

MODERN AMERICAN LIGHTHOUSES.

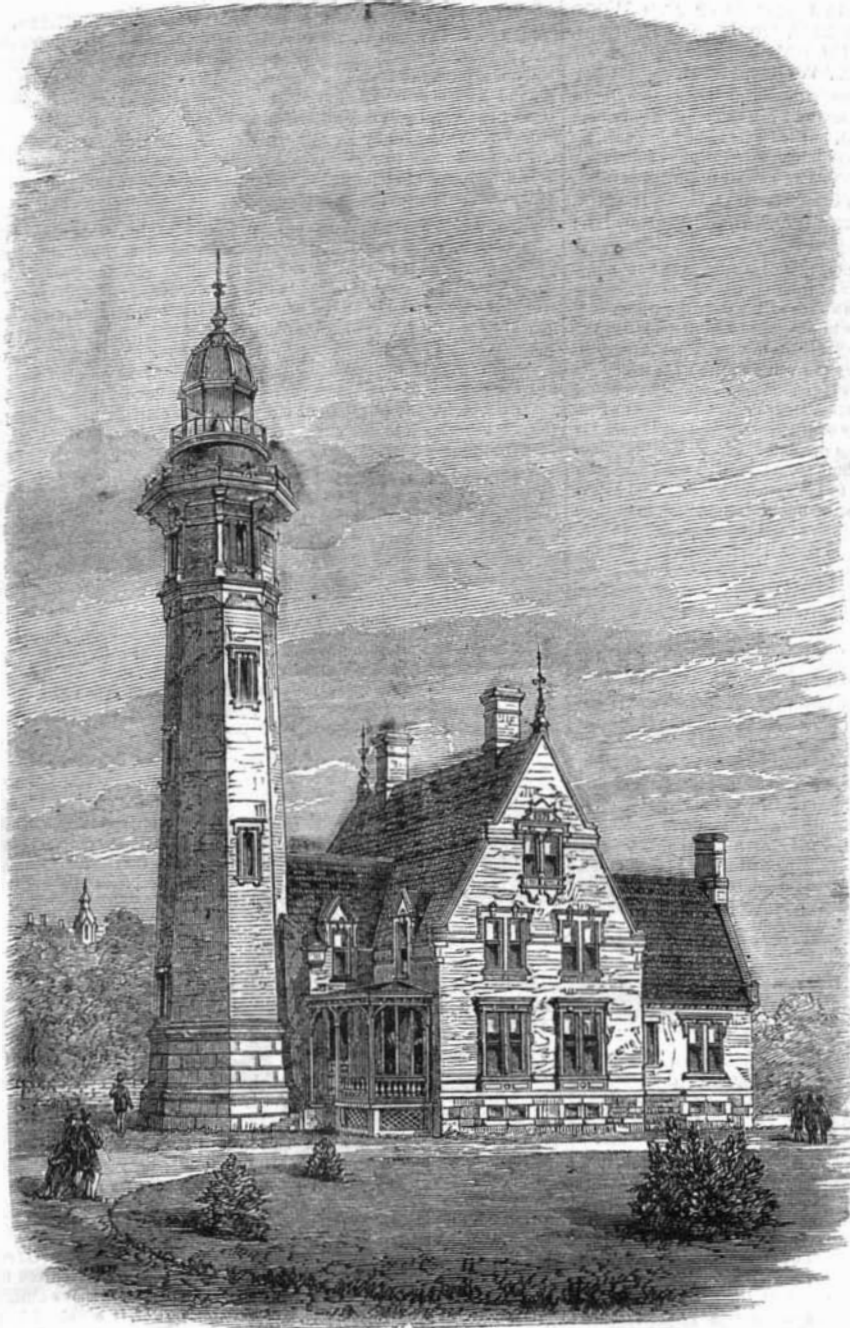
We publish herewith views of two lighthouses recently erected on the Great Lakes. The first, that at Cleveland, Ohio, is situated on the shore of Lake Erie, and is chiefly noticeable for the substantial elegance of its architecture; the second is on Spectacle reef, in Lake Huron, and is in many respects a remarkable engineering work. We are indebted to *Engineering* for the engravings, and we extract the following description of the Lake Huron structure from a report of the Lighthouse Board:

