparatus for mixing, J. F. Barker 234,904 Album, etc., clasp, C. Posen 235,016 Annunciator, electrical, T. W. Lane 234,993 Axle box, car, W. P. Wyly 234,901 Bale tie, J. G. Battelle 234,948 Barrel heater, Cook, Chase & Beard 234,908 Band cutter, Bieln & Weidauer 234,944 Bath box for chemical and photographic purposes, ventilated, J. C. Macurdy 234,879 Bells with brass, coating stock, O. B. Wilson 234,900

Table listing various inventions and their patent numbers, including items like Belt, driving, E. & C. Poullain, Binder for papers, etc., M. King, Blotting pad, C. M. Lothrop, Boiler and other furnaces, W. Ennis, etc.

Table listing various inventions and their patent numbers, including items like Paraffine wax, refining, Sloane & Bell, Pigments, manufacture of white, H. Knight, Planter, hand, G. L. Hudson, Platform spring, L. M. Fitch, etc.

DESIGNS. Bell, box, H. Thau, Carpet, H. Horan, Carpet, H. Hunt, Carpet, T. J. Stearns, Corset, M. P. Bray, Fire iron, etc., stand, R. Christesen, Furniture seat and back, G. W. Rich, Skirt, J. Schoenhof, Toy money box, Kyser & Rex, Wall paper, E. Leissner.

TRADE MARKS. Crackers, E. W. Albee, Medical compound for dysmenorrhoea, M. J. Fuzard, Pharmaceutical preparation, certain, G. Evanovitch, Razors, knives, shears, scissors, and surgical instruments, G. Knecht, Tobacco and cigarettes, plug and smoking, Oliver & Robinson.

English Patents Issued to Americans. Beverage, A. W. Armstrong New York city, Celluloid, decorating, A. Hart et al. New York city, Crayon holder, J. Reckendorfer, New York city, Electric light apparatus, H. S. Maxim, Brooklyn, N. Y., Flax breaker, G. Milliken, Philadelphia, Pa., Furnace, J. Wolstenholme Buffalo, N. Y., Gas making apparatus, C. F. Dietrich, Baltimore, Md., Heel stiffeners, S. L. Bailey, New York city, Hoisting machine, T. McCabe, Philadelphia, Pa., Lamp, W. B. Robins, Cincinnati, Ohio, Loom, J. Lyall, New York city, Oil extracting apparatus, J. E. Borne, Brooklyn, N. Y., Packing, metallic, E. P. Monroe, New York city, Pliers, J. F. Cranston, Springfield, Mass., Pumps, ship, J. Edson, Boston, Mass., Slicing machine, J. Herts, Brooklyn, N. Y., Telephone switch, C. D. Haskins, New York city, Ventilating apparatus, P. Mehan, Chelsea, Mass.

A SPLENDID HOLIDAY GIFT.

DR. SCOTT'S ELECTRIC HAIR BRUSH.

A REMARKABLE INVENTION,

Which has won its way to Royal favor in England, been cordially indorsed by the Prince and Princess of Wales, and written upon by the Rt. Hon. W. E. Gladstone, is now brought to the notice of the American public. It cures by natural means, will always do good, never harm, and is a remedy lasting for many years. It should be used daily in place of the ordinary Hair Brush. The Brush Handle is made of a new odorless composition resembling ebony; a combination of substances PRODUCING A PERMANENT ELECTRIC VOLTAIC CURRENT WHICH ACTS IMMEDIATELY UPON THE HAIR GLANDS AND FOLLICLES. This power can always be tested by a silver compass which accompanies each Brush.

- IT IS WARRANTED TO
CURE NERVOUS HEADACHE IN 5 MINUTES!!
CURE BILIOUS HEADACHE IN 5 MINUTES!!
CURE NEURALGIA IN 5 MINUTES!!
PREVENT FALLING HAIR AND BALDNESS!!
CURE DANDRUFF & DISEASES OF THE SCALP!!
PROMPTLY ARRESTS PREMATURE GRAYNESS!!
MAKES THE HAIR GROW LONG & GLOSSY!!
IMMEDIATELY SOOTHES THE WEARY BRAIN!!
MONEY RETURNED IF NOT AS REPRESENTED.

IT RARELY FAILS TO PRODUCE A RAPID GROWTH OF HAIR ON BALD HEADS, WHERE THE GLANDS and FOLLICLES ARE NOT TOTALLY DESTROYED.

Proprietors: The Pall Mall Electric Association of London. New York Branch: 842A Broadway.

[From the Mayor of Saratoga.] August 12, 1880. "I cheerfully testify to the merits of Dr. Scott's Electric Hair Brush. It cures my headaches within a few minutes. I am so pleased with it I purchased another for my wife. It is an excellent Hair Brush, well worth the price, aside from its curative powers."



[From Rev. Dr. Bridgeman. Brooklyn. June 1st, 1880.] "Gents:—I have never before given a testimonial, but am willing to encourage the use of an honest remedy. I am so pleased with your Hair Brush that I deem it my duty to write you recommending it most cordially. My hair, about a year since, commenced falling out, and I was rapidly becoming bald; but since using the Brush a thick growth of hair has made its appearance, quite equal to that which I had previous to its falling out. I have tried other remedies, but with no success. After this remarkable result I purchased one for my wife, who has been a great sufferer from headache, and she finds it a prompt and infallible remedy."

"I would Not take \$1,000 for my Brush" Mr. Smith is a gentleman well known in this City as a Law Publisher, and also as a Director in several Public Institutions of New York.

