(10) L. B. asks: What can I use that will render a paper butter or lard tray grease and brine proof, and at the same time be non-poisonous? A. Coat the paper tray with paraffine, or else cover the article with an ordinary varnish.

(11) H. C. inquires of what metal those bright red or blue caps are made which are on many of the French bottles of medicines, etc. It is very thin, and I should like to know how it is colored. A. The caps referred to are composed of tin mixed with more or less lead, then coated with more or less shellac varnish, colored with aniline dyes according to fancy.

(12) J. G. B. asks how to temper thin sheet steel, size 10 by 14 inches, and keep it straight. A. The saw-makers temper steel saws by dipping in oil edgewise to harden, then draw in hot oil bath and hammer to straighten. The hammering involves much experience, and is considered a high art among saw-makers. You can make a fair experiment in hammering by a trial upon a piece of sheet iron that is warped. Hardening sheet steel by pressure between cold plates of iron, but we do not know with what success.

ivory penstock which was broken square across? A. Ivory cement. Dissolve 1 part of isinglass and 2 of white glue in 30 of water; straiu, and evaporate to 6 parts. Add one-thirtieth part of gum mastic, dissolved in one-half a part of alcohol; add 1 part of zinc white. When required for use, warm and shake up. 2. How is aniline prepared from coal tar? A. See Scientific American Supplements, 57 and 68. 3. Would a bullet from a rifle go through an ordinary book, one-half inch thick, bonnd in boards, placed at a distance of 200 yards? A. It depends upon the caliber of the gun, the amount of powder used, and the manner in which the book is supported. Under favorable conditions the bullet would pass through a book one-half inch thick.

(14) R. A. T. asks: 1. What is the difference between "draught pounds" and "avoirdupois The primary coil consists of four layers No. 16 cotton-pounds"? A. "Draught pounds," as we understand it, is covered copper wire, and the secondary of 2% pounds the "pull" in pounds by the horse ou the vehicle or load. Avoirdupois pounds are the ordinary pounds of four Bunsen cellsonly a mere trace of an induced curcommerce. 2. What is the difference between the disi. e., if a team of horses are hitched at a distance of 3 feet at one time and 5 feet at another from the draught, what is the difference of "draughtpounds"? A. None. 3. What is meant by "draught pounds," and what by "foot pounds!" A. The m auing of the term "foot ponuds' is the weight in pounds multiplied by the distance it is lifted in feet in one minute of time. The difference between "draught" and "foot" pounds is that the former takes no account of the movement of the load, and the latter does.

(15) C. E. A. writes: I notice in your issue for January 13, page 25, an article upon the formatiou of sulphuric acid and a method of absorbing the same by means of a zinc plate. Is the acid meutioned formed when gasoline is used? A. If the gas from gasoline is properly prepared and bursed, it should not contain any sulphnric acid.

(16) W. H. D. asks: What is the per cent of potash in pine wood ashes? A. Red pine, 52 per cent potash; white pine, 15 & per cent potash

(17) J. W. F. asks: 1. What is the best book to buy for the use of analyses? A. Fresenius' "Manual of Quantitative Chemical Analyses." 2. Also, a book on fertilizers. how to manufacture. etc.? A. "On Arti ficial Manures, their Chemical Selection, and Scientific Application to Agriculture," by M. G. Ville, trans lated and edited by Wm. Crookes

(18) M. T. S. asks: 1. At about what temperature wou'd pure oxygen attack copper, producing combustion or fusion? Or would it so act at any temperature short of fusion? A. It would begin at low red heat before fusion. 2. Please give best method of obtaining oxygen (absolute purity not essential) cheaply and rapidly. A. Cousult Scientific American Sur-PLEMENT, No. 313, p. 4994. The method is there given in full.

any quick method of transferring the film and image of an albumen photograph on to glass, linen, etc.? A. There is no satisfactory method for transferring the film and image of an albumen photograph on to glass, linen, etc. The best method would be to photograph direct.

(20) B. C. M. asks: 1. How the non-erasible lines are put on slated paper? A. The lines are ruled with ziuc, after which one coat of the silicate coating is put over the slate. 2. Would varnish prevent the fading of an outline taken by the gelatiue transfer process? A. Use bleach shellac and alcohol as a varnish as it will prevent fading.

