kind of battery to use for such? A. A simple way to make a burglar alarm is to construct a spring key with a rounded knob on the top thereof, and set it in the casing of the window, so that the rounded knob projects beyond the casing when the contact points of the key are separated. A cavity is made in the edge of the sash to receive the rounded knob projecting from the back of the key when the window is closed, so as to permit of the circuit remaining open so long as the window is closed. When the window is raised, the engagement of the sash with the rounded knob will push the key forward, bringing its contact point against the fixed contact. The spring key and its fixed contact lead to a battery and a bell, and when the key makes a contact in the manner described, the belt will be rung. If desirable, the wires may also include a part of an annunciator. The key for a door will be arranged with a pin projecting through the door casing, to be engaged by the door when closed, so that it will push the key forward, away from its fixed contact, thus keeping the circuit open while the door is closed. By this arrangement, when the door is open, the pressure on the pin being released, the key will move forward, and make the contact as in the other case. If desirable, two parallel wires may be run to each window and door in a room, and the spring key will be attached to one of these wires, and the fixed contact to the other wire, so that whenever a key is made to complete the circuit, an alarm will be given. The battery commonly used with the burglar alarm is the Leclanche. The Fuller battery is also an excellent battery for this purpose. 2. Would also like to know how to make a simple interrupter for induction coil. A. You can make a simple interrupter for an induction coil by connecting a coarse file with one of your battery wires, drawing the other battery wire along the face of the file. If you desire to make an electro-magnetic interrupter, you may take a small magnet wound with coarse wire, attach its armature to a flat spring, and place a small auxiliary spring on the back of the armature spring. Support in front of the auxiliary spring an adjustable contact point, connect the contact point with one of your battery wires and the armature spring with the other. 3. How is mercury sold, and how much is it worth? A. The price of mercury is 75 cents per pound. It is usually sold in large quantities in wrought iron flasks containing 100 pounds each.

(29) C. W. M. asks: Do you know of any substance that, if placed between a magnet and a piece of steel, will destroy the attraction of the steel to the magnet? A. No substance having the required property has been discovered.

(30) G. L. F. asks: 1. Can hair be permanently removed by electricity? A. We believe it has been done. 2. How is the operation performed? A. By means of a platinum wire made incandescent by the passage of electricity. The wire is thrust down by the side of the root of the hair. 3. Is it painful? A. We believe it is not extremely painful.

(31) L. W. B. writes: 1. I have seen it stated that the rifles used by the sharpshooters in the late civil war weighed as much as a hundred pounds; now, is this so, and where can I learn their construction, etc.? A. They were of various weights, but, we believe, none of them weighed one hundred pounds. There is a good article on rifles in Appleton's Cyclopedia. 2. In filling the lining of a fireproof safe with plaster of Paris, will it make any difference whether it is put in dry, or mixed with water and poured in? A. It should be put in dry. 3. Where can I find out all about archery? A. You can find out much about it in works on the subject, which are sold at the principal book stores.

(32) W. C. C. writes: We have constructed a number of carbon batteries in which we used red flower-pot clay for our porous cups, the batteries being excited by electropoion fluid. For a short time they seem to give considerable current, gradually decreasing in quantity. The fluid turns a dark green color, and gives off sulphureted hydrogen gas; at the same time, purple crystals form inside the porous cups. The batteries have been charged as directed; the carbons placed in the porous cups and filled with electropoion fluid, and the zincs in the outer jar, which is filled with water. A. The green color of the solution indicates that your battery is exhausted, and the generation of hydrogen shows that your zinc is not perfectly amalgamated. The zinc should be amalgamated thoroughly, and the fluid should be changed when exhausted. Possibly your jars are too porous. Try filling a portion of the walls of the jars with paraffine. To accomplish this, you will need to have the jars clean, dry, and hot.

(33) J. D. asks: 1. What will remove from paper the impression in red ink of a rubber stamp? I have tried an ink eraser of two liquids, being, I am told, the first, dilute acetic acid, and the second lime water, but it leaves the impression in pale brown. A. Remove the oily material of the ink with ether or naphtha, then try a bleaching powder. 2. What would be the cost of maintaining an ordinary Edison incandescent lamp by chemical battery? A. We are unable to give the exact figures, but the cost to run a single lamp is much more than that of gas. 3. How many cells, and what kind, would be best, cleanest, and most convenient for a private dwelling? A. This depends of course upon the number of lamps you use, their resistance, and the manner in which they are connected up in the circuit. Probably the bichromate form of Bunsen battery is the best. They work fairly well for one week without renewal.

(34) J. D. C. asks: 1. Does a body passing through air create friction? A. Yes. 2. Is there friction in air? A. Yes.

(35) C. S. B. writes: 1. In the dynamo described in SUPPLEMENT, No. 161, if, instead of the outside of the field magnets being made straight at the lower end, they are made bracket-shape, or provided with outwardly projecting flanges, will the magnetism collect at the flanges instead of where it is needed? A. The magnetism would be liable to be dissipated by the lateral extension of the poles. 2. Which gives the more sound for the same weight of metal—a bell or a gong? A. For the same weight of metal, the gong will give the louder sound.

(36) Miss A. C. asks: 1. What kind of coal produces gaslight? A. Bituminous. 2. How is gas secured? Is it by propelling it into a gasometer, or by what process? A. Gas is made by distilling bituminous coal in a closed retort, conducting the gaseous products through a washing and purifying machine to a gasometer. It is forced through the main and service pipes by the pressure of the gasometer. Coal gas, when very poor in carbon, is sometimes carbureted by the employment of gasoline or naphtha. 3. Does any other matter mix in with the gas while securing it? A. See answer to No. 2. 4. When in general gasometer, how is gas propelled into the houses? Since the gasometer is filled, how can the gas be prevented from receding? A. The gas is prevented from receding by valves or water traps. The pressure created in the retorts is sufficient to carry the gas into the gasometer against the pressure of the gas contained by the gasometer; but in most gas works a machine called a gas exhauster is employed to take the gas from the retorts, and force it into the gasometer. 5. And is there any danger of explosion from overpressure of gas? A. There is no danger of explosion from overpressure of gas, as the pressure is very slight—the greatest pressure being equal to a column of water 1 to 2 inches high. Gas when mixed with air forms an explosive compound, which is sufficiently powerful, when ignited, to destroy the gasometer. 6. Has the gasometer any compartments? A. Generally, gasometers have no compartments. They are sometimes, however, made in two sections arranged telescopically, so as to increase the capacity of the gasometer without making the water reservoir too deep.

(37) W. A. D.—We think the statement of the experiment of causing an iron beam to swing to and fro by hitting it with pith balls is a little fanciful. No doubt the iron beam could be set into vibration by means of the cork pellets, if thrown at regular intervals, and synchronously with the vibrations of the bar; but we do not think that any tremendous results would be secured by bombarding an iron beam with pith pellets.

(38) G. A. H. writes: I have a clinical thermometer which from frequent use has become almost illegible, from the wearing off of the black markings of the scale. Will you please give me a recipe for a permanent preparation by which I can mark it again? A. Probably the marks on your thermometer are engraved, and the black filling has been removed. You can refill the engraving marks by rubbing the scale over with asphaltum varnish, leaving the varnish only in the engraved marks. The surplus on the surface of the scale may be removed by a cloth wet with a little turpentine.

(39) R. L. N. asks what the red substance is that dentists use for plates for artificial teeth, and how it is worked. Will you also state what book will give me some information on dentistry? A. The substance referred to is rubber colored with vermilion. Previous to vulcanizing, it is very plastic, and may be forced into warm moulds. For dental work the moulds are generally made of plaster of Paris. After the mould is filled and secured, it is placed in a vulcanizer, which is simply a small steam boiler, and is allowed to remain in the vulcanizer under a steam pressure of 100 pounds, or a temperature of 320°, for one hour.—You can procure books on Dentistry from any of the dental depots in this city or in Philadelphia.