DR. GEO. A. SCOTT—Dear Sir: Permit me to add the testimony of my wife to that of the many others who have been benefited by the use of your Electric Brush. She has for years been a sufferer from Neuralgia in an acute form, but since I obtained for her one of your Brushes, she has experienced entire relief. Please accept my sincere thanks.

"Your Brush is certainly a remarkable cure. I am highly pleased with it. Its effect is most wonderful, and you may be sure I shall recommend it heartily among my friends. It is also a splendid Hair Brush, well worth the money and will last me for years."

Remember that this is NOT a "metallic" wire brush, but made of PURE BRISTLES.

As soon as you receive the Brush, if not well satisfied with your bargain, write us, and we will return the money. What can be fairer? This paper will not knowingly publish any humbug, and I have placed a Brush in the hands of Mayor Cooper and Postmaster James of New York, as a guarantee of my good faith.

Remittances should be made payable to GEO. A. SCOTT, 842A Broadway, New York. Agents wanted in every town. They can be made in checks, drafts, post office orders, or currency. Inclose 10 cents for registration, and we guarantee safe delivery of Brush.

Advertisements.

Inside Page, each insertion - - - 75 cents a line.

Back Page, each insertion - - - \$1.00 a line.

(About eight words to a line.) Engravings may head advertisements at the same rate per line, by measurement, as the letter press. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

GET THE BEST AND CHEAPEST.

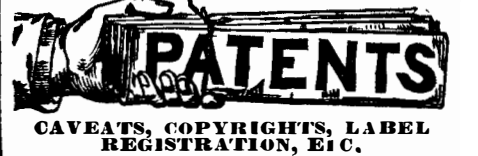


J. A. FAY & CO., (Cincinnati, Ohio, U. S. A.) Exclusive Agents and Importers for the United States, of the CELEBRATED PERIN BAND SAW BLADES, Warranted superior to all others in quality, strength, uniformity of temper, and general durability. One Perin Saw outwears three ordinary saws.

MACHINISTS AND STEAM FITTERS. We manufacture a Double-Acting Steam Jet Pump. Elevates water 75 feet with 45 lb. steam. It is the best and most economical in use. Suitable for Locomotives, Mills, etc. We want agents in all parts of the country. Write for circular to J. H. SHERRIFF, SON & CO., Pittsburgh, Pa., owners of "Coil" Patents.



WANTED PARTNER. With from twenty-five to fifty thousand dollars, in the manufacture and sale of the Improved United States Scales, Stock, Grain, Wagon, Railroad Truck and others. They have been manufactured about five years, taking the lead in every locality where they have been introduced. The business is well established and protected by patents, and requires more capital. References: Litchfield Car and Machine Co., Litchfield, Ill. (former manufacturers of the scale), or any of the banks of this City, or Shelbyville, Ill. S. J. AUSTIN, Terre Haute, Ind. (Patentee of the Improved United States Scale).

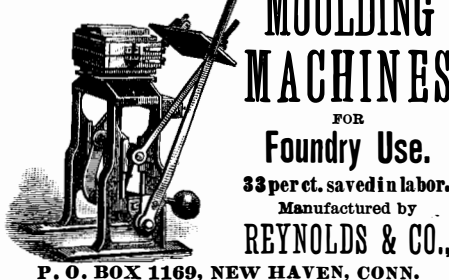


CAVEATS, COPYRIGHTS, LABEL REGISTRATION, ETC. Messrs. Munn & Co., in connection with the publication of the SCIENTIFIC AMERICAN, continue to examine Improvements and to act as Solicitors of Patents for Inventors. In this line of business they have had OVER THIRTY YEARS EXPERIENCE, and now have unequalled facilities for the Preparation of Patent Drawings, Specifications, and the Prosecution of Applications for Patents in the United States, Canada, and Foreign Countries. Messrs. Munn & Co. also attend to the preparation of Caveats, Registration of Labels, Copyrights for Books, Labels, Reissues, Assignments, and Reports on Infringements of Patents. All business intrusted to them is done with special care and promptness, on very moderate terms.

TOOPE'S PATENT FELT and ASBESTOS.

Non-Conducting, Removable Covering, for Hot or Cold Surfaces. Easily applied by any one. Samples free. Toope's Patent Grate Bar, best and cheapest in the world.

CHARLES TOOPE, Mfg. Agt., 353 East 78th Street, New York.



MOULDING MACHINES FOR Foundry Use. 33 per cent. saved in labor. Manufactured by REYNOLDS & CO., P. O. BOX 1169, NEW HAVEN, CONN.

ARITHMETIC BY MACHINERY. Agents wanted to sell our Adding Machine (patent applied for) to bookkeepers, merchants, farmers, scholars, etc., etc. Guaranteed accurate, simple, and rapid. Dials and gears are of bronzed metal and cannot get out of order. Sells at sight, and big profits. Sample and terms by mail \$1. UNDERWOOD & CO., Box D 21, Grand Rapids, Mich.

ICE-HOUSE AND COLD ROOM.—BY R. G. Hatfield. With directions for construction. Four engravings. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, 59. Price 10 cents. To be had at this office and of all newsdealers.

50 Lithographed Chromo Cards, no 2 alike, 10c. Name in fancy type. CONN. CARD CO., Northford, Ct.

"Nelson's Family Expense Book," and Valuable Information for Everybody. Good for one year, 52 pages ruled with a printed heading. Containing all the articles of daily consumption. You can see at a glance how much your daily, weekly, or monthly expenses are; 23 pages of practical formulas, useful to Farmer, Mechanic, and Merchant. Bound in cloth. Price 25 cents. For sale by Booksellers, and THE NELSON PUBLISHING CO., Ionia Sta., N. Y. Postage stamps taken.

