Chief Engineer's Office, U.S. Navy Yard,

VVASHINGTON, November 18, 1874.
Commodore Thos. H. Patterson, U.S. N., Commandant: SIE:-In obedience to your order of October 5th, 1874, to carefully test the EMPIRE PORTABLE FORGE, manufactured at Troy, N. Y., I have the honor to submit the following report:

excellent and convenient forge. It works easy and with but little noise, and the power being applied with a lever, it can be worked without interfering with the manipulation of the fire.

I can recommend it as a very useful tool for work ship board or shop use.

Very respectfully, your obedient servant,

EDWIN FITHIAN, Chief Engineer, U.S.N

Business and Lersonal.

The Charge for Insertion under this head is \$1 a Line.

Dry steam dries green lumber in 2 days, and is the nly Cheap House Furnace. H. G. Bulkley, Cleveland, O. Agricultural Implements, Farm Machinery, Seeds T rtilizers. R. H. Allen & Co., 189 & 191 Water St., N. Y

Magic Lanterns, Stereopticons of all sizes and pices, for Parlor Entertainment and Public Exhibitions. Pays well on small investment. Catalogues free. McAllister, Man'f'g. Optician, 49 Nassau St., N. Y.

Fleetwood Scroll Saw, with Boring Attachment, for all descriptions of light Scroll Sawing. See adv't, page 188. Trump Bro's, Manufacturers, Wilmington, Del.

For Salc-No. 6 McKenzie Blower; cost \$500; used two years, Price \$200. Enterprise M'f'g Co., Phila., Pa.

Heavy Planer and Matcher (second hand) wanted. State lowest cash price, maker, and condition. P. P. Toale, Charleston, S. C.

Housekeepers, House Furnishers in Tin, Tinmen send Postal Card to J. R. Abbe, Providence, R. I.

We have had continuous business relations with and have found them honest and prompt in every in-stance. Persons contemplating a wide-spread venture in advertising would do well to communicate with G, P, R, & Co., 41 Park Row, New York. They have unusual facilities for the transaction of such business,-[Observer Fayetteville, Tenn. |

Thomas's Fluid Tannate of Soda never fails to remove Scale from any Steam boiler; it removes the scale-producing material from a l kinds of water; cannot injure Boiler, as it has no effect on iron; saves 20 times its cost both in Fuel and repairs of Boiler; increases steam ing capacity of Boller; has been tested in hundreds of Boilers; has removed Bushels of Scales in single cases It is in Barrels 500 lb., 1/2 Bbls. 250 lb., 1/4 Bbls. 125 lb. N. Spencer Thomas, Elmira, N. Y.

Tin Manufacturers, who have waste strips, pieces, or round blanks to sell, address—giving sizes—Norton Bros., 44 & 46 River St., Chicago, Ill.

 $3,000 \text{ in_Premiums}$; Stamp for Circular. Thomas Schoticle, Grass Valley, Cal.

For Sale-The entire Patent or State Rights for the best Music Leaf Turner out. Will turnback, forward, Dal Sig, or Da Capo, without using the hands, Address J. T., Birmingham, Conn. (P. O. Box 120.)

See N.F. Burnham's Turbine Water Wheel advertisement, next wcck, on page 189.

Wanted—Traveling Agents, to appoint Sub-Agents, or Canvassers, everywhere. Address E. F. Landis & Co., Lancaster, Pa.

Zero-Refrigerator with Water Cooler. Best in the World. Send for Catalogue. A. M. Lesley, 221 W. 23d street, New York.

For Sale—Engine 2x4½-½ H.P. Will send photo. A. R. C., Dentist, Lincoln, Ill. Very cheap!

The Lester Oil Co., 183 Water St., N.Y., Exclusive Manufacturers of the renowned Synovial Lubricating Oil. The most perfect and economical lubricant in existence,

Steam and Water Gauge and Gauge Cocks Combined, requiring only two holes in the Boiler, used by all boiler makers who have seen it, \$15. T. Holland, 57 Gold

Millstone Dressing Diamond Machines-Simple, effective, economical and durable, giving universal satisaction. J. Dickinson, 61 Nassau St., New York,

Position Wanted in a Machine or other Mechanica Works-preferably Steam Engines-as Foreman or Asalstant, by a practical Machinist and experienced Mcchanical Engineer and Draughtsman. Address Frank II. Pond, M. E., Woonsocket, R. I.

2nd Hand Engines and Boilers for Sale at Low prices. Address Junius Harris, Titusville, Pa.

An old established responsible House wishes, in connection with their different European Offices, to take the exclusive European Agency for first class special Machinery. Only established firms, who can guarantee their ware, need address D. & W., Box 2620, New York.