(21) T. G. H. asks for a receipt for manufacturing the "hcktograph," or gelatine pad, now much used in office and clerical work. It is imperfect and nsatisfactory in its present condition, and can, I think, be improved. A. The following is a composition by

Geraune	100 ե	arus.
Water	375	16
Glycerinc	375	14
Kaolin		
ilso one by W. Wartha:		
Gelatine	100 p	arts.
Dex rine	100	6.
Glycerine	,000	*1
Barium sulphate g	, B.	

(22) F. T. H. asks: 1. If ordinary school crayon is just chalk, or of what is it composed, and in about what proportions? A. Washed pipe clay and washed chalk, equal parts; mix them into a paste with sweet ale made hot, and with a chip or two of isinglass dissolved in it. 2. Are the crayons cut into shape, or are the materials made in sulntion and let settle into moulds? A. The paste is rolled out with a rolling pin, then cut into slips, and then rolled into cylinders by the aid of a little flat piece of wood. then cut to the length of three inches each, and placed in a slow oven or drying stove until hard.

(23) L. R. A. asks: 1 Where can I obtain directions for making a sumple and efficient telephone transmitter, in which carbon is used? A. See SUPPLE-MENTS, 250 and 163. 2. Please give the formula for computing the power of a celestial refracting telescope? Also, for determining the focal distance of a two-lens eyepiece? A. To compute the magnifying power of a telescope, divide the focal length of the object-glass in inches by the focal length of the eyepiece, or its equivalent in inches. The quotient is the magnifying power. To get the focal value of a Huyghens exepiece, multiply together the focal lengths of the two lenses in inches and this product by the distance from face to face of their plane sides, also in inches. Divide this product by the sum of the focal lengths of the two lenses in inches. The quotient will be the focal length of an equivalent ens in iuches. To illustrate: Take two lenses, respectively 3 inches and 1 inch focus, distance apart, 2 inches. Then $\frac{3'' \times 1'' \times 2''}{3'' + 1''} = \frac{6''}{4''} = 1\frac{1}{2}$, or the focus of an equivalent lens. Suppose that your ob-

ject glass is 40 inches focus, then $\frac{40}{11/2} = 26\frac{e}{10}$ magni-(13) J. S. W. asks: 1. How to mend an fying power. A crude way practiced with small teleone eye through the telescope and with the other eye direct, both eyes seeing the object at the same time. A little practice will enable one to approximate to the power. This is often done with terrestrial or erecting eyepieres which are sometimes a little complicated in the arrangement of the lenses. 3. In the secondary battery described on page 406 of vol. xliv., Scientific AMERICAN, could the lead foil that covers the insides of tea chests be advantageously used as plates, or is it too thin? Canton fiannel and blotting paper is soon de stroyed by the sulphuric acid. What other cheap stuffs can be used instead? A. The foil would be too thin. Better cast your plates with holes in them, and fill the holes with the lead oxide. 4. I have an induction coil 8 inches long; wire core, seven-eighths inch in diameter. covered copper wire, and the secondary of 2% pounds No. 32 cotton-covered wire. Even with a battery of rent is perceptible. Please give me a clew to the fault. tances the power is from the draught (in foot lengths) - A. It is probable your insulation is imperfect. You cannot obtain results without the most careful insulation. Try doubling or trebling the quantity of fine wire See Supplement. 160.

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

J. P. G.—The mineral is a slate containing pyrites J. E. H.—The mineral is a carboniferous shale

COMMUNICATIONS RECEIVED. On Fire Escapes. By A. C. A.

On Flight. By F. P. H.

Advertiszments.

Inside Page, each insertion - - - 75 cents a line Back Page, each insertion - - - \$1.00 a line. (About eight words to a line.)

Engravings may head advertiseme ts at the same rate per line, by measureme t. as the letter press. Adver-tisements must be received at publication office as early as Thursday morning to appear in next issue.