THE PERFECTED STYLOGRAPHIC. The most convenient and economical outfit for writing. Pen, Pencil, and Inkstand in one. Can be ordered by mail, and exchanged or returned if not suited. For full description of various styles, send two cent stamp for illustrated circular. READERS' AND WRITERS' ECONOMY CO., 25-33 Franklin Street, Boston; 4 Bond Street, New York; 38 Madison Street, Chicago.

MACHINISTS' TOOLS. Lathes, Planers, Drills, Gear Cutters, Shaping Machines, AND SPECIAL MACHINERY. GOULD & EBERHARDT, NEWARK, N. J.

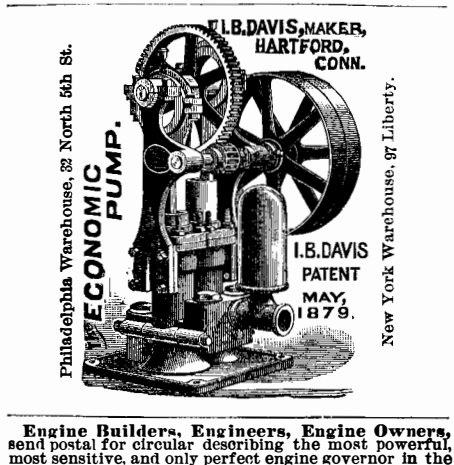
Valuable Water Front ON EAST RIVER. Between Eighth and Twenty-third Sts., For Sale! Suitable for iron works or manufacturers, where large water facilities are required. About 50 lots, including land under water. CHAS. S. BROWN, 77 Liberty St., N. Y.

WANTED, A STEAM ENGINE. new or 2d-hand, with or without boiler, about one horse power. Address Box 33, Mindoro, La Crosse Co., Wis.

NO MORE USE FOR OIL ON MACHINERY. Oline Lubricating Compound, manuf'd by HOLLAND & THOMPSON, Troy, N. Y. Avoids hot journals, dripping, and waste. Send for catalogue of Grease and Cups for all kinds of machinery.

PATENT FOR SALE.—ENTIRE RIGHT OF A Double-Head Windmill. Price \$500 cash. OSCAR BAIRD, Vienna X Roads, Ohio.

WANTED.—PRACTICAL MACHINIST, Draughtsman, and Designer. Address, stating experience and salary expected, K. M. C., Box 773, New York.



Engine Builders, Engineers, Engine Owners, send postal for circular describing the most powerful, most sensitive, and only perfect engine governor in the world. Address The Allen Governor Co., Boston, Mass.

THE STUDENT'S ILLUSTRATED GUIDE TO Practical Draughting. A Series of Practical Instructions for Machinists, Mechanics, Apprentices, and Students at Engineering Establishments and Technical Institutes. By T. P. PEMBERTON. Sent free by mail on receipt of price, \$1.00. Address T. P. PEMBERTON, 5 Dey St., New York.

CARY & MOEN STEEL WIRE OF EVERY DESCRIPTION & STEEL SPRINGS. NEW YORK CITY. 24 W. 29 ST.

WANTED, A GOOD RELIABLE person, with the best of references, to secure foreign patents for a combined SULKY ROAD SCRAPER and PLOW. Good terms will be given. Address G. S. A., Box 773, New York.

ALL J. FRITZ, Dayton, O., Dealer in Scroll Saws, Wood, Design, and Amateur Supplies. Send for catalogue. ICE AND ICE HOUSES—HOW TO MAKE ice ponds; amount of ice required, etc., and full directions for building ice-house, with illustrated plan. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 55. Price 10 cents. To be had at this office and of all newsdealers.

PORTER MANUF'G CO. The New Economizer, the only Agricultural Engine with Return Flue Boiler in use. Send for circular to PORTER MFG. Co., Limited, Syracuse, N. Y. G. G. YOUNG, Gen. Agt., 42 Cortland St., New York.

ICE-BOATS—THEIR CONSTRUCTION and management. With working drawings, details, and directions in full. Four engravings, showing mode of construction. Views of the two fastest ice-sailing boats used on the Hudson river in winter. By H. A. Horsfall, M.E. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, 1. The same number also contains the rules and regulations for the formation of ice-boat clubs, the sailing and management of ice-boats. Price 10 cents.

The "SWEETLAND CHUCK," Universal, Independent, and Eccentric. Unexcelled for Accuracy, Strength, Reliability, and Simplicity of construction. SWEETLAND & Co., 126 Union St., New Haven, Conn.

Two New and Important Books.

SOAP AND CANDLES, STARCH, DEXTRINE, and GLUCOSE. IN PRESS.

A Technical Treatise on Soap and Candles, with a Glance at the Industry of Fats and Oils. By R. S. Cristiani. Fully illustrated. 500 pages 8vo, handsomely printed on fine paper.

Subscriptions will now be received at \$6.00 per copy, payable on delivery.

A Practical Treatise on the Manufacture of Starch, Dextrine, and Glucose. Illustrated by about 75 engravings. 800 pages 8vo, handsomely printed on fine paper.

Subscriptions will now be received at \$3.50 per copy, payable on delivery.

HENRY CAREY BAIRD & CO., Industrial Publishers, Booksellers, and Importers, 810 WALNUT STREET, PHILADELPHIA.

DO YOUR OWN PRINTING Presses and outfits from \$3 to \$500 Over 2,000 styles of type. Catalogue and reduced price list free. H. HOOVER, Phila., Pa

INVITATION To Participate in the General German Patent and Trade Mark Exhibition IN FRANKFORT-ON-THE-MAIN, 1881.