For small size Screw Cutting Engine Lathes and Drill Lathes, address Star Tool Co., Providence, R. I. W. Campbell's Self-Acting Shade Rollers. The Trade supplied, 87 Center Street, New York.

Send for Illustrated Circular—New principles of propelling vessels—speed increased, and power saved. C.H. Jenner, Brockport, N.Y.

For Sale, or Partner Wanted Boat Propeller, Address G. Heydrich, New Ulm, Minn,

Factory, 309 South Fifth Street, Philadelphia, Pa. ther particulars, call on or address Clark, Smith & Co., Fort Plain, N. Y.

Price only 3.50.—The Tom Thumb Electric Telegraph. A compact working Telegraph Apparatus, for sending messages, making magnets, the electric light, giving alarms, and various other purposes. Can be put in operation by any lad. Includes battery, key, and wires, Neatly packed and sent to all parts of the world on receipt of price. F. C. Beach & Co., 263 Broadway, New York.

Piano and Organ Wire Work of all kinds, Valve and Key Pins, Iron and Brass Finishing Nail The Hendey Machine Co., Wolcottville, Conn.

Send to Atlas Works, Indianapolis, Ind., for a Photograph of their 20 inch Engine Lathe.

Wash Stands, New Styles, Marble Tops, can be used in any situation. Prices very low. Send for a cata logue. Bailey, Farrell & Co., Pittsburgh, Pa.

Grindstones—4,000 tuns. Berea Stone Co., Berea, O. Send for Circular of a very Superior Boiler Feed Pump. D. Frisbie & Co., New Haven, Conn.

The "Scientific American" Office, New York, is . fitted with the Miniature Electric Telegraph. By touching little buttons on the desks of the managers signals are sent to persons in the various departments of the establishment. Cheap and effective. Splendid for shops, offices, dwellings. Works for any distance. Price \$6, with good Battery. F. C. Beach & Co., 263 Broadway, New York, Makers. Send for free Illustrated Catalogue

For best Presses, Dies, and Fruit Can Tools, Bliss & Williams, cor. of Plymouth and Jay, Brooklyn, N. Y. Buy Boult's Paneling, Moulding, and Dove-tailing Machine. Send for circular and sample of work. B. C. Mach'y Co., Battle Creek, Mich., Box 227.

Small Tools and Gear Wheels for Models. List free. Goodnow & Wightman, 23 Cornhill, Boston, Mass. For Sale-One "Cottrell & Babcock" Water Wheel Regulator, in good order-by D. Arthur Brown & Co., Fisherville, N. H.

For Surface Planers, small size, and for Box Corner Grooving Machines, send to A. Davis, Lowell,

Hotehkiss Air Spring Forge Hammer, best in the market. Prices low. D. Frisble & Co., New Haven, Ct. For Solid Wrought-iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for (11) ithograph, &c.

"Book-Keeping Simplified." The whole system in a few pages. Cloth, \$1. Boards, 75 cents. Sent, post-paid. D. B. Waggener & Co., 424 Walnut St., Philadelphia, Pa., Publishers "Waggener's Trial-Balance Book."

Faught's Patent Round Braided Belting-The Best thing out—Manufactured only by C. W. Arny 103 Cherry St., Philadelphia, Pa. Send for Circular

Temples and Oilcans. Draper, Hopedale, Mass. For Solid Emery Wheels and Machinery, send to the Union Stone Co., Boston, Mass., for circular

Mechanical Expert in Patent Cases. T.D. Stetson, 23 Murray St., New York.

All Fruit-can Tools, Ferracute, Bridgeton, N. J. Peck's Patent Drop Press. Still the best in use.

Genuine Concord Axles-Brown, Fisherville, N.H. Spinning Rings of a Superior Quality—Whitinsville Spinning Ring Co., Whitinsville, Mass. Send for

sample and price list. Power Hammers and Bolt Forging Machines—Nine sizes of the former and two of the latter, guaranteed the most economic tools of their kind known. For price

and cuts, address S. C. Forsaith & Co., Manchester, N.H. Hydraulic Presses and Jacks, new and second plastering? A. Nine square feet of surface. Metals. E. Lyon, 470 Grand Street New York.