(40) B. A. L. asks: Can you give me a receipt for a lacquer or varnish for varnishing an old theodolite? Would one of shellac varnish colored with lampblack be suitable? Would it stand wear any length of time? A. You can color the brass parts of your instrument black, by dipping them in a solution consisting of sulphate of copper ¼ ounce, hyposulphite of soda ¼ ounce, dissolved in one pint of water. Clean the articles thoroughly, and heat them in the solution. More hyposulphite of soda renders the articles darker, and the addition of more sulphate of copper renders the color gray. Another method of giving brass articles a dark color is to dip them in a solution of arsenic and muriatic acid. These articles, after being colored, may be protected by a very thin coat of shellac varnish or lacquer. Either of the above stains for brass wears well.

(41) W. T. P. writes: I wish to construct a pair of cylinders to condense oxygen and hydrogen gases for lime light use. What thickness should one 16 inches in diameter and 48 inches long be made of, either steel, iron, or copper, to hold a pressure of 250 pounds per square inch? A. Your cylinders should be made of three-sixteenths steel riveted and brazed. We think you have selected a size larger than is necessary for ordinary use. If you make your cylinders 12 inches in diameter, and 3 feet high, they will contain about 2·4 feet of gas each. Your cylinders, if made of the dimensions given, have a capacity of 5·58 cubic feet each. 2. How many cubic feet of gas would such cylinder hold at above pressure? A. At 250 pounds pressure, each cylinder will contain about 90 cubic feet of gas. 3. Please give a rule to find the pressure for each doubling of the cylinder's capacity. A. When you have created a pressure in your cylinder of 15 pounds, it will contain 5·58 feet of gas; when you have doubled the pressure, it will contain 11·16 feet. When you have increased the pressure to 60 pounds, it will contain 22·32 feet, and so on.

(42) P. S. K. W. asks what to use to make a thin coating on wood so that hot oil will not penetrate it. A. Use an alcoholic solution of gum shellac.

(43) A. R. asks how to obtain instruction book on mechanical drawing. A. Probably in no other work is there so much furnished for the price as in Professor MacCord's papers, published in the SUPPLEMENT. We have these papers, containing 450 special engravings, stitched in paper, for $2.50, or bound in cloth for $3.50.

(44) J. K. M. S. desires a receipt for some liquid which, if applied in small quantities, will kill a tree. A. Use kerosene or turpentine around the roots.

(45) R. V. G. asks: 1. Are there any lead pencils made so that the marks will not rub off if you varnish them over? A. Ordinary pencil marks can be preserved by coating them over with a solution of collodion to which 2 per cent of stearine has been added. 2. Have you any book treating on the subject of acids? A. Fownes' Chemistry, which is an excellent authority, we can send you for $3.50. 3. A recipe for putting metal leaf on wood. A. Coat the wood with a size made as follows: To ½ pound parchment cuttings or cuttings of white leather add 3 quarts water, and boil it in a proper vessel till reduced to nearly half the quantity; then strain through a sieve.

(46) E. A. B. desires the receipt of a good glue for pasting labels on the backs of library books. A. Strong glue, 50 parts, is dissolved with a little turpentine in a sufficiency of water over a gentle fire; to the mixture is added a thick paste made with 100 parts of starch. It is applied cold, and dries rapidly.

(47) L. N. T. asks: What preparation is used to gild the edges of writing paper, and how is it applied? A. A camel's hair pencil is dipped into white of egg mixed with water, and with this the dry edges of the paper are moistened; gold leaf is then taken up on a tip brush, and applied to the moistened edge, to which it instantly adheres. When all three edges have been gilded in this way, and allowed to remain a very few minutes, take a burnisher formed of a very smooth piece of hard stone, and rub the gold very forcibly, which gives a high degree of polish.

(48) K. H. H. desires a receipt for a freezing mixture—one that will freeze or bring water as near the freezing point as possible, and be capable of being re-used several times, so as to render its cost as inexpensive as possible compared to the practical results to be attained therefrom. A. Use:

Nitrate of ammonia.....1 part.
Water .....1 "

The mixture should be made in a thick vessel, well clothed, to prevent the accession of external heat; and the substances to be acted on should be contained in a very thin vessel, so as to expose it more fully to the action of the mixture. See also Freezing Mixtures, in SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 89, 252.

(49) S. R. B., Jr., desires a recipe for polishing horns. A. First scrape with glass to take off any roughness, then grind some pumicestone to powder, and, with a piece of cloth wetted and dipped in the powder, rub them until a smooth surface is obtained. Next polish with rottenstone and linseed oil, and finish with dry flour and a piece of clean linen rag. The more rubbing with the stone and oil, the better the polish. Trent sand is used in the Sheffield factories. It is a very fine and sharp sand, and is prepared for use by calcining and sifting.

(50) H. W. O. writes: 1. I wish to mix graphite and pulverized asbestos with lead. Is there anything that I can add to make them adhere when the lead is heated to a low state of fusion? A. Nothing but a mechanical mixture of these three ingredients can be made. 2. I would like to granulate the lead at low heat without hardening it. Antimony and tin both make it hard, and for this reason cannot be used for the purpose required. A. The addition of bismuth, tin, and cadmium will lower the fusing point of lead.

(51) G. H. desires (1) a recipe to bleach fish scales. A. The application of hydrogen peroxide (see SCIENTIFIC AMERICAN SUPPLEMENT, No. 339) would bleach the scales, provided that fat and oily matter was first removed by washing with alkalies. 2. What is magic compound to clean carpets? A. Carpets are frequently cleaned by the following process: Take a pailful of clean cold spring water, and put into it about 3 gills of ox gall. Take another pail of clean cold water only. Then rub the carpet with some of the ox gall water, using a scrubbing brush, which will raise a lather. When a convenient sized portion is done, wash the lather off clean with a rag or cloth dipped in pure water. When all the lather has disappeared, rub the part with a clean dry cloth. The magic compound probably consists of a concentrated solution of ox gall.

(52) M. C. B. asks (1) what the process is for extracting the oil from the PalmiChristi bean? A. The beans are heated in an iron tank and then pressed. 2. Whether the cake or residue is of any value after the oil is expressed? A. The cake is frequently used as feed and for a fertilizer. 3. Are there any manufactories in the United States? If not, where are they located? A. St. Louis is the center of the castor oil industry in this country. Information as to the cultivation of the bean is given in SCIENTIFIC AMERICAN SUPPLEMENT, No. 186, under title of "The Castor Bean Plant."

(53) J. A. T. asks: What will remove or prevent the collection of coating in hot beer pipes commonly called beerstone? A. The pipes may be cleaned by washing out with a strong hot solution of soda.

(54) R. E. M. asks a receipt for preserving the juice of lemons for six months or longer. A. Add a small quantity of benzoic acid or salicylic acid. Either of these agents will prevent decomposition.

(55) A. I. asks for a paint that will resist the action of a strong solution of sulphuric acid, and where it can be purchased. A. A coating of liquid asphalt, made by melting asphaltum, will resist the action of sulphuric acid. This substance can be procured from dealers in tar and like materials in your city.

(56) W. H. S. writes: I have some valuable papers from which ink stains were taken by means of acids, but by so doing ruined the finish or enamel. How can I reglaze it? A. The sizing of paper consists of a mixture of glue and alum water. For your purpose a little gum arabic dissolved in water and passed over the erased surface is perhaps as good a remedy as you can easily try.

(57) J. A. H. asks for a varnish or coating that may be used to prevent wood from absorbing moisture in refrigerators. A. Use shellac varnish prepared by dissolving white shellac in alcohol. 2. A recipe for a varnish of a light shade, that will bear washing off with water, to be used on muslin or linen, and be rolled and unrolled often without cracking? A. The addition of a small amount of glycerine to the foregoing can be used for the purpose mentioned, but it is not very satisfactory. The waterproof flexible varnish is generally prepared by dissolving 1½ ounces pure India rubber in 1 pint of chloroform, ether, or carbon disulphide.

(58) E. C. M. gives the following description of a simple open circuit battery devised by him: Take an ordinary fruit jar and place in it a number of pieces of broken electric light carbons, hundreds of which can be picked up in the street after the lamps have been trimmed. One of the bottom pieces is securely bound with one end of a gutta percha covered wire, which, going up to the top, makes the connection with binding screw on cover, the cover being made of wood or hard rubber. Next an ordinary Leclanche battery zinc is suspended from the cover of the jar, reaching down to within an inch or two of the carbons. The exciting fluid is a solution of sal ammoniac and water. E. C. M. says he now uses this battery in connection with a burglar alarm which works very satisfactorily. [We presume uncoppered carbons are used in this battery, as sal ammoniac would attack the copper, and the solution would be weakened.]