To Patent Holders, Originators, and Inventors of Industrial Trade Marks and Models, the Final Invitation for the participation in the

PATENT AND TRADE MARK EXHIBITION, which will take place in Frankfort-on-the-Main in the course of the next year, is hereby issued.

The Patent and Trade Mark Exhibition will facilitate as far as possible a realization, by the inventor, of patents and trade marks, and can do this the more so, as Frankfort-on-the-Main, being situated in the center of Germany, is visited every year by thousands of natives and foreigners, and is evidently a more suitable place for such an exhibition than any other city.

Forms of application may be obtained, free of charge, of the Bureau der Ausstellung, Handelskammer, Neue Boerse, No. 50, Frankfort-on-the-Main, 1st of October, 1880.

Magic Lantern Catalogue, 150 pp., and Lecture, 10 Cts. THE MAGICAL ORGANETTE, ONLY \$8.00. Double size Reeds, extra strength and finish. Circulars and beautiful Set Fancy Cards, 5 Cents. THEO. J. HARBACH, 808 FIBERT ST., PHILA., PA.

THE AUTOGRAPHIC PRESS. (PATENT APPLIED FOR.) The best and only durable copying machine. Produces thousands of indelible copies of writings or drawings from one original; metal impression plates lasting many years.

Capitalists, Take Notice. A few thousand dollars will secure entire control of a production (already established). Germany only competitor. Reasons, testimonials, references, and prompt answers by addressing "Exceptional Business Opportunity," Carlisle, Pa.

MACHINE KNIVES FOR PAPERMILLS, BOOK-BINDERS, WOOD WORKING AND AGRICULTURAL MACHINERY. ALSO PARALLEL VISES FOR MACHINISTS, PIPE FITTERS, BLACKSMITHS, WHEELWRIGHTS, PATTERNMEN, MARBERS, &c. MANUFACTURED BY TAYLOR STILES & CO., REIGELSVILLE WARREN CO., N.J.

50 CHROMOS, name in new type, 10c. by mail. 40 Apts. Samples, 10c. U. S. CARD CO., Northford, Ct.

WANTED.—A PRACTICAL MACHINIST as foreman of a machine and wood shop. Must understand the use of saws and wood-working tools; also, the management of Engines, Boilers, and Steam. A permanent place for the right man. Address BOX 2164, Boston P. O.

SCIENTIFIC AMERICAN SUPPLEMENT. Any desired back number of the SCIENTIFIC AMERICAN SUPPLEMENT can be had at this office for 10 cents. Also to be had of newdealers in all parts of the country.

WANTED, BY THE SOUTHWARK FOUNDRY AND MACHINE CO., Philadelphia, a number of first-class fitters on engine work.

INVALID ROLLING CHAIR. (RECLINING) A Priceless boon to those who are unable to walk. Hon. A. H. Stephens, M. C., and hundreds of others use them. Send for Circular to FOLDING CHAIR CO., New Haven, Conn.



1880 MODEL WORKING TOY ENGINES AND FIGURES. We send Engine, Figures, Pulleys, Belt, etc., all complete as per cut, and in working order, by mail for \$1.50. Our complete Catalogue, 192 pages, 700 illustrations, by mail, 10c. Catalogue No. 15, for 18-0-81, 376 illustrations, by mail, 5c. PECK & SNYDER, 124 and 126 Nassau St., New York.

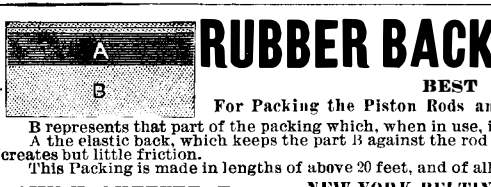


AUTOMATIC CORNET. The Latest and Greatest Musical Wonder. The Phonographic Cornet is the latest invention in the musical line. The action of this instrument is almost marvellous. The picture represents the manner of playing simply turning the little crank on the side produces most exquisite music.

THE WALLACE DIAMOND CARBONS FOR ELECTRIC LIGHTS MAN'FD. FOR THE ELECTRICAL SUPPLY CO., 109 LIBERTY STREET, NEW YORK.



ROCK BREAKERS & ORE CRUSHERS. (THE "BLAKE" STYLE.) This machine has for twenty years stood the TEST, and found to be the best one made for breaking all kinds of hard and brittle substances, such as ORES, QUARTZ, EMERY, etc., etc.



RUBBER BACK SQUARE PACKING. BEST IN THE WORLD. For Packing the Piston Rods and Valve Stems of Steam Engines and Pumps. B represents that part of the packing which, when in use, is in contact with the Piston Rod.

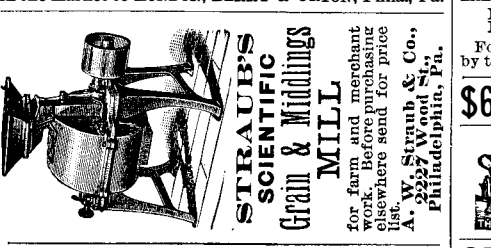


Forster's Rock & Ore Breaker and Combined Crusher and Pulverizer. The simplest machine ever devised for the purpose. Parties who have used it constantly for six years testify that it will do double the work of any other Crusher, with one-third the Power, and one-half the expense for keeping in repair.

UNIVERSAL GRINDER. These Grinders consist of a series of disks with beveled edges locked together on a shaft. They revolve towards each other at different rates of speed. They combine strength and durability. No friction; hence no heat. They will grind all kinds of Grain, also Quartz Rocks, Ores, Gypsum, Brimstone, Shavings, Shells, Brick Clay, Cork, Rubber, Bone, Oil Cake, Flax Seed, Cotton Seed, and any number of articles in use by manufacturers and farmers.