.349,vol. 26. Galvanizing eastings is described on p. 346, vol. 31.—A. L. and others will find a recipe for a blackboard composition on p. 91, vol. 30.-S. A. H. will find a formula for proportioning cone pulleys on p. 100, vol. 25.—F. P. can keep moths out of clothing by the process given on p. 225, vol. 27. . Inkstains can be removed by the method given on p. 139, vol. 29.-T. & L. will find directions for purifying rancid butter on p. 119, vol. 30.—J. D. V. Jr. will find a recipe for bronzing brass and copper on p. 331, vol. 29.—S. M. can bleach cane juice for sugar by the method given on p. 378, vol. 30.—O. K. will find directions for making rubber stamps on p. 156, vol. 31.—S. A. T. can fasten paper to brass by painting the brass with oil paint, letting it dry, and using common glue. (This answers H. II. R.) Lead is readily run into plaster molds. Λ recipe for a soldering liquid is given on p. 43, vol. 31.-W.S. will find directions for galvanizing iron on p. 12, vol. 346. Rubber can be fastened to wood with glue.-T. R. B. will find a recipe for transparent varnish on p. 11, vol. 31, which will do for making cloth airproof. -S. M. E. will find a formula for the dimensions of a safety valve on p. 107, vol. 31.—A. E. A. can bleach skeletonized leaves by the process given on p. 155, vol. 31.-P. B. will find directions for bending wood by steaming on p. 26, vol. 31.—A. M. J. and others are informed that no preventive for boiler scale can be recommended unless the nature of the mineral deposit is known.-W.M. ought not to try and remove canceling ink from postage stamps, as it may lead to fraud.-J. F. H. will find a recipe for Babbitt metal on p. 364, vol. 29.—E.T. D. will find a description of artificial pearls on p. 250, vol. 39.-J. H. R. should consult a dictionary as to the meaning of words in common use. $-\Lambda$. Λ . will find a rule for calculating gears on p. 187, vol. 29.—L. K. Y. will find full descriptions of solder of all kinds in our last three issues.—P. S. can join his als composing it and not that of the air. The indiwater spouts with waterproof glue; see p. 91, vol. 31.

- (1) S. A. T. asks: How can I cement a japan varnish and white lead.
- (2) W. B. B. asks: Having a good violin, to evaporated to the consistence of a thick paste. it? A. Take coarsely powdered copal and glass. each 4 ozs., alcohol (64 over proof) 1 pint, camphor 300 or 400 revolutions per minute, be large enough Miller's Brick Presses for fire and red brick.

 Miller's Brick Presses for fire and red brick.

 202; heat in a water bath, stirring frequently frequently with the stirring frequently and some stirring frequently with the stirring frequently and some stirring frequently and some stirring frequently with the stirring frequently stirring frequentl To Machinists.—For Sale, Cheap—A partially finished Engine Lathe, 11 feet bed, 28 inch swing. For further the clear portion. This is an excellent varnish for any musical instrument of the violin species.
 - (3) J. J. D. asks: What is meant by slack coal? A. Coal dust. The term is commonly applied to the dust formed in cutting out coal in the mine, which is frequently piled in heaps at the pit's mouth.
 - (4) F. O. asks: What metal is best for making candy molds? I want to find one that cools quickly. A. Tin molds are commonly used. Dust them with powdered sugar to prevent the adherence of the candy.
 - (5) C. F. F. asks: Which is the front side of a mill dam? A.The side which the water runs to.
 - (6) D. ●. K. asks: How can I prepare coach varnish? A. Fuse 8 lbs. fine African gum copal. add 2 gallons clarified oil, boil for 5 hours until quite stringy. Mix with 31/2 gallons turpentine, and

