

which bears against the frog of the hoof. At its lower face the plate has a bar or shoe constructed and arranged with relation to the plate in such a manner as to protect the hoof more effectively than the devices heretofore provided.

SCREEN FOR STAMP-MILLS.—MARTIN R. DRISCOLL, Frisco, Utah. The mill has an apertured frame above which a roll of screen material is mounted, having a portion extending over the aperture. A clamping-frame extends about the lower and side edges of the aperture and covers the edge of the screen material. The frame has vertically-extending bolt-recesses in its side-bars, clamping-bolts within the recesses and an auxiliary clamping-bar engaging the outer face of the lower side of the clamping-frame. By loosening the clamping frames and bars the screen-cloth can be pulled down to bring an unused portion into use without stopping the battery.

SEWING-MACHINE SHUTTLE.—PERCY H. HEWITT, EDWIN A. COCKLE, and CHARLES MATTHEWS, London, England. An improved construction of shuttle is provided by these inventors, whereby the disadvantages incidental to the use of a special spool of small capacity are avoided. The shuttle has its case divided longitudinally into two parts, which parts are provided at their heels with interlocking projections and recesses engageable by a relative longitudinal movement of the parts and permitting a slight hinging action. One part has a transverse pin at its point and the other a longitudinal slot receiving the pin. On the point end of one part is a spring, engaging a catch on the other and straining the parts longitudinally to hold the interlocking parts in engagement.

WATER-WHEEL.—PATRICK HENRETTY, Belgrade, Minn. The water-wheel comprises pulleys provided at intervals with peripheral sockets. The bucket-chain used consists of a series of buckets equally flared on both sides of a central line and provided at their juncture with eyes. Through the overlapping eyes of adjoining buckets a shaft is passed, provided alongside of the buckets with rollers operating in the sockets of the pulleys. Links connect adjacent shafts outside the rollers.

SHANK FOR CORNETS.—WILLIAM H. HORN, San Francisco, Cal., and CHARLES L. WAIN, Kamloops, Canada. The shank is arranged to permit the performer to set his cornet to different keys without requiring separate shanks. The shank is made in two sections sliding one within the other, the outer section having a head with internal threads and the inner section having two external threads capable each of engaging with the threads of the head to hold the inner section in either one of two positions.

CHIMNEY TOP OR VENTILATOR.—JOSEPH A. HODEL, Baltimore, Md. The novel features of this invention are found in the effective method of securing the base-plate to the chimney by means of anchor-bars, in supporting the top carrying the cow by means of strong slender standards so that no obstruction is offered to the free outlet of smoke from the flue pipe, in securing the vane directly to the bearing-piece, while the guard-plate is held thereto by means of arms, and in the novel method of counterbalancing the guard-plate and vane. The merits of the invention lie in the uninterrupted passage provided for the smoke, in the prevention of downdraft, and in the counterbalancing of the moving parts.

Designs.

HAMMER-HEAD.—DANIEL S. WILLIAMS, Salida, and FREDERICK R. WATERS, Ouray, Col. The leading feature of the design is the form of the flared groove or socket in the side of the polygonal hammer-head.

ORNAMENTED STONE FOR JEWELRY.—JOSEPH L. HERZOG, Manhattan, New York city. The design consists of an elk's head produced upon a background of stone.

SHOE-LACE FASTENER.—GEORGE H. RICHARDS, Memphis, Tenn. To prevent the tearing of the shoe-lace and yet to hold the lace securely in place, the inventor forms the head of the fastener on its under side with a spherical surface.

CREAM-SEPARATOR.—CHARLES S. HANNA, West Hebron, N. Y. The design consists of a cylindrical body having a base and an inverted cone-shaped bottom terminating at its apex in a gage with a faucet.

NOTE.—Copies of any of these patents will be furnished by Munn & Co. for ten cents each. Please state the name of the patentee, title of the invention, and date of this paper.

NEW BOOKS, ETC.

THE MANUFACTURE OF SAUSAGES. By James C. Duff, S.B. New York: National Provisioner Publishing Company, 1899. Pp. 131. 16mo. Price \$2.