(59) J. H. L. asks: If a rocket was fired in a vacuum, would it rise or remain stationary? The rocket is supposed to be an ordinary practicable rocket, and the vacuum an infinite theoretical vacuum. A. It would remain stationary.

(60) J. N. B. writes: Some time ago some one asked for a simple method of filling barometer tubes so as to get the bubbles out, without boiling the mercury. For ordinary weather glasses, I have had fair success as follows: Place a little tuft of raw cotton (clean and fine) in the bottom (*i. e.*, top when filled) of the tube, to which is tied a small thread; then fill the tube as full as possible, and pull the tuft of cotton out slowly. All air bubbles in the mercury will condense into the cotton, and a clean solid tube will appear. After the cotton is out, fill up to overflowing, press a small piece of thick leather over the end, and invert into a cup of mercury, etc.

(61) W. G. T. writes: Will you please inform me if at any time the SCIENTIFIC AMERICAN or the SCIENTIFIC AMERICAN SUPPLEMENT has given directions for the construction of an electric motor of about one-half horsepower or over? If so, please inform me when it was issued. A. You will find descriptions of electric motors in SUPPLEMENT, Nos. 323, 212, 267, and 259. The dynamo electric machine described in SUPPLEMENT, No. 160, will answer for a motor, if you wind the armature with No. 16 instead of No. 18 wire, and wind the magnet with No. 14 wire, employing only about four layers.

(62) W. H. B. says: Will you please tell the cause of the following: In one corner of our cellar the concrete floor has been thrown up, just as though there had been an eruption under the floor. The floor is 4 inches thick, and we cannot find out why it has acted so. A. This may be caused by the upward pressure of water in the ground or by the lateral expansion of the concrete. Even if water is not shown, the air under the pavement may be subjected to a great pressure by the increased amount of water below it, the height of the latter being constantly changed by wet or dry states of the weather.

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

B. E. N.—No. 1 is magnetic iron sand, and may be valuable as an iron ore. An analysis, costing $15.00, would be necessary to determine this. 2. The red particles may be fragments of garnets or colored quartz. The sample is sand containing iron.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted,

December 22, 1885,

AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.]

Acid, alpha-naphtholsulphonic, Vollbrecht & Mensching..... 333,040
Acid, manufacture of beta-naphthylamine sulpho, H. Prinz..... 332,829
Acid, nitronaphtholsulphonic, Vollbrecht & Mensching..... 333,036
Air and gas compressor valve, W. H. Worthen..... 333,096
Alloy or compound in producing the same, metallic, H. J. F. Niewerth..... 332,736
Anchor bolt, W. S. Craig..... 332,701
Ankle support, G. C. McEwen.....332,727, 332,728
Annunciator, D. S. Foote..... 333,063
Annunciator and circuit, telephone, J. Houlehan..... 333,014
Axle box, L. Leirer..... 332,809
Axle nut, adjustable, J. H. Steen..... 333,030
Axle, vehicle, I. W. Archibald..... 333,049
Back band, J. W. Gardner..... 332,888
Bark cutter, J. C. Hagerty..... 332,797
Bark cutting machine, J. C. Hagerty..... 332,796
Bark mill, W. A. Woods..... 332,854
Bed bottom, spring, H. Quaid..... 332,750
Bed, folding, Slater & Eaton..... 332,956
Belt tightener, P. H. Binet..... 332,867
Bobbin winder, A. V. Abercrombie..... 332,771
Boiler. See Steam boiler. Vertical tube boiler.
Boiler water tube, Wetmore & Bratt..... 333,043
Boilers, feeding fuel to, S. W. Valentine..... 332,975
Bolt. See Anchor bolt.
Bolt blank machine, J. R. Blakeslee..... 332,869
Bookbinding, manufacture of compound fabric for, S. Barlow..... 332,778