A crib, of 92 feet square, with a central opening of 48 feet square to receive the cofferdam which was to form the pier of protection, as well as a landing place for materials during the building of the lighthouse, was in 1873 constructed at Scammon's Harbor. The original intention was to put the crib in position in four sections, but upon further

height, and by the 20th, quarters for the workmen had been completed upon it, which were at once occupied. By means of a submarine diver, the bed rock within the opening of the pier, was then cleared off, and the work of constructing the cofferdam was taken in hand. The cofferdam itself consisted of a hollow cylinder 41 feet in diameter, composed of wooden staves, each 4 inches by 6 inches and 15 feet long. The cylinder was braced and trussed internally, and hooped with iron externally, so as to give it the requisite strength. It was put together at the surface of the water, and when complete was lowered into position on the bed rock by means of iron screws. As soon as it rested on the rock (which was quite irregular in contour), each stave was driven down so as to fit as closely as it would admit, and a diver filled all openings between its lower end and the rock with Portland cement. A loosely twisted rope of oakum was then

Paraffin.

"At a recent meeting of the Society of Arts, London, Mr. Frederick Field gave the following interesting information: In pursuing his celebrated researches upon the tar obtained from the red beech, Reichenbach discovered in the ultimate portion of his distillates a white translucent substance, to which he gave the name paraffin (from *parum* and *affinis*), owing to the comparatively slight action exerted upon it by most chemical re-agents. The tar was submitted to repeated fractional distillation, and the portions passing over last were mixed with strong sulphuric acid and violently agitated. After standing in a warm place for some hours, the paraffin floated upon the carbonized residue in the form of a pale colored oil, which, after cooling, solidified, and was pressed between folds of bibulous paper. By frequent crystallizations from boiling ether, it was obtained as a brilliantly white body,



LIGHTHOUSE AT CLEVELAND, OHIO.

consideration it was decided to attempt placing it as a whole upon the reef, which was successfully accomplished.

The depth of water on the reef at the points to be occupied by the four corners of the pier of protection was found to be as follows: At northeast corner, 10 feet 6 inches; at northwest corner, 13 feet; at southwest corner, 14 feet 6 inches; and at southeast corner, 9 feet 6 inches: the position to be occupied by the pier of protection having been so chosen that the sides would correspond to the cardinal points of the compass.