This is the first and only book on sausage making printed in English and there has been a considerable demand for a good book on this subject. The book will pay its cost many times over to even the smallest retail butcher, while to the sausage maker it will prove invaluable. Not only is information regarding meats, spices, casings, stuffings, etc., given in great detail but there are almost endless receipts for all kinds of standard and fancy sausages, some of the names of which recall far-away Strasburg and Nuremberg. It is an admirable book and the literature relating to provisions is so limited that we welcome every addition made to it.

DESCRIPTIVE MENTALITY FROM THE HEAD, FACE AND HAND. By Holmes Merton. Philadelphia: David McKay, 1899. Pp. 220. 8vo. 600 illustrations. Price \$1.50.

It is probable that we all use physiognomy more or less to judge of character, and yet it is only reasonable to believe that those who are constantly engaged in studying this subject may carry it out to a remarkable degree. We do not believe that character can be told to any extent by the lines of the hand, but there are many people who think that it can, and to them the latter half of the book will undoubtedly appeal.

Business and Personal.

The charge for insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in the following week's issue.

Marine Iron Works. Chicago. Catalogue free. "U. S." Metal Polish. Indianapolis. Samples free. Gasoline Brazing Forge, Turner Brass Works, Chicago.

Yankee Notions. Waterbury Button Co., Waterbury, Ct. Handle & Spoke Mch. Ober Lathe Co., Chagrin Falls, O. "Criterion" Acetylene Generators, Magic Lanterns & accessories. J. B. Colt & Co., Dept. N, 3-7 W. 29th St., N. Y.

Ferracute Machine Co., Bridgeport, N. J., U. S. A. Full line of Presses, Dies, and other Sheet Metal Machinery.

Inventions developed and perfected. Designing and machine work. Garvin Machine Co., 141 Varick St., N. Y. The celebrated "Hornsby-Akroyd" Patent Safety Oil Engine is built by the De La Vergne Refrigerating Machine Company. Foot of East 138th Street, New York.

The best book for electricians and beginners in electricity is "Experimental Science," by Geo. M. Hopkins. By mail, \$4. Munn & Co. publishers, 361 Broadway, N. Y.

The Milling Cutter Department of The L. S. Starrett Co. will be continued under the firm name of Gay & Ward, Athol, Mass. Owing to the increased business of the tool department, Mr. Starrett has withdrawn his interest in the milling cutter department, in order to devote his attention exclusively to the manufacture of fine tools. Messrs. Gay & Ward still continue to manufacture milling cutters under the immediate supervision of Mr. Gay, with increased facilities for producing an unsurpassed line of cutters.

Send for new and complete catalogue of Scientific and other Books for sale by Munn & Co., 361 Broadway, New York. Free on application.

Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters or no attention will be paid thereto. This is for our information and not for publication. References to former articles or answers should give date of paper and page or number of question. Inquiries not answered in reasonable time should be repeated: correspondents will bear in mind that some answers require not a little research, and though we endeavor to reply to all either by letter or in this department, each must take his turn. Buyers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same. Special Written Information on matters of personal rather than general interest cannot be expected without remuneration. Scientific American Supplements referred to may be had at the office. Price 10 cents each. Books referred to promptly supplied on receipt of price. Minerals sent for examination should be distinctly marked or labeled.

(7703) W. G. B. says: Have you published a formula for making an ink that would do to write on photographic negatives (for numbering them, etc.) with an ordinary pen? If so, kindly advise me the number of the copy in which the above formula can be found. A. To print the name on the photograph, several methods may be adopted. The simplest is to write the title of the subject on a slip of paper with aniline copying ink, or with ordinary copying ink mixed with gamboge or vermilion. Then slightly dampen the surface of the negative near the bottom right or left hand corner in as unobtrusive and unimportant a portion of the picture as possible. Press down the paper with the writing upon it. Leave for a few minutes and then remove the paper, when the writing will be found to have adhered to the negative. When printed, the name will print out white. Another way is to write backward on the negative, while another and better plan is to write the name in Indian ink on the surface of the paper before it is printed on. The ink will wash off in the after operations and leave the name in white where the surface of the paper has been protected by the ink.