Book, press copying, C. E. Doyle.... 333,061
Box. See Paper box.
Box strap, H. Frank.... 332,795
Bracelet, C. S. Pine.... 333,083
Bracelet, self-closing, H. Liebel.... 332,719
Brake. See Car brake.
Brick machine, hydraulic, McGregory & Koch.... 332,814
Bridge safety gate, draw, G. E. Hawks.... 332,899
Bucket covers, fastening for sap, B. F. Couch.... 332,788
Buggy top, Carroll & Ryan.... 332,878
Buggy top bow protector, J. R. Creviston.... 333,058
Butter cabinet, S. G. Highfill.... 332,903
Button fastener, J. F. Thayer.. ....332,967 to 332,970
Button setting instrument, J. H. Vinton.... 332,977
Candle moulding machine, L. Homan.... 333,013
Cap or cover, sheet metal screw, S. Adlam.... 332,772
Car brake, automatic, R. Randolph.... 332,944
Car coupling, L. Bates.... 333,051
Car coupling, I. H. Bradshaw.... 332,870
Car coupling, F. J. Papineau, Jr.... 333,025
Car coupling, J. E. Swope.... 332,847
Car, double action hay, J. Drader.... 332,704
Car ventilator, W. Y. Ober.... 332,739
Carpet stretcher and tacker, Schmidt & Kunzelman.... 332,949
Carriage, folding baby, C. Seel.... 332,757
Carriage knob, double clinching, M. A. Corliss.... 332,787
Carriage tops, back stay for, H. Higgins.... 332,800
Carrier apparatus, H. Smith....332,959 to 332,961
Cartridge loading machine, W. Hill.... 332,904
Cartridge loading machine, A. W. Wheaton.... 332,767
Cartridge shell crimper, H. T. Hazard.... 332,712
Chain link, D. Munro.... 333,095
Chair. See Folding chair. Operating chair. Reclining chair.
Chair, F. E. Harrington.... 332,711
Chandelier and rotating fan, combined, P. Murray, Jr.... 332,821
Chenille and manufacturing the same, spun, W. E. & A. C. Oehrle.... 332,938
Chimney cap, S. McDonald.... 332,810
Chloridizing gold, silver, and other ores, apparatus for, H. H. Eames.... 332,705
Churn, L. J. Wicks.... 332,982
Clamp. See Moulding clamp.
Clasp. See Suspender strap clasp.
Cleaner. See Flume rack cleaner. Pipe line cleaner.
Clock pendulums, electric synchronizing device for, H. L. Bailey.... 332,987
Clock, programme, W. Akin.... 332,694
Clock regulator, G. L. Goodrich.... 332,891
Clothes pounder, E. T. Roots.... 332,838
Clutch and coupling, friction, W. T. McRae.... 332,931
Coal, imitation, J. Mayer.... 332,726
Cold, production of, A. J. Rossi....332,751, 332,752
Color producing acids, manufacture of, Vollbrecht & Mensching.... 333,034
Coloring matter derived from alphanaphthol and diazotoluol, Vollbrecht & Mensching.... 333,042
Coloring matter derived from alphanaphtholdisulphonic acid, Vollbrecht & Mensching.... 333,035
Coloring matter derived from diazobenzol and alphanaphthol, Vollbrecht & Mensching.... 333,041
Coloring matter from betanaphthylamine sulpho acid, red, H. Prinz.... 332,830
Coloring matter from diazobenzol and alphanaphtholdisulphonic acid, Vollbrecht & Mensching.... 333,039
Compass needle, G. Blanchard.... 332,780
Concentrator, J. N. Randel.... 332,831
Cornice, F. Mankey.... 332,723
Cotton picking device, G. Beekman.... 332,865
Coupling. See Car coupling. Thill coupling.
Crate, G. Wilkin.... 332,853
Crate, folding, W. C. Doubleday.... 333,000
Crushing roll, E. A. Wall.... 332,978
Crutch, L. Ladomus.... 332,806
Cultivator, T. W. McDill.... 332,813
Curtain fixture, W. C. Kelly.... 332,907
Curtain holder. N. Wilson.... 333,045
Curtain, lace, J. F. Forth.... 333,002
Cutter. See Bark cutter.
Dam, automatic, H. Harding.... 332,895
Dental chair head rest, A. R. Merrick.... 333,019
Die stock, J. H. Hines.... 332,801
Direct-acting engine, C. C. Worthington.... 332,857
Door fastening, double, G. W. Wright.... 333,093
Door plate, E. C. Barton.... 332,775
Doubling and spinning silk, machine for, W. Nugent.... 332,823
Draught equalizer, J. H. Ingersoll.... 332,805
Drag, marine, W. H. Hart.... 332,898
Drawing and spinning machines, roll for, C. Coupland.... 332,998
Drill. See Grain drill.
Drying cylinders, construction of, Hawthorn & Liddell.... 332,901
Dust collector, C. H. Morgan....332,020, 332,021
Dyestuff from naphthol, manufacture of, Vollbrecht & Mensching....332,037, 333,038
Dyeing, bleaching, etc., apparatus for, J. O. Obermaier.... 332,740
Dyeing, sizing, and wringing yarn, apparatus for, S. Spencer.... 332,964
Dynamometer or motive power balance, E. A. Bourry.... 332,697
Egg beater, D. B. Rock.... 332,837
Egg preserving apparatus, G. B. Hakins.... 333,069
Electric meter, S. D. Mott.... 333,079
Electric meter, J. S. Raworth.... 332,832
Electric wire conduit, R. R. Taylor.... 332,761
Elevator operating mechanism, N. C. Bassett.... 332,776
Embroidering machine, H. Stockel.... 332,846
Engine. See Direct acting engine. Rotary engine.
Engine bed frames, machine for finishing, W. F. Parish.... 332,745
Engine bed frames, mechanism for finishing, W. F. Parish....332,742 to 332,744
Ensilage and fodder cutter, J. B. Brown *et al*.... 332,698
Escape movement, rotary, W. D. Chapman.... 332,879
Evaporating and condensing apparatus, E. Theisen.... 332,848
Exercising apparatus, cabinet, G. H. Benedict.... 332,989
Extractor. See Nail extractor.
Fan, automatic, P. Murray, Jr.... 332,820
Fare registering machine, J. B. Benton.... 332,866
Faucet, measuring, S. B. Derby.... 332,882
Feed water heater, L. A. Olsen.... 332,824
Feeding salt or compressed feed to cattle, device for, M. S. Thompson.... 332,973
Fence post, S. L. Knepper.... 332,807
File, newspaper, F. M. Xiques.... 332,769
Filter, J. E. Warren.... 332,979
Firearm magazine, R. T. Hare.... 332,896
Firearm sight, W. G. Owen.... 333,024
Fire kindler, P. McMenamin.... 332,816
Flange connection, expansion, G. A. Karwiese.... 332,906
Floor cloth, etc., manufacture of, G. Schwarzwald.... 332,841
Flume rack cleaner, V. H. & G. T. Crisman.... 332,790
Folding chair, Prall & Williams.... 332,749
Furnace. See Ore roasting and smelting furnace.
Galley rest, copy holder, and copy guide, combined, J. Silbernik.... 332,954
Garden rake, Fitzpatrick & Lewis.... 332,885
Gas burner, safety, L. Zagelmeyer.... 332,770
Gas mains, sealing the joints of, W. A. Hoeveler.... 333,011
Gas, manufacturing illuminating, B. Sloper.... 332,957
Gate. See Bridge safety gate.
Gate, M. P. Hiveley.... 332,802
Gates, device for operating, C. H. Paxson.... 332,940
Gauge. See Water gauge.
Generator. See Steam generator.
Glove fastening, Traver & Pierson.... 332,763
Goose call, D. S. Fuller.... 333,094
Governor, steam engine, M. Ulrich.... 332,764
Grain binder, J. F. Appleby....332,985, 332,986
Grain drill, J. O. Marks.... 332,919
Grain drill tooth or hoe, G. W. Kirkpatrick.... 332,717
Grain separator, R. M. Cochran.... 332,786
Grater, vegetable, F. C. & H. Kessler.... 332,908
Grindstone shaft, W. W. Coon.... 332,996
Gun, machine, C. H. Palmer.... 332,741
Hame fastener, J. A. Alexander.... 332,860
Hammock, Schilling & Ehrenfeuchter.... 332,948
Harrow, O. H. Eddy.... 332,706
Harvester, grain binding, T. C. Marshall.... 332,725
Harvester reel support, Miller & Ellinwood.... 332,732
Hat bodies, etc., machinery for felting, J. T. Waring.... 332,851
Hay press, portable, B. J. Curry.... 333,059
Hay rake, horse, W. P. Prall.... 333,084
Heater. See Feed water heater. Plant bed heater.
Heel nailing machine, H. A. Henderson.... 332,798
Heel trimming machine, E. B. Allen.... 332,954
Hinge for gates, roller, I. B. Tucker.... 333,033
Hitching device, L. Lewis.... 332,914
Hitching strap, S. Birdsall.... 332,779
Hoisting machinery, C. W. Hunt.... 332,803
Holder. See Curtain holder. Pen holder. Rein holder.
Hop box shade, A. Engle.... 332,883
Hose coupling, J. B. Gentn.... 333,066
Hot air register, A. C. Tuttle.... 333,089
House raising apparatus, T. F. Maher.... 332,811
Hydrocarbon vapor or gas burner, A. M. Brainard.... 332,871
Incubator thermostat, F. Humphreville.... 333,075
Injector, W. J. Sherriff.... 332,953
Injector, M. D. Strickland.... 333,086
Instrument of stationery, J. W. Turner.... 333,088
Joint. See Pipe joint.
Journal bearing for shafts, P. Murray, Jr.... 332,819
Lamp cut-out, electric arc, Loomis & Cooley.... 332,721
Lamp, electric arc, W. M. Thomas.... 332,971
Lamp suspension device, W. H. Babcock.... 332,695
Lamps, globe for incandescent electric, W. Stanley, Jr.... 333,028
Latch, door, W. G. Cline.... 332,995
Latches, keeper for knob, H. Morton.... 333,022
Lathe attachment, W. Middleditch.... 332,817
Lathe, metal turning, Reed & Back.... 332,833
Lathe tool holder, C. H. Kelley.... 332,806
Lathe, turning, O. Kromer.... 333,016
Leather stock with naphtha to extract oils therefrom, treating, J. J. Sawin.... 332,840
Leveling and supporting implement, L. S. Hoyt.... 332,715
Leveling instrument, Haithcock & Suit.... 333,009
Lifter. See Transom lifter.
Line stretcher, Grosinski & Beecher.... 333,067
Link making machine, J. I. Cheesman.... 332,993
Liquors, apparatus for filling vessels with fermented, C. Mussel.... 333,081
Lithographic stones, machine for making artificial, J. Wezel.... 332,852
Lock, J. C. Taylor.... 332,966
Lock, C. F. Veit.... 332,976
Loom let-off mechanism, Gambrill & Russel.... 332,887
Loom let-off mechanism, J. & J. Nightingale.... 332,822
Loom take-up mechanism, J. C. Brooks *et al*.... 332,782
Looms on breakage of the weft, device for arresting the take-up mechanism of, A. F. Staples. 333,029
Lubricants, machine for testing, R. H. Thurston.. 332,974
Lubricating flanges and treads of car wheels, F. S. Clarkson.... 332,994
Lumber drying platen, N. S. Bouton.... 332,991
Marker, land, P. M. Dice.... 332,792
Mashing apparatus, C. Andersen.... 332,774
Mat or floor covering, R. Martinez.... 332,921
Match making machine, Norris & Hagan.... 332,737
Measure for drygoods, etc., self-indicating, Springe & Raiffeisen.... 332,965
Measure, lumber, E. N. Barber.... 332,864