SNOW'S BEST Water Wheel Governor, MANUFACTURED BY COHOES IRON FOUNDRY AND MACHINE CO., COHOES, N. Y.

SEND FOR THE BEST BAND SAW BLADE in the market to LONDON, BERRY & ORTON, Phila., Pa.



SURFACE FILE HOLDERS. By their use a crooked file may be utilized as well as a straight one, and both are made to do better execution in filing broad surfaces than has hitherto been possible.

The George Place Machinery Agency Machinery of Every Description. 121 Chambers and 109 Reade Streets, New York.

Do Your Own Printing \$3 PRESS prints circulars, labels, &c. (Self-inked \$4) Larger sizes for larger work. For old or young. Great money saver. A paying business anywhere for all or spare time. Send two stamps for a catalogue of all sizes Presses, Type, Cards, Paper, &c., to the Manufacturers KELSEY & CO., Meriden, Conn.

JOHN R. WHITLEY & CO. European Representatives of American Houses, with First-class Agents in the principal industrial and agricultural centers and cities in Europe. London, 7 Poultry, E. C. Paris, 8 Place Vendôme. Terms on application. J. R. W. & Co. purchase Paris goods on commission at shippers' discounts.

ORGANS \$30 to \$1,000; 2 to 32 Stops. Pianos \$125 up. Paper free. Address Daniel F. Beatty, Washington, N. J.

CENTENIAL AND PARIS MEDALS. Mason's Friction Clutches and Elevators. "New and Improved Patterns." VOLNEY W. MASON & CO., Providence, R. I., U. S. A.

"RELIABLE" Engines a complete success. Prices still 40 per cent. below those of other makers. Unequaled for efficiency, simplicity and durability. Prices from \$250 for 10 H. P., to \$400 for 30 H. P. All complete with Governor, Pump, and Heater. Address, for circular, HEALD, SISCO & CO., Baldwinville, N. Y.

PATENT COLD ROLLED SHAFTING.

The fact that this shafting has 75 per cent. greater strength, a finer finish, and is truer to gauge, than any other in use renders it undoubtedly the most economical. We are also the sole manufacturers of the CELEBRATED COLLINS' PATENT COUPLING, and furnish Pulleys, Hangers, &c., of the most approved styles. Price list mailed on application to JONES & LAUGHLINS, Try Street, 2d and 3d Avenues, Pittsburgh, Pa.

THE BIGGEST THING OUT. Illustrated book sent free. Address E. NASON & CO., 111 Nassau St., New York.

TELEPHONE Works 1 mile. Price \$4. Pat'd. Circulars free. HOLCOMB & CO., Malet Creek, Ohio.

Just issued. TRAUTWINE'S CIVIL ENGINEER'S POCKET BOOK, illustrated with 670 engravings from original designs. Fourteenth Thousand. Revised and Corrected. 16mo, 675 pages. Buck, gilt edge. Price \$5. Mailed on receipt of price. E. Claxton & Co., Phila.

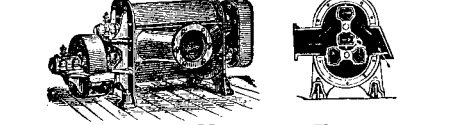
Langdon Mitre Box Co., MILLERS FALLS, MASS. Langdon and New Langdon Mitre Box. Send for circular.

CARNEGIE BROS & CO UNION IRON MILLS PITTSBURGH PA. WROUGHT IRON BEAMS CHANNELS TEES & ANGLES

CIGAR BOX LUMBER. SPECIAL PRICES to all parties ordering 20,000 FEET and upwards. Being Sole Manufacturers of the celebrated perfectly smooth and thoroughly seasoned CUT AND PRESS DRIED LUMBER, we can offer to all manufacturers extra inducements in line of Cigar Box Cedar Boards and Veneers. Poplar, Sycamore, Butternut, and Mahogany. Also in Panel Woods and Brush Stock. Our Cedar Veneers applied to Poplar, is much preferred to imitation Cedar. Full line Foreign and Domestic Woods in Logs, Plank, Boards, and Veneers. Send for Catalogue and Price List. 186 to 200 Lewis Street, New York.

The attention of Architects, Engineers, and Builders is called to the great improvement in wrought STRUCTURAL IRON. It is believed that were owners fully aware of the small difference in cost which now exists between iron and wood, the former, in many cases, would be adopted, thereby saving insurance and avoiding all risk of interruption to business in consequence of fire. Book of detailed information furnished to Architects, Engineers, and Builders, on application.

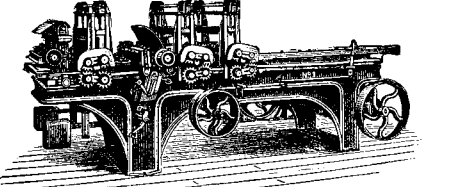
ROOTS' NEW IRON BLOWER.



POSITIVE BLAST. IRON REVOLVERS, PERFECTLY BALANCED IS SIMPLER, AND HAS FEWER PARTS THAN ANY OTHER BLOWER. P. H. & F. M. ROOTS, Manuf'rs, CONNERSVILLE, IND. S. S. TOWNSEND, Gen. Agt., { 6 Cortlandt St., { 8 Dey Street, } NEW YORK. WM. COOKE, Selling Agt., 6 Cortlandt Street, JAS. BEGGS & CO., Selling Agts., 8 Dey Street, SEND FOR PRICED CATALOGUE.