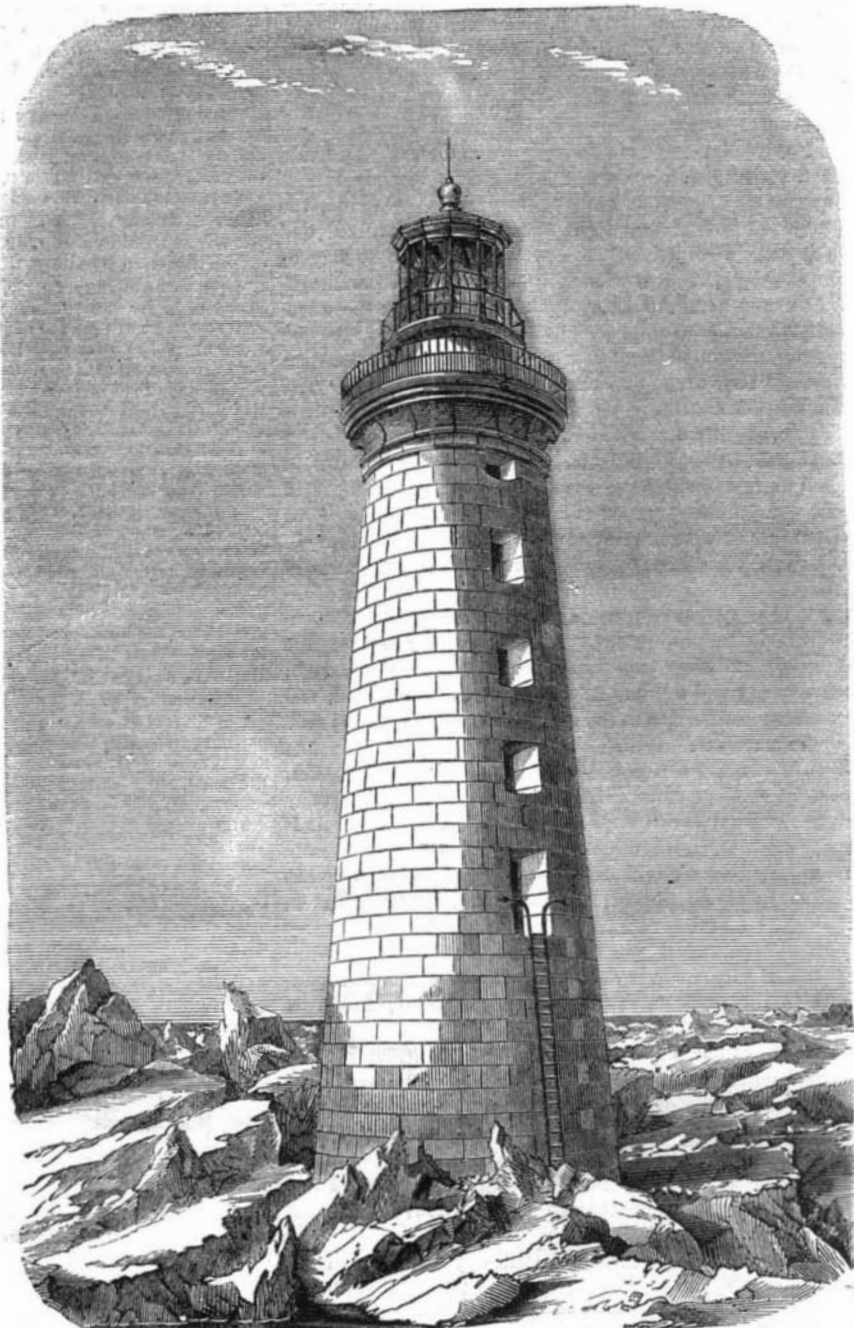
On the evening of the 18th of July, 1871, everything being in readiness, at 8 P. M., the tugs *Champion* (screw propeller) and *Magnet* (side wheel) took hold of the immense crib and started to tow it to the reef, 16 miles distant, followed by the *Warrington* (screw propeller), having in tow the schooner *Belle* (the two having on board a working force of 140 men), the tug *Stranger* (screw propeller) with barges *Ritchie* and *Emerald*, and the tug *Hand* with two scows of the lighthouse establishment. The barge *Table Rock*, with fifty cords of stone on board, was left in reserve at the harbor. The construction scow, with tools, etc., on board, was towed with the crib. At 2 A. M., next morning, six hours after starting, the fleet hove to off the reef, awaiting daylight and the abatement of the wind, which had again freshened up. At 6½ A. M., it having moderated, the pier, with considerable difficulty, was placed in position; and after being secured to the temporary pier and the moorings previously set for the purpose, all hands went to work throwing the ballast stone into the compartments, and by 4 P. M., succeeded in getting into it about 200 cords (1,200 tons). By this time the wind was blowing freshly and the sea running so high as to make it necessary to stop work for the time; but early next morning all the reserve stone was put into the compartments.

By September 12, the pier had been built up to its full

pressed close down into the exterior angle between the cofferdam and rock, and outside of this a larger rope made of hay. The pumping machinery having meanwhile been placed in readiness, the cofferdam was pumped dry, and on the same day (14th October) a force of stone-cutters descended to the bottom and commenced the work of leveling off the bed rock, and preparing it to receive the first course of masonry. The bed rock was found to consist of dolomitic limestone (confirming the previous examinations), highest on the western side toward the deepest water, and sloping gradually toward the eastern. In order to make a level bed for the first course of masonry, it was necessary to cut down about 2 feet on the highest side, involving a large amount of hard labor, rendered more difficult by the water forcing its way up through seams in the rock. But the work was finally accomplished, the bed being as carefully cut and levelled as any of the courses of masonry. The first course of masonry was then set, completing it on the 27th of October.