Measure, tailor's, G. J. & E. Chambers.... 332,783
Medicine, blackleg, remedy for, C. L. Hussey.... 332,804
Medicine, cough remedy, J. F. Richardson.... 332,946
Meter. See Electric meter. Water meter.
Mill. See Bark mill. Sawmill.
Mortise lock, G. Voll.... 332,849
Motion, machine for producing rectilinear reciprocating, J. M. Furlong.... 332,708
Moulding clamp, Phelps & Sterns.... 332,942
Moulding machine, sand, A. Rice.... 332,844
Moulding machine, sand, P. C. Smith.... 332,962
Nail extractor, I. H. Kizer.... 332,909
Nail feeding apparatus, S. Perry.... 332,826
Nail, flat wire, C. W. Dean.... 332,702
Neckwear fastener, G. H. Marvin....332,922, 332,923
Nut lock, J. B. Thompson.... 332,972
Operating chair, Robinson & Holmes.... 332,836
Ore roasting and smelting furnace, B. F. Hambleton.... 332,894
Ore separator, G. H. Blake.... 332,696
Overflow trap for washbasins, bathtubs, etc., S. Lane, Jr.... 332,911
Packages, fastening for tied, M. McCarty...332,924, 332,925
Packing band, joint, D. B. Morrell.... 332,735
Packing, piston rod, G. H. & J. Dickson.... 332,793
Packing, piston rod, C. C. Worthington.... 332,856
Panels, producing open work, F. Mankey.... 332,722
Pants, supplementary waistband for, L. Freidenrich.... 333,064
Paper box, J. A. Scott.... 332,951
Paper boxes, making, I. W. Hallett.... 332,713
Paper boxes, making, M. Young.... 332,983
Paper, cabinet for sanitary toilet, J. T. Hoyt.... 333,073
Paper, composition of matter for waterproofing, C. S. Bird.... 332,868
Paper, package of sanitary or toilet, J. T. Hoyt.... 333,074
Paper, transfer or reproducing, D. Gestetner.... 332,890
Parasol, W. A. Drown.... 333,062
Pen holder, J. M. Clapp.... 332,880
Piano action, F. Imhorst.... 332,716
Piano action, J. Zech.... 333,047
Picture frame mouldings, manufacturing, H. McHugh.... 332,815
Pipe. See Tobacco pipe.
Pipe joint, G. R. Scott.... 332,754
Pipe line cleaner, J. S. Klein.... 332,910
Plant bed heater, Roush & Halterman.... 333,085
Planter and guano distributer, corn, R. E. Simril.. 332,955
Planter, broadcast seed, S. S. Speicher.... 332,963
Planter, corn, E. Burkholder.... 332,874
Planter, seed, J. B. Parker.... 332,746
Plow, I. Anderson.... 332,862
Plow, W. H. Hodgson.... 333,010
Plow, wheel, C. M. French.... 333,065
Plows, scraper attachment for wheel, E. Slosson.. 333,844
Pneumatic dispatch tube system, C. M. Johnson.. 332,905
Pole changer, E. W. Smith.... 332,845
Pool rack, self-tallying, Peterson & Larson.... 332,827
Power. See Tidal power.
Preserving meats, etc., apparatus for, W. Balder.. 332,988
Press. See Hay press.
Press for separating liquid and solid matter, H. W. Lafferty.... 332,718
Pressure regulator, M. G. Wilder.... 332,768
Pressure regulator, automatic, W. S. Payne.... 332,747
Printing machine, cylinder, J. T. Hawkins.... 333,070
Printing machine sheet delivery apparatus, J. T. Hawkins.... 333,071
Propeller, screw, E. H. Hall.... 332,710
Propelling apparatus for steam vessels, screw, E. H. Hall.... 332,709
Protector. See Buggy top bow protector.
Pump, steam vacuum, G. H. Nye.... 332,738
Punch cutting machine, L. B. Benton.... 332,990
Rack. See Pool rack.
Railway, cable, D. J. Miller....332,933, 332,934
Railway, electric, J. F. McLaughlin.... 332,928
Railway, electrical, J. F. McLaughlin, 332,926, 332,927, 332,929
Railway frog, W. J. Morden....332,734, 332,734
Railway frog, F. C. Weir.... 332,980
Railway, gravity switchback, L. A. Thompson.... 332,762
Railway grip, cable, D. J. Miller.... 332,730
Railway sleeper and chair, Howard & Boustield.. 333,015
Railway switching device, cable, D. J. Miller.... 332,932
Railway track, J. Frysinger.... 332,707
Railway track chair, A. A. Strom.... 332,760
Railways, apparatus for automatically indicating or signaling the passage of trains upon, Lebasteur & Rouart.... 332,913
Rake. See Garden rake. Hay rake.
Reclining chair, F. W. Brooks.... 333,052
Refrigerator, J. Falkner.... 332,884
Regulator. See Clock regulator. Pressure regulator.
Rein holder, check, W. D. Taber.... 333,031
Rock drill support, S. Ingersoll.... 333,077
Roof, A. L. Lindsley.... 332,720
Rotary engine, A. W. Van Dorston.... 332,765
Safe, J. R. Grove.... 333,068
Sash cord fastener, W. Altick.... 332,773
Sawmill, circular, R. B. Holt.... 332,714
Saws, device for setting, filing, and jointing circular, A. Winkler.... 333,092
Sawing, tenoning, and boring chair legs, etc., machine for, L. Bush, Jr.... 332,699
Scaffold, A. C. Halterman.... 332,893
Scale and rule holder, C. A. Smith.... 332,958
Scraper and carrier, dirt, H. M. Brown.... 332,872
Seat and desk fastening, F. L. Sands.... 332,859
Separator. See Grain separator. Ore separator.
Sewing machine cutting attachment, buttonhole, F. E. Schmidt.... 332,950
Sewing machine hemmer and lace guide combined, W. R. Clark.... 332,700
Sewing machine tension attachment, R. Rossiter. 332,753
Sewing machine thread holder and cutter, D. F. Spees.... 332,759
Sewing machines, device for attaching presser feet and other attachments to, H. C. Goodrich.... 333,004
Sewing machines for boots and shoes, feed motion for, C. Mansfield.... 332,812
Shell, M. Von Forster.... 333,091
Shirt bodies, securing bosoms to, M. Hermann.... 332,799
Shutter fastener and bower combined, F. C. Robinson.... 332,835
Skate, T. D. Davis.... 332,881
Skate wheel, roller, H. A. & H. A. House, Jr.... 333,072
Skating appliance, R. H. Rice.... 332,945
Snow clearer, W. A. Greenlees.... 333,006
Snow excavator, railway, J. N. Butler.... 332,876
Sockets, tap for screw threading, H. R. Borie.... 332,781
Sodawater draught tube, J. C. Miller.... 332,731
Spark arrester, F. Manual.... 332,724
Spading machine, W. E. Depp.... 332,703
Spindle and bearing, W. T. Carroll.... 332,992
Spindle bolster, W. T. Carroll.... 333,056
Splasher holder, A. W. Parmelee.... 332,825
Stamping machine, M. C. Walling.... 332,850
Steam boiler, J. F. Pease.... 332,748
Steam boiler, G. A. Porter.... 332,828
Steam boilers, air supply apparatus for, J. S. Pessenger.... 332,941
Steam engine, J. Curtis.... 333,060
Steam generator, M. Foreman.... 333,001
Steam trap, J. Corell.... 332,997
Steam trap, H. A. Tobey.... 333,032
Steam, utilization of exhaust, M. Honigmann (r).. 10,675
Steel ingots, soaking pit for, J. Riley.... 333,027
Stereotype matrices, apparatus for making, J. X. Browne.... 332,873
Stereotype plate roughing machine, G. E. Lloyd.... 333,018
Stone dressing machine, H. Donnelly.... 332,999
Stone dressing machine, F. Manning....332,915, 332,916
Stove hood, H. M. Brush.... 332,055
Stove polish, W. T. See.... 332,756
Strap. See Box strap. Hitching strap.
Sugar, machining raw, Newhall & Tucker.... 333,023
Suspender ends, device for attaching, W. E. Clarke.... 332,785
Suspender strap clasp, C. R. Harris.... 332,897
Suspension device, L. T. Lawton.... 333,017
Swing, W. S. Brown.... 333,054
Switch. See Tramway switch.
Table service articles, individual holder or rest for, Nichols & Whitney.... 333,082
Target trap, A. H. & C. C. Hebbard.... 332,902
Telephone, mechanical, M. B. Williamson.... 333,044
Thermometer, Sardy & Coles.... 332,947
Thill coupling, W. A. Scott, Jr.... 332,952
Thill coupling, J. M. Simpson.... 332,843
Thill couplings, anti-rattler for, T. P. Randall.... 332,943
Tidal power, Bussard & Gates.... 332,875
Tobacco curing apparatus, D. G. McLellan.... 332,729
Tobacco pipe, J. Aikman.... 332,853
Toe calk bars, roll for forming, J. W. Foulks.... 333,003
Tongue iron, wagon, O. Vanorman.... 332,766
Torpedo boats, electro-magnetic steering and reversing mechanism for, H. P. Griswold.... 333,008
Torpedo, railway signal, H. F. Clark.... 332,784
Toy spring gun, F. W. Goodyear.... 332,892
Trace connection for hames, adjustable, J. A. Alexander.... 332,859
Trace fastening, adjustable, J. A. Alexander.... 332,861
Track and wheel cleaning and lubricating device, F. G. Tuttle.... 333,030
Tramway switch, H. A. Hunter.... 333,076
Transom lifter, G. J. Dickson.... 332,794
Trap. See Overflow trap. Steam trap. Target trap.
Trimmer. See Wick trimmer.
Truck, car, A. M. Wellington.... 332,981
Tube. See Sodawater draught tube.
Type writer, B. T. Mulligan.... 333,080
Type writing machines, ink ribbon annunciator for, T. I. Daniel.... 332,991
Umbrella support, D. C. Markham.... 332,917
Umbrella top, D. C. Markham.... 332,918
Valve gear, H. F. Shaw.... 332,842
Valve, sliding gate, J. Old.... 332,939
Valve, steam engine, H. C. Anson.... 332,863
Valve, throttle, C. H. Worthen.... 332,855
Vehicle running gear, McPherson & Ramsdail.... 332,930
Vehicle spring, C. H. Cain.... 332,877
Vehicle, two-wheeled, Bex & Heunsch.... 332,777
Ventilator. See Car ventilator.
Vertical tube boiler, Holtzmann & Mayer.... 333,012
Wagon body, Law & Mooney.... 332,912
Wagon brake, H. M. & J. M. Crippen.... 332,789
Wagon, buckboard, Brown & Bradley.... 333,053
Wagon, dumping, J. N. Archambault.... 333,048
Wagon, dumping, F. C. Milliken.... 332,818
Washer and linchpin, combined, J. Lovett.... 333,078
Washing machine, W. Arnold.... 333,050
Watch case, C. K. Colby.... 333,057
Water closet tank, J. W. Somerville.... 332,758
Water gauge, W. Young.... 333,046
Water gauges, glass tube for, A. Guilbert-Martin. 332,920
Water meter, proportional, L. H. Nash....332,935, 332,937
Water meters, operating proportional, L. H. Nash.... 332,936
Wick trimmer, lamp, H. H. Hawley.... 332,900
Windmill gearing, G. H. Pattison.... 333,026
Window bracket shelf, folding and adjustable, E. M. Greer.... 333,007
Window shade attachment, adjustable, J. H. Granger.... 333,005
Wire, barbed, H. B. Scutt.... 332,755
Wire barbing machine, J. Stubbe.... 333,087
Wire feeding machine, J. H. Gerry.... 332,889
Wrench, M. Gale.... 332,886