Steel Castings

From 1/4 to 15,000 lb. weight, true to pattern, of unequalled strength, toughness, and durability. 15,000 Crank Shafts and 10,000 Gear Wheels of this steel now running prove its superiority over other Steel Castings. Send for circular and price list. CHESTER STEEL CASTINGS CO., 407 Library St., Phila., Pa.



WITHERBY, RUGG & RICHARDSON, Manufacturers of Patent Wood Working Machinery of every description. Facilities unsurpassed. Shop formerly occupied by R. Ball & Co., Worcester, Mass. Send for Catalogue.

ROOFING.

For steep or flat roofs. Applied by ordinary workmen at one-third the cost of tin. Circulars and samples free. Agents Wanted. T. NEW, 32 John Street, New York.

HUB MACHINERY.—HUB TURNING, HUB MORTISING, and Hub Boring Machines. Send for price list and circulars. DAVID JENKINS, Sheboygan, Wis.

Agents Wanted Sells rapidly. C4S50 S. M. SPENCER, 112 Wash'n St., Boston, Mass.

Superior Wood Working Machinery, principally for Cabinet, Piano, and Piano Action Makers. Shafting, Pulleys, and Hangers. 1. Prybil, 461 to 467 W. 40th St. New York.

FOR SALE—LARGE MACHINE SHOP, WITH Machinery, Tools, Engine, etc., ready for running. Inquire of A. MONNETT & CO., Bucyrus, Ohio.

OTIS' SAFETY HOISTING Machinery.

OTIS BROS. & CO., No. 348 Broadway, New York.

WOOD WORKING MACHINERY IRON WORKING TOOLS SPECIAL TOOLS. MANUFACTURED BY H.B. SMITH MACHINE CO. SMITHVILLE, BUR CO., N. J. CIRCULARS FREE.

\$55.66 Agents' profit per week. Will prove it or forfeit \$500.00. Outfit and Samples worth \$500 free. Address E. G. RIDEOUT & CO., 10 Barclay Street, New York.

"The 1876 Injector."

Simple, Durable, and Reliable. Requires no special valves. Send for illustrated circular. W. M. SELLERS & CO., Phila.

STEAM PUMPS. THE NORWALK IRON WORKS CO., SOUTH NORWALK, CONN.

STEAM HEATING APPARATUS. SIZES OF BOILERS, RADIATORS, 28 PER CENT. EFFICIENCY. Send for Circular to H. B. SCHENCK & CO., NEW YORK.

WOOD WORKING

Machinery. Celebrated "Schenck" Planers and Matchers. 20,000 ft. flooring, 45,000 ft. surfacing per day. Re-sawers, Moulders, Tenoners, Scroll Saws, etc. H. B. Schenck, Successor to Jno. B. Schenck's Sons, Matteawan, N. Y.

SPARE THE CROTON AND SAVE THE COST. Driven or Tube Wells

furnished to large consumers of Croton and Ridgewood Water. WM. D. ANDREWS & BRO., 235 Broadway, N. Y., who control the patent for Green's American Driven Well.

Leffel Water Wheels, With recent improvements. Prices Greatly Reduced. 8000 in successful operation. FINE NEW PAMPHLET FOR 1879. Sent free to those interested. James Leffel & Co., Springfield, O. 110 Liberty St., N. Y. City.

PLAYS! PLAYS! PLAYS! PLAYS! For Reading Clubs, for Amateur Theatricals, Temperance Plays, Drawing Room Plays, Fairy Plays, Ethiopian Plays, Guide Books, Speakers, Pantomimes, Tableaux Lights, Magnesium Lights, Colored Fire, Burnt Cork, Theatrical Face Preparations, Jar-ey's Wax Works, Wigs, Beards, and Moustaches at reduced prices. Costumes, Scenery, Charades. New catalogues sent free containing full description and prices. SAMUEL FRENCH & SON, 35 E. 14th Street, New York.

Advertisements.

Inside Page, each insertion - - - 75 cents a line. Back Page, each insertion - - - \$1.00 a line.

Engravings may be made at the same rate per line, by measurement, as the letter press. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.



SCROLL SAWYER.

This Three-Shelf Bracket Design, size 18x21, and over 300 miniature designs for Scroll Sawing, sent post-paid on receipt of 10 cts., and the names and addresses in full of two active scroll sawyers. Price of pattern alone, 15 cts. Or send two stamps for illus. Catalogue of scroll saw goods. I offer inducements to purchasers made by no other house. Liberal discounts to the trade.

State where you saw advertisement. A. H. POMEROY, Hartford, Conn.

Mill Stones and Corn Mills.

We make Burr Millstones, Portable Mills, Smut Machines, Packers, Mill Picks, Water Wheels, Pulleys, and Gearing specially adapted to Flour Mills. Send for catalogue.

J. T. NOYE & SONS, Buffalo, N. Y.

NEW YORK BELTING AND PACKING THE CAR & WAGON SPRINGS Made by our processes are thoroughly efficient and practically indestructible. 37 & 38 PARK ROW, NEW YORK.

Pond's Tools,

Engine Lathes, Planers, Drills, &c. DAVID W POND, Worcester, Mass.



COLUMBIA BICYCLE.

The Bicycle has proved itself to be a permanent, practical road vehicle, and the number in daily use is rapidly increasing. Professional and business men, seekers after health or pleasure, all join in bearing witness to its merits.

THE POPE MFG CO., 89 Summer Street, Boston, Mass.