TALLMAN & McFADDEN, 607 Market St., Philad's

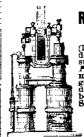
MANUFACTURERS

wanted, offers, accompanied by drawings and prices of Steam Looms for weaving wire c. oth about 3 ft. in width.

(19) A. B. asks: Can you tell me if there is Steam Looms for weaving wire c. oth about 3 ft. in width.

offers to address under S. W. 426, to

G. L. DAUBE & CO., Frankfort on the Main.



RIDER COMPRESSION **PUMPING ENGINE**

(Hot Air), for city or country residences where it is required to raise a supply of water, is the most Perfect Fumping Machine in the market. Its marvelo s Simplicity, absolute Safety, great Economy and Effectiveness, render it far superior to all others. Can be run by any inexperienced person. Send for catal ogue and price list to CAMMEY EK & SAVER, 33 Liberty St. New York, and 20 W. Lake St. Chicago, Ill.

Please mention this Paper.

Please mention this Paper.

PATENT

Self-Oiling Loose Pulley.

Fully tested by several years' use and found reliable.

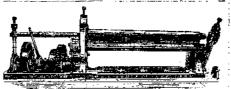
SATISFACTORY RESULTS guaranteed, if directions are followed. Orders filled for Pulleys from 6 in. to 20 in. diameter.

LANE & BODLEY CO.,

CINCINNATI, OHIO,

MANUFACTURERS

Shafting, Steam Engines, Boilers, SAW MILLS, AND GENERAL MACHINERY.



PATENT BENDING ROLLS, For Heavy Punches, Shears, Boiler Shop Rolls, Radial Drills, etc., send to

HILLES & JONES, Wilmington, Del.



NUT TAPPING MACHINE. DURRELL'S PATENT. No. 1 Machine, 900 lb., 7 spindles. " 2 " 1,050 " 7 spindles. " 2 " 3 "

Capacity of 7 Spindles, 8,000 per 10 hours.

Acknowledged to be an indispens able tool Manufactured by HOWARD BROS.

Fredonia, N. Y.



REMINGTON TYPE-WRITER.

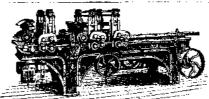
Warranted. Satisfaction guaranteed Type-Writer Supplies. Send for cir-culars. Address E. REMINGTON, SONS, Manufacturers, or WYCKOTI SONS, Manufacturers, or WYCKOTI SPANANS & BENEDICT, Sole Agents 291 and 283 Broadway, New York.

AN EXPERIENCED ENGINEER & DRAUGHTSMAN. competent to manage a large Foundry and Machine Shop, is open for an engagement in either way in some healthy locality. Address "F," Box 773. New York.



CE AND ICE HOUSES—HOW TO MAKE ice ponds; amount of ice required, etc., and full directions for building ice-house, with illustrated plan. Contained in Scientific American Supplement, No. 55. Price 10 cents. To be had at this office and of all newsdealers.





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





The Eclipse Engine Furnishes steam power for all Agricultural purposes, Driving Saw Mills, and for every use where a first-class and economical Engine is required. Eleven first-class premium; awarded, including Centennial, 76. Rofer to No. 7, issue of 77, No. 14, issue of 78, of Science of 77, No. 14, issue of 78, of Science of 77, No. 14, issue of 78, of Science of 77, No. 14, issue of 78, of Science of 7



CLARK'S RUBBER WHEELS. This wheel is unrivaled for durability, simplicity, and cheapness. Adapted for Warehouse and Platform Trucks Scales, Heavy Casters, and all purposes for which wheels are used. Circular and Price List cree. GE(). P. CLARK, Windsor Locks, Ct.

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





An engine that works without Boiler Always ready to be started and to give at once full power.

SAFETY. ECONOMY
CONVENIENCE.
Burns common Gas and Air. No steam, no coal, no ashes, no fires, no danger, no extra insurance.

Almost no attendance.

THE NEW OTTO SILENT GAS ENGINE Useful for all work of small stationary steam engine. Built in sizes of 2, 4, and 7 H. P., by SCHILEICHER, SCHUAIM & CO., N. E. cor. 33d & Walnut Sts., Phila., Pa. A. C. Mauning, 38 Dey St., New York, Agent.