DESIGNS.

Stove, cannon, H. C. Bascom.... 16,423
Stove, cylinder, Bascom & Wemyss.... 16,424

TRADE MARKS.

Cement for leather, H. G. Williams.... 12,875
Corn, evaporated sugar, W. L. Amos.... 12,871
Lamps, C. S. Upton.... 12,874
Ribbons, J. Ryle.... 12,873
Rum, C. W. Howland.... 12,872

A printed copy of the specification and drawing of any patent in the foregoing list, also of any patent issued since 1866, will be furnished from this office for 25 cents. In ordering please state the number and date of the patent desired, and remit to Munn & Co., 361 Broadway, New York. We also furnish copies of patents granted prior to 1866; but at increased cost, as the specifications, not being printed, must be copied by hand.

Canadian Patents may now be obtained by the inventors for any of the inventions named in the foregoing list, at a cost of $40 each. For full instruction address Munn & Co., 361 Broadway, New York. Other foreign patents may also be obtained.

Important Practical and Scientific Books

LIST No. 3.

Bemrose.—Fret-Cutting and Perforated Carving. With 53 Practical Illustrations, 4to, . . . $3.00
Bemrose.—Manual of Buhl-Work and Marquetry. With Practical Instructions and 90 Designs. 4to, $3.00
Bemrose.—Manual of Wood Carving: With Practical Illustrations, for Learners of the Art, and 128 illustrations. 4to, ... $3.00
Booth.—Marble Workers' Manual. 12mo, . . . $1.50
Buckmaster.—Elements of Mechanical Physics; Illustrated. 12mo, ... $1.50
Bullock.—The American Cottage Builder. A Series of Designs, Plans, and Specifications, from $200 to $20,000, for Homes for the People; together with Warming, Ventilation, Drainage, Painting, and Landscape Gardening. Illustrated by 75 Engravings. 8vo, . $3.50
Bullock.—The Rudiments of Architecture and Building, for the use of Architects, Builders, Etc.: Illustrated by 250 Engravings. 8vo, ... $3.50
Burgh.—Practical Rules for Proportions of Modern Engines and Boilers, for Land and Marine Purposes. 12mo, ... $1.50
Byrne.—Hand-Book for the Artisan, Mechanic, and Engineer: Comprising the Grinding and Sharpening of Cutting Tools, Abrasive Processes, Lapidary Work, Gem and Glass Engraving, Varnishing and Lacquering, Apparatus, Materials, and Processes for Grinding, Polishing, etc. 185 Illustrations. 8vo, . . $5.00

☞ *The above or any of our Books sent by mail, free of postage, at the publication prices to any address in the world.*

☞ *Our large Catalogue, 96 pages, 8vo, and our other Catalogues and Circulars, the whole covering every branch of Science applied to the Arts, sent free and free of postage to any one in any part of the world who will furnish his address.*

HENRY CAREY BAIRD & CO.,
INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS,
810 Walnut Street, Philadelphia, Pa., U. S. A.

SANITARY EXAMINATION OF DRINKing Water.—By Prof. E. R. Angell. The odor of water, and how to detect it. Tests and their applications. Nitrates and Nitrites. Lead and Iron. Test for lead. Tests for organic matter. A valuable paper. Contained in SCIENTIFIC AMERICAN SUPPLEMENT. No. **462.** Price 10 cents. To be had at this office and from all newsdealers.

WORK FOR ALL. $30 a week and expenses paid. Outfit worth $5 and particulars free. P. O. VICKERY, Augusta, Maine.

AMERICAN PATENT of valuable invention, in connection with Refrigerating Machinery, for sale. For particulars apply to W. PHILLIPS, 57½ Old Broad Street, London, England.

Syracuse Malleable Iron Works

ENGINEER'S POCKET BOOK. BY Charles H. Haswell, Civil, Marine, and Mechanical Engineer. Giving Tables, Rules, and Formulas pertaining to Mechanics, Mathematics, and Physics, Architecture, Masonry, Steam Vessels, Mills, Limes, Mortars, Cements, etc. 900 pages, leather, pocket-book form. Price $4. This valuable work will be sent on receipt of price by MUNN & CO., New York.

PROPOSITIONS FOR GAS AND ELECTRIC LIGHTING.

PROPOSITIONS are hereby invited and will be received by the undersigned committee for the purpose of lighting the city of Montgomery, Alabama, with Gas and Electricity. Population 25,000.

W. S. REESE, Mayor,
T. H. CARR, Alderman,
J. W. HALE, "
A. A. WILEY, "
T. J. WILLIAMS, "
Committee.

TRAINING FOR MECHANICAL ENGIneers.—A paper by Prof. G. I. Alden, treating of the ends which engineering schools must aim to secure in order to meet the growing demands of the profession. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. **462.** Price 10 cents. To be had at this office and from all newsdealers.