BOGARDUS' PATENT UNIVERSAL ECONOMIC MILLS - For grinding Bones, Ores, Sand, Oil Crucibles, Fire Clay, Guanos, Oil Cake, Feed, Corn, and Cob, Tobacco, Snuff, Sugar, Salts, Roots, Spices, Coffee, Coconut, Flaxseed, Asbestos, Mica, etc., and whatever cannot be ground by other mills. Also for Paints, Printers' Inks, Paste Blacking, etc. JOHN W. THOMSON, Successor to JAMES BOGARDUS, corner of White and Elm Sts., New York.

PERKINS'

High Pressure Engine and Boiler, Etc.

On returning to England, I have arranged with Mr. James L. Howard, of Hartford, Conn., to represent the interests of The Perkins' Engine Company, Limited, of London, in this country. All communications addressed to him on this subject will receive attention.

UPRIGHT DRILLS H. BICKFORD Cincinnati, Ohio.

ERICSSON'S NEW MOTOR. ERICSSON'S New Caloric Pumping Engine FOR DWELLINGS AND COUNTRY SEATS.

Simplest, cheapest, and most economical pumping engine for domestic purposes. Any servant girl can operate. Absolutely safe. Send for circulars and price lists.

DELAMATER IRON WORKS C. H. DELAMATER & CO., Proprietors. No. 10 Cortlandt Street, New York, N. Y.

SHEPARD'S CELEBRATED \$50 Screw Cutting Foot Lathe. Foot and Power Lathes, Drill Presses, Mill Boards, etc.

MACHINISTS' TOOLS. NEW AND IMPROVED PATTERNS. Send for new illustrated catalogue.

TELEPHONE and Electrical Supplies. C. E. JONES & BRO., CINCINNATI, O.

H.W. JOHNS' ASBESTOS LIQUID PAINTS, ROOFING, Steam Pipe & Boiler Coverings.

WANTED. A thoroughly competent and experienced man to take charge of a foundry employing 200 men, doing engine and general work.

THE BELMONT OIL Prevents Rust, Tarnish, etc., on Firearms, Machinery, Tools, Cutlery, Safes, Saws, Skates, Stoves, Hardware, etc.

THE BELMONT OIL WATER MOTOR power. Prices from \$15 to \$250. Send for circular to THE BACKUS WATER MOTOR CO., Newark, N. J.

EMERY WHEELS and GRINDING MACHINES.



THE TANITE CO., Stroudsburg, Monroe County, Pa.

Orders may be directed to us at any of the following addresses, at each of which we carry a stock: New York, 14 Dey Street. Chicago, 152 and 154 Lake St. St. Louis, 209 North Third St. St. Louis, 811 to 819 North Second St. Cincinnati, 212 West Second St. Louisville, 427 West Main St. Indianapolis, Corner Maryland and Delaware Sts. New Orleans, 26 Union St. San Francisco, 2 and 4 California St. Philadelphia, 11 North Sixth Street. Boston, 21 Doane St. Portland, Oregon, 43 Front St. London, Eng., 9 St. Andrews St. Hoborn Viaduct, E. C. Liver pool, Eng., 42 The Temple, Dale St. Sydney, N. S. W., 11 Pitt St.

Before ordering engraving of any kind, send to us for estimates and samples. We have the largest engraving establishment in the world, and the best facilities for doing work of the best quality, quickly and cheaply. PHOTO-ENGRAVING CO. 67 & 69 Park Place, New York.

COMPOUND NOT A DRUG OXYGEN A NEW TREATMENT for Consumption, Asthma, Bronchitis, Catarrh, Dyspepsia, Headache, Debility, Neuralgia, Rheumatism, and all Chronic and Nervous Disorders. ACTS DIRECTLY upon the great nervous and organic centres, and cures by a natural process of revitalization. HAS EFFECTED REMARKABLE CURES, which are attracting wide attention.

HARTFORD STEAM BOILER Inspection & Insurance COMPANY W. B. FRANKLIN, V. Pres't. J. M. ALLEN, Pres't. J. B. PIERCE, Sec'y.

THE BAKER BLOWER. Centennial Judges Report. "Good Design and Material. Very efficient in action. With the special advantages that they can be connected for motion directly with engine without the use of gearing or belting."

The Asbestos Packing Co., Boston, Mass. PATENTED ASBESTOS ROPE PACKING, LOOSE, JOURNAL, WICK, MILL BOARD, SHEATHING PAPER, FLOORING FELT, CLOTH.

BOILER COVERINGS. Plastic Cement and Hair Felt, with or without the Patent "AIR SPACE" Method. ASBESTOS MATERIALS.

THE BACKUS WATER MOTOR power. Prices from \$15 to \$250. Send for circular to THE BACKUS WATER MOTOR CO., Newark, N. J.

WATCHMAN'S Improved Time Detector, with Safety Lock Attachment, Patented 1878-79. HENRY W. BULKLEY, Sole Manufacturer, 149 Broadway, N. Y.

Pyrometers, For showing heat of Ovens, Hot Blast Pipes, Boiler Flues, Superheated Steam, Oil Stills, etc. HENRY W. BULKLEY, Sole Manufacturer, 149 Broadway, N. Y.

WM. A. HARRIS, PROVIDENCE, R. I. (PARK STREET), Six minutes walk West from station. Original and Only builder of the HARRIS-CORLISS ENGINE With Harris' Patented Improvements, from 10 to 1,000 H. P.

SHAFTS PULLEYS HANGERS At Low Prices. Large Assorted Stock. A. & F. BROWN, 57-61 Lewis St., New York.