SHEPARD'S CELEBRATED **\$60**

Screw Cutting Foot Lathe. Foot and Power Lathes, Drill Presses, Scrolls, Saw Attachments, Chucks, Mandels, Twist Drills, Dogs, Calipers, etc. Send for catalogue of outfits for amateurs or artisans. Address

H. L. SHEPARD & CO.,
341 & 343 West Front St., Cincinnati, O.

MACHINISTS' TOOLS.

NEW AND IMPROVED PATTERNS. Send for new illustrated catalogue.

Lathes, Planers. Drills, &c.
NEW HAVEN MANUFACTURING CO.,
New Haven, Conn.

DROP FORGINGS OF JRON BEECHER & PECK, NEW HAVEN CONN.



CURTIS PRESSURE REGULATOR, FOR STEAM AND WATER, Is made entirely of Metal. Occupies the same space as a Globe Valve. It has no glands or packing, and is a lock-up valve,

current states of the control of the



JAFAY & CO.

Cincinnati, Ohio, U.S. A.

Exclusive Agents and Importers for the United States, of the

PERIN BAND SAW BLADES,
Warranted superforto all others in quality, fluids, uniformity of temper, and general durality. One Perin Saw outwars three ordinary saws.

POSTAL COIN SCALE

The Postal Coin Scale illustrated on page 71 of this issue is a necessity to every business man. Sent prepaid on receipt of \$5. Agents wanted. Address for terms and make drafts or money orders payable to GEO. F. JUNE & CO., 267 Broadway. New York.







Sample and Circular Free by mail. U. S. MINERAL WOOL CO., 22 Courtlandt St., N. Y.



Over 50 varieties manufactured by E. & B. HOLMES,





SPEAKING TELEPHONES.

THE AMERICAN BELL TELEPHONE COMPANY, W. H. FORBES, W. R. DRIVER, THEO. N. VAIL, President. Treasurer. Gen. Manager.

W. H. FUIBES. W. R. DRIVER, Gen. Manager.

Alexander Grabam Itell's patent of March 7. 1876, owned by this company, covers every form of apparatus including Microphones or Carbon Telephones, in which the voice of the speaker causes electric undulations corresponding to the words spoken, and which articuations produce similar articulate sounds at the receiver. The Commissioner of Patents and the U. S. Circuit Court have decided this to be the true meaning of his claim; the validity of the patent has been sustained in the Circuit on final hearing in a contested case, and many injunctions and final decrees have been obtained on them. This company also owns and controls all the other telephonic Inventions of Bell, Esison, Berliner, Gray, Blake. Phelps, Watson, and others.

[Descriptive catalogues forwar ded on application.] Telephones for 'rivate Line, Club, and Social systems can be procured directly or through the authorized agents of the company.

All telephones obtained except from this company, or its authorized licensees. are infringements, and the makers, sellers, and users will be proceeded against. Information furnished upon application.

Address all communications to the

AMERICAN ISELLI. TELLETHONE COMPANY, 95 Milk Street. Boston, Mass.



MESSRS, MUNN & CO., in connection with the pub-

lication of the SCIENTIFIC AMERICAN, continue to examine Improvements, and to act as Solicitors of Patents for Inventors. In this line of business they have had thirty-five

ears' experience, and now have inequaled facilities for the preparation of Patent Drawings, Specifications, and the prosecution of Applications for Patents in the United States, Canada, and Foreign Countries. Messrs. Munn & Co. also attend to the preparation of Caveats, Copyrights for Books. Labels, Reissues, Assignments, and Reports on Infringements of Patents. All business intrusted to them is done with special care and promptness, on very reasonable terms.

A pamphlet sent free of charge, on application, containing full information about Patents and how to pro cure them; directions concerning Labels, Copyrights, Designs, Patents, Appeals, Reissues, Infringements, Assignments, Rejected Cases, Hints on the Sale of Patents, etc.

We also send. free of charge, a Synopsis of Foreign Patent Laws, showing the cost and method of securing patents in all the principal countries of the world.

MUNN & CO., Solicitors of Patents, 261 Broadway, New York BRANCH OFFICE -Corner of F and 7th Streets, Washington, D. C.