INJECTORS For all kinds of STEAM BOILERS. RUE MFG. CO., FILBERT ST., Philadelphia, Pa., U. S. A.

A BIG OFFER. To introduce them, we will **Give Away** 1,000 Self-Operating Washing Machines. If you want one send us your name, P. O. and express office at once. **The National Co., 23 Dey St, N. Y.**

REIS TELEPHONE, Transmitter and receiver, $2 each. These electric telephones antedate and do not infringe any telephone patent. G. K. MILLIKEN & CO., 70 Washington Street, Boston, Mass.

PURE NATURAL LUBRICATING OIL. Cold test 40 below zero. $12.50 per barrel of 50 gallons. FRANKLIN OIL WORKS, Franklin, Pa.

TELEPHONES SOLD.

Don't pay exorbitant rental fees to the Bell Telephone Monopoly to use their Telephones on lines less than two miles in length. A few months' rental buys a first-class Telephone that is no infringement, and works splendid on lines for private use on any kind of wire, and works good in stormy weather. It makes homes pleasant; annihilates time; prevents burglaries; saves many steps, and is just what every business man and farmer should have to connect stores, houses, depots, factories, colleges, etc., etc. The only practicable and reliable Telephone that is sold outright and warranted to work.
Chance for agents. No previous experience required. Circulars free. WM. L. NORTON, Buffalo, N. Y.

STATIONARY STEAM ENGINES ESPECIALLY adapted to Electric Lighting Purposes. Treating of the development of Steam Engines; the principles of Construction and Economy; with descriptions of Moderate Speed and High Speed Engines. By Robert H. Thurston A.M., C.E., with many handsomely executed illustrations. 12mo, cloth, $1.50. Address, MUNN & CO., 361 Broadway New York.

TOWNES' MANUAL OF CHEMISTRY.

Embracing WATTS' PHYSICAL and INORGANIC CHEMISTRY.

A new American from the Twelfth English Edition. 1,050 pp., Leather, $3.50. Will be sent, postpaid, by MUNN & CO., on receipt of Price.

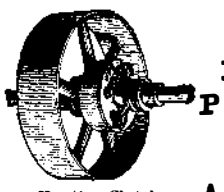
PERFECT
NEWSPAPER FILE

The Koch Patent File, for preserving newspapers, magazines, and pamphlets, has been recently improved and price reduced. Subscribers to the SCIENTIFIC AMERICAN and SCIENTIFIC AMERICAN SUPPLEMENT can be supplied for the low price of $1.50 by mail, or $1.25 at the office of this paper. Heavy board sides; inscription "SCIENTIFIC AMERICAN," in gilt. Necessary for every one who wishes to preserve the paper. Address

MUNN & CO.,
Publishers SCIENTIFIC AMERICAN.

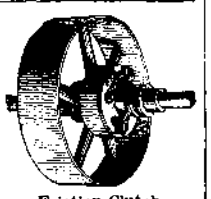
THE LARGEST Photo-Engraving ESTABLISHMENT IN THE WORLD — SIXTEEN YEARS PRACTICAL EXPERIENCE — **MOSS ENGRAVING CO.** — 535 PEARL ST. COR. ELM. NEW YORK. — Moss' New Process Superior to Any Other Method. — ILLUSTRATIONS of Every Description For Books, Magazines, Newspapers, Catalogues, CIRCULARS, &C. IN THE Highest Style of the Art.
SEND GREEN STAMP FOR 24 PAGE CIRCULAR — SEND PHOTOGRAPH, DRAWING OR PRINT FOR ESTIMATE.

SHAFTING, PULLEYS, HANGERS.



Friction Clutch.

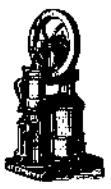
Pat. Steel Shafting.
PATENT FRICTION CLUTCH,
Internal Clamp Couplings.



Friction Clutch.

Send for Illustrated Circular and discount sheet.
A. & F. BROWN, 43 PARK PLACE, NEW YORK.

GLASS PAINTING. BY FRED MILler. A Course of Instruction in the Various Methods of Painting Glass and the Principles of Design. Illustrated, 12mo, cloth. London, 1885. Price $2.00. This valuable book sent by mail prepaid by MUNN & Co., New York, on receipt of price.



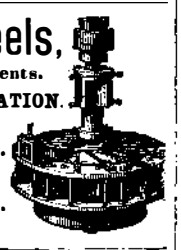
Rider's New and Improved COMPRESSION Hot Air Pumping Engine
New and Improved Designs.
INTERCHANGEABLE
MANUFACTURED BY
DELAMATER IRON WORKS,
Foot of West 13th Street, New York, U. S. A.

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.

FOOT OR POWER **LATHES** FOR WOOD OR METAL.
All sizes. Catalogues free. Lathes on trial.
SEBASTIAN, MAY & CO.,
165 West 2d Street, Cincinnati, O.

AERIAL NAVIGATION.—DESCRIPtion and illustration of a new aeronautic machine, devised by Mr. Fred. W. Brearey, Secretary of the Aeronautical Society of Great Britain. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. **467.** Price 10 cents. To be had at this office and from all newsdealers.

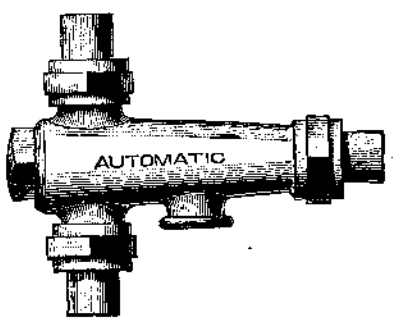
Leffel Water Wheels,
With Important Improvements.
11,000 IN SUCCESSFUL OPERATION.
FINE NEW PAMPHLET FOR 1885
Sent free to those interested.
JAMES LEFFEL & CO.,
Springfield, Ohio.
110 Liberty St., N. Y. City.



ICE. REFRIGERATING

and Ventilating Machines Jarmans Patent. **YORK MFG. CO., York, Pa.**

THE NEW "GRESHAM" PATENT
Automatic Re-Starting Injector.



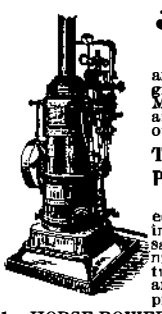
A most remarkable boiler feeder, which has just taken the first premium at the Inventors' Exhibition in England. May be used as a lifter or a non-lifter; restarts immediately without any manipulation whatsoever, after interruption of the feed from any cause. The most effective injector ever placed on the market for stationary or portable boilers. Reliable and cheap.

Sole Manufacturers in the United States and Canada,
Nathan Manufacturing Co.
92 & 94 LIBERTY ST., N. Y.

MINING AND HOISTING
Machinery; also, **Stationary Engines, Boilers, and Ventilating Fans.** Estimates made and contracts taken for constructing all kinds of Mining Machinery.
I. A. FINCH & CO., BOX 335, SCRANTON, PA.

THE DESIGNING OF ORDINARY IRON HIGHWAY BRIDGES.
Illustrated by Numerous Engravings and 7 Folding Plates. Showing Bridges Actually Constructed, and Giving Their Dimensions; also containing 42 Tables. Price, $4.00. By J. A. L. WADDELL, C.E., B.A.Sc., M.A.E. The very complete index will prove of great convenience to both students and engineers, using the work as a book of reference. Address, MUNN & CO., 361 Broadway, New York.

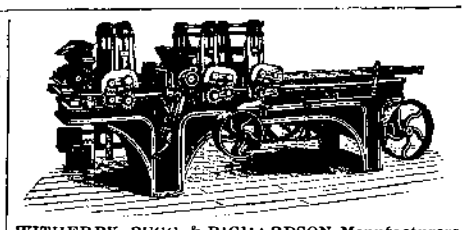
WANTED An active Man or Woman in every county to sell our goods. Salary $75 per Month and Expenses. Canvassing outfit and particulars FREE. STANDARD SILVERWARE CO., Boston, Mass



J. C. TODD,
Manufacturer.
Flax, Hemp, Jute, Rope, Oakum, and Bagging Machinery, Steam Engines, Boilers, etc. Sole Agent for Mayher's New Acme Steam Engine and Force Pump 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	3	HORSE POWER.... $290
1½	HORSE POWER.... 190	4	HORSE POWER.... 350
2	HORSE POWER.... 245	5	HORSE POWER.... 420

Send for descriptive circular. Address
J. C. TODD, Paterson, N. J.
Or 36 Dey St., New York.