THE OLDEST YANKEE NOTION HOUSE In the World. HOWARD BROTHERS & READ, Successors to HOWARD, SANGER & CO., OWNERS OF THE HOWARD MANUFACTURING CO., MANUFACTURE AND INTRODUCE PATENTED NOVELTIES. THE ONLY Real Pocket Scale IN THE MARKET. MADE OF METAL, Heavily Nickel Plated, COMPACT, STRONG, DURABLE. Can be carried in the Vest Pocket. Each one warranted absolutely accurate. Weighs up to 8 lbs. PRICE 25 CENTS. Sample by mail on receipt of price. A liberal discount to the trade. No. 1 - "Post Office," weighs to 8 ozs. No. 2 - "Pocket," weighs to 8 lbs. Howard Manufacturing Co., Box 2295, New York.

Pictet Artificial Ice Co., Limited, P. O. Box 303, 142 Greenwich St., New York. Guaranteed to be the most efficient and economical of all existing Ice and Cold Air Machines.

THE New York Ice Machine Company, 21 Courtland St., New York, Rooms 54, 55.

LOW PRESSURE BINARY ABSORPTION SYSTEM. Machines Making

ICE AND COLD AIR.

Low Pressure when running. No pressure at rest. Machines guaranteed by C. H. Delamater & Co.

Our new Stylographic Pen (just patented), having the duplex interchangeable point section, is the very latest improvement. THE STYLOGRAPHIC PEN CO., Room 169 Broadway, New York. Send for circular.

NON-CONDUCTOR COVERINGS, FOR STEAM BOILERS AND PIPES. THE RAYMOND MFG CO., 642 West 52d St., 105 Liberty St., New York.

OPERA and FIELD GLASSES of the greatest power combined with portability and low prices. Send for illustrated catalogue to R. & J. BECK, Manufacturing Opticians, Philadelphia, Pa.

DOUBLE PITMAN PRESSES. STILES & PARKER PRESS CO., Middletown, Ct. Established 1844.

JOSEPH C. TODD, Successor to TODD & RAFFERTY, PATERSON, N. J., Engineer and Machinist. Flax, Hemp, Jute, Rope, Oakum, and Bagging Machinery, Steam Engines, Boilers, etc. Sole Agent for Mayher's New Patent Acme Steam Engine and Force Pumps combined. Also owner and exclusive manufacturer of

THE NEW Baxter Patent Portable Steam Engine. These engines are admirably adapted to all kinds of light power for driving printing presses, pumping water, sawing wood, grinding coffee, ginning cotton, and all kinds of agricultural and mechanical purposes, and are furnished at the following low prices: 1 Horse Power, \$150; 1 1/2 Horse Power, \$190; 2 Horse Power, \$245; 2 1/2 Horse Power, \$275; 3 Horse Power, \$290; 4 Horse Power, \$350. Send for descriptive circular. Address J. C. TODD, PATERSON, N. J. Or No. 10 Barclay St., New York.



Scientific American FOR 1881.

The Most Popular Scientific Paper in the World. VOLUME XLIV. NEW SERIES. COMMENCES JAN. 1st. Only \$3.20 a Year, including postage. Weekly. 52 Numbers a Year.

This widely circulated and splendidly illustrated paper is published weekly. Every number contains sixteen pages of useful information, and a large number of original engravings of new inventions and discoveries, representing Engineering Works, Steam Machinery, New Inventions, Novelties in Mechanics, Manufactures, Chemistry, Electricity, Telegraphy, Photography, Architecture, Agriculture, Horticulture, Natural History, etc.

All Classes of Readers find in THE SCIENTIFIC AMERICAN a popular resume of the best scientific information of the day; and it is the aim of the publishers to present it in an attractive form, avoiding as much as possible abstruse terms. To every intelligent mind, this journal affords a constant supply of instructive reading. It is promotive of knowledge and progress in every community where it circulates.

Terms of Subscription. - One copy of THE SCIENTIFIC AMERICAN will be sent for one year - 52 numbers - postage prepaid, to any subscriber in the United States or Canada, on receipt of three dollars and twenty cents by the publishers; six months, \$1.60; three months, \$1.00.

Clubs. - One extra copy of THE SCIENTIFIC AMERICAN will be supplied gratis for every club of five subscribers at \$3.20 each; additional copies at same proportionate rate.

One copy of THE SCIENTIFIC AMERICAN and one copy of THE SCIENTIFIC AMERICAN SUPPLEMENT will be sent for one year, postage prepaid, to any subscriber in the United States or Canada, on receipt of seven dollars by the publishers.

The safest way to remit is by Postal Order, Draft, or Express. Money carefully placed inside of envelopes, securely sealed, and correctly addressed, seldom goes astray, but is at the sender's risk. Address all letters and make all orders, drafts, etc., payable to

MUNN & CO., 37 Park Row, New York.

To Foreign Subscribers. - Under the facilities of the Postal Union, the SCIENTIFIC AMERICAN is now sent by post direct from New York, with regularity, to subscribers in Great Britain, India, Australia, and all other British colonies; to France, Austria, Belgium, Germany, Russia, and all other European States; Japan, Brazil, Mexico, and all States of Central and South America. Terms, when sent to foreign countries, Canada excepted, \$4, gold, for SCIENTIFIC AMERICAN, 1 year; \$9, gold, for both SCIENTIFIC AMERICAN and SUPPLEMENT for 1 year. This includes postage, which we pay. Remit by postal order or draft to order of Munn & Co., 37 Park Row, New York.

THE "Scientific American" is printed with CHAS. ENEU JOHNSON & CO.'S LITH. Tenth and Lombard Sts., Philadelphia, and 50 Gold St. New York.