The degree of success of this novel cofferdam may be inferred from the fact that, although prepared with pumps of an aggregate capacity of 5,000 gallons per minute, not more than a capacity of 700 gallons was used, except when emptying the cofferdam, and then only to expedite the work. Once emptied, a small portion of this capacity was ample to keep the cofferdam free from water; and this at a depth of 12 feet of water, on rock, at a distance of nearly 11 miles from the nearest land. Every person connected with the work may well feel a just pride in its success.

A BUILDING in San Francisco that has 500 rooms is to have a clock with 500 dials, a dial for each room. The dials will be operated with compressed air, conducted in pipes all over the building. The clock has been built by the Seth Thomas Clock company, of Thomaston, Conn.



LIGHTHOUSE ON SPECTACLE REEF, LAKE HURON.

highly plastic and somewhat unctuous. For many years it was regarded as simply a chemical curiosity. It is now annually made, as will, presently be shown, by thousands of tons.

Paraffin is a pure hydrocarbon, having no oxygen whatever, and its analysis has given the following percentage composition: Carbon, 85.16; hydrogen, 14.76.

Paraffin, when pure, is perfectly colorless and translucent; after slightly warming, it becomes highly plastic, and can be easily molded with the greatest ease. Hence, it differs in some respects essentially from spermaceti, with which it has often been erroneously compared, as well as from stearic acid and other bodies used for the manufacture of candles.

From this plasticity, in warm rooms, paraffin candles (if not of a very high melting point) are liable to bend; while on the other hand, those made of sperm or stearic acid, although of a lower melting point, remain erect. Of course, as has been observed, this very much depends upon the fusibility of the substance, and the harder descriptions of paraffin are always selected for candles which have to be subjected to much heat.

Liquid paraffin is very mobile, and can be filtered through paper almost as readily as water itself.

It is scarcely acted upon, even by fuming sulphuric acid, unless at very high temperatures, so that it can be purified by this means from many other organic substances with which it may have been associated, they being immediately charred by contact with sulphuric acid.

When submitted for a length of time to the action of chlorine or bromine, chlorinated or brominated compounds are formed with disengagement of torrents of hydrochloric or hydrobromic acids.

Mr. MacIvor, who has devoted many years to the study of paraffin, says that, after this body is acted upon by chlorine, it first becomes a gummy looking solid, and afterwards a liquid of

orless and transparent; and as the passage of the chlorine is continued, a hard brittle resin is the result. The substance consists of—

Carbon.....	29.55
Chlorine.....	66.82
Hydrogen.....	3.39
	99.76

This gentleman has also remarked that the paraffins having the highest melting point are those which are most easily acted upon by the gas.

Iodine dissolves in paraffin, imparting to it a beautiful violet color, which becomes brown as the paraffin solidifies; but the action of this element upon the hydrocarbon is very feeble, no apparent decomposition taking place after prolonged heating for many hours.

By the action of strong nitric or sulphuric acids, M. Campion discovered a new body, which he calls paraffinic acid, and describes it as a bright, transparent liquid, of a very inflammable nature.

Strong nitric acid yields a series of interesting compounds, lately studied by Schorlemmer and others.

Mr. Fordred informed me some years ago that, when paraffin is acted upon by sulphuric acid to which a few crystals of permanganate of potash have been previously added, the action is so violent that light and heat are involved, and even at times accompanied by explosion. The best way of trying the experiment is to heat up the acid and permanganate in a tube, and drop a small piece of paraffin in the warm liquid. When they are all three placed together in the tube and heated up, the action is not nearly so violent. Success does not always attend the experiment, but it can be tried. The decomposition convinces us that the word paraffin (little affinity) is slightly a misnomer.

Paraffin is insoluble in water, very sparingly soluble in alcohol, even when boiling, more so in ether, exceedingly in naphtha, sulphide of carbon and aniline.