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.

VOLNEY W. MASON & CO.,
FRICTION PULLEYS CLUTCHES and ELEVATORS.
PROVIDENCE, R. I.

COPPER WIRE; HOW DRAWN.—AN interesting description of the process of drawing copper wire as practiced at the celebrated works of Mouchel, at Aube, Boisthorel, and Tillieres, France. Illustrated with 5 engravings. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. **471.** Price 10 cents. To be had at this office and from all newsdealers.

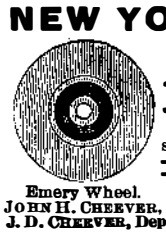
How to Become QUICK AT FIGURES. Price $1.—All dealers.—Circulars free.
—The Woodbury Company, Boston, Mass.—

The New Catalogue of Valuable Papers
contained in SCIENTIFIC AMERICAN SUPPLEMENT, sent *free of charge* to any address.
MUNN & CO., 361 Broadway, N. Y

OTTO GAS ENGINE.

GUARANTEED TO CONSUME 25 to 75 PER CENT. LESS GAS THAN ANY OTHER GAS ENGINE Per BRAKE-HORSEPOWER
SCHLEICHER, SCHUMM & CO., PHILADELPHIA and CHICAGO.

NEW YORK BELTING AND PACKING COMP'Y.
The Oldest and Largest Manufacturers of the Original
SOLID VULCANITE Emery Wheels.



Emery Wheel.

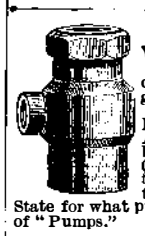
All other kinds Imitations and Inferior. Our name is stamped in full upon all our standard **BELTING, PACKING,** and **HOSE.** Address
NEW YORK BELTING & PACKING CO.
Warehouse: 15 Park Row, opp. Astor House, New York.
Branches: 308 Chestnut St., Phila., 167 Lake St., Chicago, 52 Summer St., Boston.
JOHN H. CHEEVER, Treas.
J. D. CHEEVER, Dep'y Treas.

2½C. PULLEYS 4C.
ORDER FROM OUR "SPECIAL LIST."
ROUGH THE John T. Noye Mfg. Co. **FINISHED**
BUFFALO, N. Y.

PETROLEUM AS FUEL IN LOCOMOtive Engines. A paper by Thomas Urquhart.—How locomotives are arranged for burning petroleum. The spray injector. Storage of petroleum. Experimental engines and tenders. Results of comparative trials. Contained in SCIENTIFIC AMERICAN SUPPLEMENT No. **455.** Price 10 cents. To be had at this office and all newsdealers.

EASY STAR LESSONS. By Richard A. Proctor. With 48 star maps and 45 other illustrations. Extra cloth, $2.50. Will be sent postpaid by MUNN & CO., on receipt of price

HYDROPHOBIA.—A PAPER BY DR. G. Vaillant, giving his experience with simaba cedron as an antidote to hydrophobia. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. **468.** Price 10 cents. To be had at this office and from all newsdealers.



THE BEST STEAM PUMP.
Van Duzen's Patent Steam Pump.
Incomparable in cheapness and efficiency. Needs no care or skill; cannot get out of order; has no moving parts.
A Superior Fire Pump.
Instantaneous and powerful, ever ready. Available, wherever steam pressure can be had, for pumping any kind of liquid (hot, cold, sandy, impure, etc.). We make ten sizes, prices from $7 to $75. Capacities from 100 to 20,000 gallons per hour. State for what purpose wanted and send for Catalogue of "Pumps." **Van Duzen & Tift, Cincinnati, O.**

CONSTRUCTION OF STABLES. — A paper by A. W. Wright, describing a model stable just finished for the North Chicago City Railway. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. **463.** Price 10 cents. To be had at this office and from all newsdealers.

TELEPHONES For Private Lines. Straight or Crooked; Call Bells, Ear-Phone, etc. 4 Styles; Very Best Made; 5 Patents. Prices Low. Send for Illus. Circular. **J. Holcomb & Co.,** Cleveland, O.

ADVERTISERS Can learn the cost of any proposed line of Advertising at GEO. P. ROWELL & CO.'S NEWSPAPER Advertising Bureau, 10 Spruce St., New York. Send 10 cents for a 100-page pamphlet.

$0000000000.
NO CAPITAL REQUIRED.

To enable any person of ordinary intelligence to make from $5 to $20 a day. We will pay ONE DOLLAR cash on every subscription taken for the most popular $2 Weekly Paper in America. Never was such a large commission offered before. In even the smallest towns agents can obtain several new subscribers every day the year round, and thus make more money than they could in any other soliciting business. For descriptive pamphlet write HARDENBROOK & CO., 240 Broadway, N. Y.

Mention this paper.

THE GOLD AND JEWELLED MEDAL
Was awarded by the National Medical Association
TO THE AUTHOR OF THE
SCIENCE OF LIFE.

IT being the best Medical Treatise on Manhood, Exhausted Vitality, Nervous and Physical Debility, Premature Decline in Man, the Errors of Youth, and the untold miseries resulting from indiscretions or excess in early life, which the author has proved may be alleviated and positively cured. It is a standard medical work on the above, and is a treasure to every young and middle-aged man. Warranted as represented or the money refunded in every instance; 300 pages, embossed muslin, full gilt; 125 prescriptions for all diseases. Price only $1 by mail, sealed postpaid. Illustrative sample, 6 cents. Send now. This work is universally recommended by the press, clergy, parents, and teachers, and every one of its more than a million readers. Every man, young or old, should read this book, and every sufferer should consult the author. "There is a balm in Gilead; there is a physician there." Address Dr. W. H. PARKER, 4 Bulfinch St., Boston, Mass.

SALTER, Aug. 23, 1885.
W. H. PARKER, M. D.—Dear Sir: I have just taken the last medicine you sent me. I am now (thanks to your skill) completely restored to good health. Last year, before commencing treatment, I did not think my health could be restored; but after using the first month's remedies, I knew there was hope. I was surprised at the constant beneficial effect it produced. You really are the good Samaritan, and I would most earnestly recommend you to all suffering from nervous disease.
Yours truly, ALBERT R——,
Salter, Washington Co., Wis.
Book E, vol. xiii., case 122.

CURE FOR THE DEAF

PECK'S PATENT IMPROVED CUSHIONED EAR DRUMS **Perfectly Restore the Hearing,** and perform the work of the natural drum. Invisible, comfortable and always in position. All conversation and even whispers heard distinctly. Send for illustrated book with testimonials, **FREE.** Address F. HISCOX, 853 Broadway, N. Y.

FREE TO MEN Who suffer from **Nervous Debility,** *Lost Vigor, Exhausted Vitality, etc.* **A FREE TRIAL PACKAGE** Of the celebrated MARSTON BOLUS, together with *Sealed Treatise* and Testimonials, will be sent on receipt of 2 stamps. MARSTON REMEDY CO., 46 West 14th Street, New York.

PILES. Instant relief. Final cure in 10 days, and never returns. No purge, no salve, no suppository. Sufferers will learn of a simple remedy, Free, by addressing C. J. MASON, 78 Nassau St., N. Y.

DEAFNESS its CAUSES and CURE, by one who was deaf twenty-eight years. Treated by most of the noted specialists of the day with no benefit. *Cured himself* in three months, and since then hundreds of others by same process. A plain, simple, and successful home treatment. Address T. S. PAGE, 128 East 26th St., New York City.

TO WEAK MEN suffering from the effects of youthful errors, early decay, lost manhood, etc. I will send you a valuable treatise upon the above diseases, also directions for self-cure, free of charge. Address Prof. F. C. FOWLER, Moodus, Conn.

MEN ONLY. A Quick, Permanent Cure for Lost Manhood, Debility, Nervousness, Weakness. No quackery. Indisputable Proofs. Book sent sealed, free. ERIE MED. CO., BUFFALO, N. Y.