- (7) P. H. K. asks: Can you give me a rule to measure corn in a crib? Λ. Multiply the depth the crib in inches, and divide by 215042. The quotient will be the number of bushels.
- (8) M. A. B. says: The best thing for taking dirt and grease off the hands without injury is bicarbonate of soda, used in place of soap.
- (9) I. R. M. asks: How can I calculate the speed of a train of pulleys? A. Proceed as in vulgar fractions, placing the number of the revolutions of the prime mover as the numerator of a compound fraction, and the diameter of each of thedriving wheels in inches also as numerators, and the diameters of each of the pulleys in inches as denominators, and proceed by cancelation.
- (10) A.E. S. asks: How can I paste newspaper clippings into a scrap book without the icestone, and chalk. leaves curling up and warping? A. Use a gum arabic mucilage with some refined sugar dissolved
- (11) A. B. L. asks: How can I make a washing crystal? A. The soda ash and soda crystals of commerce are used for this purpose, and you could not make them on a small scale to advantage.
- (12) C. asks: Is there an animal generalin the Northern Pacific.
- (13) S. says: I read an article on the beneficial effects of glycerin in boilers. I tried the experiment, and the result was the reverse of bene-We got rid of most of the earthy matter by using a surface blower, but the glycerin had the effect of depositing the earthy matter in a hard crust, and the surface blower showed clear water in the boiler. A. The use of glycerin, as a solvent for the salts in impure matters, has been recommended for cleaning woolen fabrics, but your experiment of its use in steam boilers is the first of which we have heard. It is possible that, by blowing off phuricacid of specific gravity 184=66° Baumé at 66° from the bottom, you might get rid of the deposit. Fah. 2. What volume of hydrogen gas will the from any of our readers who can communicate any information.
- (14) J. K. asks: What constitutes a vard of
- polishing holly wood? A. Use a white shellac var-
- (16) J. H. asks: Is the Pacific Ocean higher than the Λ tlantic at the point whereit is proposed to connect them by a canal? Λ . No.
- (17) W. R. B. says: In Dick's "Practical Astronomer" is a description of Rogers' achromatic telescope on a new plan. It consists of placing a small compound lens of flint and crown glass in a small part of the cone of rays of a large crown glass objective, and thus correcting the rays, enabling a person to use a large crown glass objective and making it achromatic by the small compound one. 1. I have a good crown glass double coavex lens, of 5 inches diameter and about 100 inchesfocus. What should be the size, shape, and focus of each of the lenses forming the compound one, to produce the proper correction for the above mentioned lens? A. Plano concave of double dense flint, of 2¼ inches diameter, 3½ inches radius, and plano-convex of plate glass same dimen-2. At what distance should the given compound lens be placed from the object glass? Λ . About 60 inehcs. 3. With the compound lens adjusted, what would be the entire focus of the instrument? A. Twelve feet six inches. 4. Are you acquainted with any telescope on the above plan, and is it satisfactory? A. An inch dialyte, by Plossl, of Vienna, divided γ Coronce, distance ●6"
- (18) S. . S. asks: If the daily motion of the earth were to cease, would all the loose bodies on the surface fall into space? A. No.
- (19) J. C. C. asks: Where is the best place to hang a thermometer to ascertain the heat of the atmosphere? A. If it is desired to know the temperature of the surrounding atmosphere, the instrument should be placed in some shady spot, protected alike from the direct rays of the sun and cooling drafts of air. If exposed to the direct rao of the vat, with steam at 60 or 70 lbs. per inch? Λ . diation of the sun, the instrument itself will become overheated (the materials of which it is composed being better absorbers than the surrounding air), and the consequence will be that the thermometer will indicate the temperature of the materi- vat for every gallon of water evaporated in the cations of cheap thermometers are never absolutely correct.
- (20) P. E. R. asks: How can I cement glass porcelain mortar? A. Use a mixture of black together, to withstand the action of electro-plating would be best to show how much water there is in solutions? Λ . Try a solution of shellac in alcohol,
 - 34x11/2 inches cylinder, 20 or 30 lbs. pressure, and for the purpose? A. Yes.
 - (22) H. S. P. asks: 1. What would be the horse power of an engine, with a cylinder of 5 inches bore by 6 inches stroke, running at 300 strokes per minute, with 70 lbs. of steam? A. It it do to run a circular saw 15 inches in diameter shell and thickness of iron are given. through two inch oak plank? A. Yes. 3. How large 4. Will an upright boiler last as long as a horizontal one? A. Upright boilers, when well made, are quite serviceable.
 - (23) P. B. asks: 1. What is the average weight of freight locomotives? A. There is a very great variety, an average example being somewhat as follows: Weight, 60,000 lbs. 2. What is the diameter of the drive wheels? A. Five feet. 3. What is the length of the stroke? A. Two feet. 4. What built of brick, 50 feet square and 20 feet high. The is the diameter of the cylinder? A.Sixteen inches. reverberation is so great as to make it very disa-5. What is the weight of an average freight car? A. Eight tuns.

- (24) W. P. asks: 1. What size of engine vould it take to run a boat 15 feet long at the rate of the corn in inches by the length and width of of 8 miles per hour? A. Make the cylinder $2\frac{1}{2}$ x 4. 2. I have a boiler 36 inches high x 15 inches diameter, carrying from 40 lbs. to 50 lbs. pressure per square inch. Would it be large enough? $\Lambda.$ The boiler is too small for the speed.
 - (25) H. J. asks: 1. Will an engine having a cylinder 3x6 inches, steam pressure of 60 lbs., running at 300 revolutions per minute, with a cut-off at 34 stroke, do to run a circular saw 6 inches in diameter with? The fly wheel of the engine is 24 inches, and the mandrel pulley 6 inches, in diameter. A. The engine is quite large enough. 2. My boiler is 13 inches in diameter by 5 feet in length, a plain cylinder in form. Is it big enough? A. No. What will take the stains of varnish or paint off

marble? A. Try a paste composed of soda, pum-

Where is the best place to put exhaust steam in smoke stack, at top or bottom? Λ . The top.