When heated with sulphur at a moderately high temperature, it is decomposed, carbon separates, and abundance of sulphuretted hydrogen is evolved. This fact may be of interest to chemists, as affording a ready source of this indispensable reagent in the laboratory. The two substances, the paraffin being in large excess, are heated together in a flask, when a steady and copious flow of the gas is obtained, and the characteristic action of the gas upon lead salts will be seen by the experiment.

With the regard to the beautiful translucency of paraffin, which, in spite of certain drawbacks, has made this body such an unusual favorite as a means of light, Mr. MacIvor informs me that, if, when melted, it is cooled very gradually and subjected to a slight and steady pressure, it becomes actually transparent, like ice, but that a blow, or even a scratch, will alter its molecular structure, and cause it to re-assume its normal appearance. As this change is also produced upon re melting it, however cautiously, that triumph of manufacture in this department of industry, namely, making a transparent candle, is yet in the distance.

Mr. Gellatly has shown that the specific gravity rises with the melting point of paraffin. Thus paraffin melting at about 60° Fah. has only a specific gravity of 0.823; at 128° Fah., which may be considered a very good average (rather high, perhaps), it has a specific gravity of 0.911; and a specimen of an extraordinarily high melting point (176° Fah.) was as high as 0.940, more than 10 per cent above that at 90° Fah.

Paraffin is obtained in large quantities by distillation from oil shales.

To Render Glass Opaque or Frosted.

According to *Dingler's Journal*, a sheet of ordinary glass, whether patent plate or crown does not matter, is cleaned; and if only portions of it are to be frosted, those are left bare, while the others are protected by mechanical means in any simple manner. Some fluor spar is rubbed to a fine powder and mixed with concentrated sulphuric acid, so as to make a thin paste, and this is then rubbed by means of a piece of lead upon those parts of the glass required to be rendered opaque. A fine frosted outline or design may thus be produced upon a sheet of smooth transparent glass. To finish the operation, the glass is gently heated in an iron vessel covered with a funnel passing up the chimney, to get rid of the noxious fumes that are given off; on cooling, the plate is washed with a dilute solution of soda or potash, to remove any acid yet remaining, and is then rinsed in water. Focusing glasses for the photo camera, and development glasses for pigment printing, can be prepared in this way at very little expense.

Decline of Medical Study in France.

The *Union Medicale* says that in France the number of medical students, as well as that of practitioners, is on the decline, the medical recruit, both in civil and military life, becoming more and more difficult. Medical studies have now become so long and laborious (the physical and chemical sciences being now far more than mere auxiliaries, and forming an important part in the preparation for examinations) that the student, after his laborious and costly career, finds, on getting into practice, that he has no effective protection from the encroachment of charlatans and parasites.

Oil and repair the harness. Unbuckle all the parts and wash clean with soft water, soap and a brush. A little turpentine or benzine will take off any greasy substance which the soap fails to remove. Then warm the leather, and, as soon as dry on the surface, apply the oil with a paint brush or a swab. Neat'sfoot oil is the best. Hang up the harness in a warm place to dry, but do not let it burn.

Railroads in Europe and America in 1873.

	Railroads, Miles.	Population.	Area, Sq. Miles.
United States.....	71,565	40,232,000	2,492,316
Germany.....	12,207	40,111,265	212,091
Austria.....	5,865	35,943,592	227,234
France.....	10,333	36,469,875	201,900
Russia in Europe.....	7,044	71,207,794	1,992,574
Great Britain, 1872.....	15,814	31,817,108	120,769
Belgium.....	1,301	4,839,094	11,412
Netherlands.....	886	3,858,055	13,464
Switzerland.....	820	2,669,095	15,233
Italy.....	3,667	26,273,776	107,961
Denmark.....	420	1,784,741	14,453
Spain.....	3,401	16,301,850	182,758
Portugal.....	453	3,987,867	36,510
Sweden and Norway.....	1,049	5,860,122	188,771
Greece.....	100	1,332,508	19,941

NEW BOOKS AND PUBLICATIONS.

THE CARPENTER'S AND BUILDER'S ASSISTANT AND WOOD WORKER'S GUIDE. By Lucius D. Gould, Architect and Practical Builder. Fully Illustrated. Price \$3. New York: A. J. Bicknell & Co., 27 Warren street.

This well gotten-up volume will be practically useful to any carpenter or builder who will read it. It is not so elaborate a work as Tredgold (to whom Mr. Gould makes his acknowledgments), but is likely to be more used by mechanics and workmen than that complete and valuable, but somewhat complicated manual. Mr. Gould's work will well repay attentive perusal.

ROPP'S READY RECKONER AND COMMERCIAL CALCULATOR. By Christian Ropp, Jr. Price \$1.00. Bloomington, Ill.: Published by the Author.

Mr. Ropp is a practical farmer, and hence is well posted as to how much mathematics farmers need in the routine of their business. He also appreciates the value of time, and doubtless is aware of the puzzling which very frequently takes place over long sums in obstinate fractions, when the farm accounts are made up. Hence, he proceeds in a practical manner to make a rough road smooth, and produces the work before us, a handy little volume in pocket-book shape in which is condensed an immense amount of useful information, in the shape of short cut through calculations which ordinarily bristle with a formidable array of perplexing figures. There are grain tables, showing the corresponding prices of bushels and hundred-weights, and time, interest, wages, and lumber tables. The book also contains clear explanations, of contractions in the various processes of arithmetic, of measures of all sorts and kinds, of bookkeeping, and, in fact, so much, and in so small a space, that we despair of enumerating all, and leave the reader to the pleasure of discovering for himself when he buys the book. There are several blank pages to serve for memoranda, a pocket for papers, and a silicate slate for rough notes. Altogether, it is a very useful manual, and one which must be a great assistance both to the farmer and the business man.

BABBITT'S HEALTH GUIDE. Price \$1. New York: Published by E. D. Babbitt, D. M., 437 Fourth Avenue.

A philosophy of cure, founded on the idea that healing elements are potent in proportion as they are subtle and refined, and weak in proportion as they are gross; that sunlight, electricity, and especially the still finer life forces, being subtle next to spirit itself, are the most potent to heal, while mineral substances, being from the coarsest department of Nature, are the weakest and least penetrating. This constitutes the law of power. The law of harmony is stated to be a nicely balanced contrast of elements. Magnetism, or the warm positive principle, and electricity, the cold negative principle, are stated to be the propelling principles of the universe, and these are combined equally to bring about harmony and health. Too much of the cold principle in the human system brings about chills, paralysis, and chronic diseases—too much of the warm principle, fevers and inflammatory diseases. While sunlight, baths, food, clothing, the social relations, etc., are explained and commended, a strong magnetic hand is considered the most potent of all instruments for charging a feeble system with a new life power, and for equalizing ill balanced conditions. Directions are given for the practice of manipulation, and the treatment for one hundred different diseases, without drugs.

THE APPRENTICE, or First Book for Mechanics, Machinists, and Engineers. By Oliver Byrne, Mathematician and Civil, Military, and Mechanical Engineer, etc. New York: A. J. Fisher, 98 Nassau street.

A new edition of a book which is well enough known to the engineering profession, but which presupposes an apprentice of a very advanced mathematical education. The reduction of all the results to units of work is an especially commendable feature in this volume, and its first few chapters are full of practical ideas, clearly expressed; but the profuse employment of the calculus hinders the value of the book in the hands of those for whom it was ostensibly written.

SKIN GRAFTING. By R. J. Levis, M.D., Surgeon to the Pennsylvania Hospital and to the Wills Ophthalmic Hospital.

Dr. Levis has done much valuable service to therapeutic science in studying and utilizing this process, which, together with the now much practised transfusion of blood, opens up the question as to whether the whole corpus may not ultimately be reconstructed.

Inventions Patented in England by Americans.

(Compiled from the Commissioners of Patents' Journal.)

From March 17 to March 23, 1874, inclusive.