- (26) S. E. P. asks: How can I remove rust from joiner's tools? Λ . Use emery and oil, with a piece of wood. This also answers S. Λ . T.
- (27) W. W. says: I have a small upright engine, cylinder 4 inches diameter by 6 inches stroke. Would it do to run an ordinary row boat? ly known as the sea otter? A. Yes. It is found | How fastwould she go, and what would be the best kind of propeller wheel to use? What kind of boiler would be best? Would it be necessary to have a counterbalance on the crank? A. Your engine is large enough for a boat 25 feet long, with a propeller 30 inches in diameter and a boiler from 30 to 36 inches in diameter. Some slight counterbalance may be put on, but it is not a matter of any great importance.
- (28) G. asks: What amount of sulphuric acid will it require to entirely dissolve 1 lb. zine? A. For its complete conversion into sulphate of zine, 1 lb. of pure zine requires 11/2 lbs. of su!-We shall be glad to hear further on this matter mixture give off? A. One pound of pure zinc, by from any of our readers who can communicate its reaction with hydrated sulphuric acid, will liberate about 40 gallons of hydrogen.
- (29) C. S. R. asks: What is the cause of the bursting of water backs? Two such accidents oc-(15) J. B. S. asks: What is the best way of curred lately. A. There was probably ice in the circulating pipes, so that the steam which was formed could not escape. Under such circumstances, fire should never be permitted in a range.
 - (30) K. K. asks: What would be the difference between the pressure necessary to explode a steam boiler from the inside, and that necessary to crush or flatten it from the outside? A. In the case of a wrought iron boiler, perfectly cylindrical, the internal pressure that would rupture it is thickness in inchesxtensile strength in lbs. per square inch+the diameter in inches. The external crushing force is: 111,000×(thickness in inches)2diameter in inches×length in fect.
 - (31) B. R. asks: Can ice be torn off a dam by powder? The ice is 18 inches thick and the water 12 or 13 feet deep. A. We advise you not to attempt this kind of blasting, unless you have had some previous experience.
 - (32) J. H. asks: 1. How are red mortar and black mortar made, for laying face bricks in? Λ . Mortar is made red by mixing therewith a certain proportion of Spanish brown, and black by lamp black, but neither is sufficiently permanent to be satisfactory. 2. Is fresh water better than salt for making mortar in winter? A. Purc water is better than salt water in any weather.
 - (33) H. says: The atmosphere in a certain building is raised from 0° to 75° by water at 212°, passing through coils of iron pipe. Suppose this operation should be reversed, and an attempt made to cool the atmosphere at 90° by cold water at a temperature of 35°, provided the circulation were kept up, to what degree of temperature could the atmosphere be reduced? A. This question cannot be answered except by experiment.
 - (34) J. S. asks: How much water can be oiled away in 10 hours in a vat, 5 by 12 feet, with It will depend upon the arrangement whether you boil away 25 or 75 per cent as much water as you have steam. With a good apparatus, you may ealculate to evaporate 3 of a gallon of water in the
- (35) S. G. says: Suppose a water tank, 8x10 x5 feet deep, is placed on top of a house, 1,000 feet from an engine house, what kind of an indicator the tank? Λ . Put up a stand pipe, say one inch in diameter, in the engine house, and connect it at improve it I removed all polish and paint with al-1 (21) G. A. N. says: I want a small engine, bottom with the pipe running from the pump to cohol, which spoilt the tone. How can I restore to run a sewing machine or small lathe. Would a the tank. Enlarge the upper part, which must be connect this float by a cord over a pulley, with an indicator in the engine room below. As the water in this pipe will stand higher, when pumping, than in the tank, it will be necessary to stop the pump to find the true hight.
 - (36) F. S. says: 1. Please give me a rule for would develope from 4 or 5 horsepower. $\,$ 2. Would $\,$ finding the strength of $\,$ a boiler when diameter of single riveted iron boiler, the safe working strain, a boiler would this engine require? A. Make a in pounds per square inch, may be found by multiboiler with 60 or 70 square feet of heating surface. plying the thickness in inches by 7,600, and dividing the product by the diameter of the boiler in inches. 2. Would it make any difference in the working of an engine which end of the boiler I took the steam from, or at which end I let in the feed water? A. Ordinarily, no.

Are large mill saws tempered after they are made? A. Yes.

(37) S. D. K. says: We have a large hall, greeable to speak in, causing confusion of sound. What is the best remedy? Will wires do, and how