BOOK SEWING MACHINE.—H. G. Thompson, Milford, Conn.
CARTRIDGE CARRIER.—J. H. Black, Columbia, Pa.
CASTOR.—J. H. Redfield, New York city.
CLOTHES' HOOK.—C. G. Cole, Bennington, Vt.
COMPRESSED AIR APPARATUS, ETC.—W. E. Prall, Washington, D. C.
DRESSING STONE.—A. S. Gear, Boston, Mass.
SIGNAL LANTERN.—T. A. Davies, New York city.
TELEGRAPH.—M. Gally, Rochester, N. Y.
TELEGRAPH, ETC.—G. d'Infeville et al., New York city.
THRUST BEARING.—C. Godfrey, Huntington, N. Y.
TREATING HYDROCARBON OILS.—R. A. Chesecrough, New York city.

IMPORTANCE OF ADVERTISING.

The value of advertising is so well understood by old established business firms that a hint to them is unnecessary; but to persons establishing a new business, or having for sale a new article, or wishing to sell a patent, or find a manufacturer to work it: upon such a class, we would impress the importance of advertising. The next thing to be considered is the medium through which to do it.

In this matter, discretion is to be used at first; but experience will soon determine that papers or magazines having the largest circulation, among the class of persons most likely to be interested in the article for sale, will be the cheapest, and bring the quickest returns. To the manufacturer of all kinds of machinery, and to the vendors of any new article in the mechanical line, we believe there is no other source from which the advertiser can get as speedy returns as through the advertising columns of the *SCIENTIFIC AMERICAN*.

We do not make these suggestions merely to increase our advertising patronage, but to direct persons how to increase their own business.

The *SCIENTIFIC AMERICAN* has a circulation of more than 42,000 copies per week, which is probably greater than the combined circulation of all the other papers of its kind published in the world.

Recent American and Foreign Patents.

Improved Combined Blind and Sash Fastener.

William O. Pond, Mobile, Ala.—This is a combined fastening for blinds or shutters and for window sashes, consisting of an adjustable fastening bar attached to the blind, a stationary hook in the casing, and a hinged hook attached to the sash. As the sash is lowered, the hook catches into the stationary hook automatically, and securely fastens the sash down.

Improved Combined Car Starter and Brake.

William T. Beckman, Petersburg, Ill.—This invention, which is designed more especially for application to street cars, has for its object to utilize the force expended in braking the cars, for the purpose of storing power to be subsequently used as an aid to propulsion. To this end a friction clutch, a chain pulley, and ratchet mechanism are employed, and a spring, these elements or devices being so combined and attached to the axle, wheel, and draft bar, that whenever the brake mechanism is brought into action the spring will be compressed correspondingly to the force thus expended or necessary to overcome the momentum of the car and reduce its speed, or bring it to rest. The power thus stored is immediately or remotely available in starting or propelling the car.

Improved Combined Seed Drill and Fertilizer.

John F. and Samuel C. Thomas, Adamstown, Md.—This invention consists in bringing the discharge spouts of seed and manure near the ground and one around the other, so that the seed and manure will be left on the ground in close proximity but not in contact, thus avoiding the destruction of the vitality of any of the seeds; in protecting the reciprocating stirrer of the hopper by an apron; in combining with each endless carrier an angle gate to regulate the feed; and in combining with a seed gate a spring-held spool which will allow the gate to yield to a stone or other hard substance.

Improved Heating Apparatus for Sleighs, Carriages, etc.
Thomas H. Price and Theodore F. Wade, Lafayette, Ind.—The object of this invention is to provide an improved foot-warming attachment for sleighs, carriages, etc. It consists in a metal case containing the burners, which is applied to the sleigh or carriage bottom, and provided with a concave top that forms also the bottom of a box from which heated air is discharged upward through its perforated top. Said perforated top is practically a part of the sleigh bottom. The invention also includes a heat-conducting bar arranged beneath the concave bottom of the air heating box for the purpose of equalizing the distribution of heat, and thereby securing a better effect with the consumption of a given quantity of oil or burning fuel.

Improved Bracket Insulator for Telegraph Wires.

Charles L. Le Baron, Pensacola, Fla.—The insulator is preferably rectangular in form, made of glass or other suitable non-conducting material, and has a closed slot to adapt it to be hung on a spike, and an open slot, at right angles to the closed slot, to receive the line wire. The wire is put in the slot before the insulator is hung on the spike, and the wires may, in many cases, be dispensed with.

Improved Telegraph Wire Insulator.

Charles L. Le Baron, Pensacola, Fla.—The insulator is made of glass, circular in form, and has a circumferential groove to receive the wire that supports the line wire, and end cavities to increase the distance electrically between the conducting wire and spike, which latter passes through the insulator longitudinally.

Improved Surface Planer.

William C. Margedant, Hamilton, O.—This invention consists of the combination in surface-planing machines with a single rotary tool, of two tables, a single piece subjacent, and an upper one formed in two sections the whole adjustable together vertically, and one of the upper independently adjustable, horizontally and vertically, so that the warp may be taken out of one piece of timber on the upper table, while another is being surface planed on the lower table.

Improved Package Envelope.

Charles C. Kelly and Julius Cobb, St. Paul, Minn.—This invention relates to the construction of package envelopes with a view to making them more secure and reliable. It consists in providing the body with end and side flaps, connecting tongues, and slits.

Improved Torch and Fire Kindler.

Robert Wiehle and Christian Feuchter, Ironton, O.—This superior kindler is formed of cornstalks soaked in petroleum, then dried, and next dipped in melted rosin, and finally wrapped in paper, which latter subserves important functions.

Improved Surface Plane.

Charles E. McBeth and William C. Margedant, Hamilton, O.—This invention consists in combining, with a part table and its adjustable slide, a socket holder arranged to slide and be held at various points of adjustment.

Improved Reverberatory Furnace for Roasting Ores.
Ernst Helligendorfer, Belmont, Nev.—The object of this invention is to so improve the grates of reverberatory and other furnaces that a clear fire, free from smoke and of the highest oxidizing power, is obtained by currents of heated air, which are introduced between and sidewise to the gases of combustion, so that the caking of the roasted ore is prevented and the grate applied effectively to roast silver ore, galena, and zinc blende. The invention consists in the introduction of partitions of cast iron plates between and at both sides of the grate, parallel to the grate bars and the fireplace, extending as high as the fuel is accumulated on them.

Improved Boot Stretcher.

John C. Compton and Henry V. Hartz, Cleveland, O.—This invention consists in combining, with a two part grooved toe piece and an inclined in-step piece, a single slide having tongues and incline; and also in combining a hollow toe and heel piece with a pivoted bar susceptible of being locked at several points of adjustment.

Improved Molding Machine.

William C. Margedant, Hamilton, O.—This invention consists in a sticker bed formed of two frames and two sections, both of the latter adjustable horizontally, so that the same machine may be employed as a sticker, molder, shaper, matcher, surface planer, or sand-papery machine; also in feed roll arbors having hollow sockets, the former being thus allowed to slide in and out of the latter; also in combining yokes, weighted levers, connections, and end slotted levers, to compel the feed rolls always to remain in a horizontal plane at all altitudes to which they may be raised by the subjacent timber; also in combining slotted plates and frames with bolts, to enable the fence to be adjusted in various positions; also in a filing piece sliding under the table sections, and apertured to receive the shaft of a shaper or other head.

Improved Awning.

Charles L. Barnes, New York city.—This invention is an awning composed of concentric or telescopically movable sections, of wood or metal; one or more of which sections is provided with ventilators, which are closed in an automatic manner as the sections are drawn into each other.

Improved Spring Clasp for Stocking Supports.

Edward Halsey, San José, Cal.—This invention relates to a new form of clasp for use in attaching stockings to elastic or other straps, whereby they are supported from a waste band or belt.

Improved Wheel Plow.

Isaac B. Green, Gillespie, Ill.—The plows are secured to the rear parts of two bar or double beams, the bars of which are connected and held at the proper distance apart by blocks of the requisite thickness interposed between them, and to which they are secured. The forward ends of the plow beams may be raised and lowered to adjust the plows to work shallower or deeper in the ground. Means are provided to keep said plow beams always in line, and prevent lateral movement of the plows. By loosening wedges the standards and beam may be moved laterally to adjust the plows further apart or closer together, as may be desired, and by removing pins the plow beams may be detached and exchanged, so as to throw the soil toward or from the plants, as circumstances may require.