(7704) J. W. M. writes: There has been quite a discussion here caused by your article on the 16-inch gun. The question is, "What is the fall of the curve of the water when looking one mile out to sea?" Or rather the ratio. For instance, the first mile view will have a fall of 8 inches. What will the second mile show? A. Allow for refraction of the atmosphere and the earth's curvature when looking out to sea:

Table with 2 columns: Distance (miles) and Fall (feet). For 1 mile, 0.57 feet; 2 miles, 2.29 feet; 3 miles, 5.14 feet; 4 miles, 11.60 feet; 5 miles, 14.3 feet; 10 miles, 57.2 feet; 20 miles, 357.0 feet; 50 miles, 1429.0 feet; 100 miles, 5717.0 feet.

(7705) D. McC. writes: Replying to J. W. B., No. 7689, of Notes and Queries, in SCIENTIFIC AMERICAN of July 22, 1899, would say that the "Magical" or "Mineral" sponge he inquires about is made of 25 pounds common whiting, 4 ounces powdered soap bark and 4 ounces powdered alum, thoroughly mixed and inclosed in a small cotton flannel bag (size to fit the hand), with the "fuzzy" side out and tightly sewed up. To use, thoroughly soak in water and rub article to be polished afterward rubbing dry with another cloth. After using the sponge (it becomes dry and hard, but can be again used until worn out by pounding the cake inside the cloth to a powder.

(7706) J. J. H. asks: Will you please answer through your paper at what degree does aluminum melt and what metals it will melt with, and oblige a forty-six year reader of your paper. A. Aluminum melts at 625 degrees C. or 1,157 degrees Fah. It can be alloyed with copper, nickel, tungsten, manganese, chromium, zinc, tin, and titanium.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Issued for the Week Ending

JULY 25, 1899.

AND EACH BEARING THAT DATE.

(See note at end of list about copies of these patents.)

- Accumulator plate, H. F. Hobel... 629,363
Aerial machine operating device, J. H. Lowering... 629,361
Addressing machine, H. R. Grassmann... 629,443
Aeration of liquids in bottles, means for effecting, K. S. Murray... 629,752
Air brake, E. Bartholomew... 629,708
Amalgam, A. Laughlin... 629,518
Arch center, J. S. White... 629,656
Back peeling brake, F. H. Lippincott... 629,514
Bar. See Typewriter's rack bar.
Barrel washer, J. Faust... 629,743
Basin, wash, J. Totham... 629,628
Batter machine, J. P. Roberson... 629,607
Battery. See Secondary battery. Storage battery.
Beard adjuster, stop, U. G. McQueen... 629,699
Bearing, W. B. Sargeant... 629,395
Bearing ball, L. Horn... 629,564
Beating for carpet sweeper, Ball, F. C. Mason... 629,518
Beater and sifter, J. C. Roberts... 629,688
Beetle ball, W. H. Perkins... 629,598
Bench. See Work bench.
Bending structural shapes, machine for, S. E. Diescher... 629,498
Bicycle, W. J. O'Brien... 629,376
Bicycle driving gear, C. H. Spence... 629,622
Bicycle driving gear, C. Westall... 629,655
Bicycle frame, T. D. McCall... 629,555
Bicycle or like vehicle frame, L. B. Smyser... 629,401
Bicycle pedals, etc., foot grip for, A. G. Tomkies... 629,627
Bicycle seat, H. T. Miller... 629,497
Bicycle steering device, tandem, F. L. Bryant... 629,335
Blank feeding device, C. H. Fogg... 629,441
Blind, rolling, R. Richter... 629,524
Boat detaching apparatus, hook for, C. Mackeprang et al... 629,383
Boiler, W. J. O'Brien... 629,376
Boiler cleaner, W. H. Holcomb... 629,583
Boiler furnace, A. P. Ritzos... 629,606
Boiler furnace, down draft, F. Girtanner... 629,350
Boiler tubes, means for fastening, T. Huber... 629,490
Boiler tubes, means for fastening, T. Huber... 629,490
Bottle, anti-dumping, J. Bertram... 629,537
Bottle, anti-dumping, E. De Anguera... 629,537
Bottle stopper, J. W. Smith... 629,619
Box. See Garbage box.
Box fastener and seal, W. C. Rarig... 629,523
Box or case, F. McIntyre... 629,586
Boxes, apparatus for shaping lids of sheet metal, P. Carbon... 629,546
Brake, H. J. Warmington... 629,483
Branding cattle, liquid for, H. W. Scott... 629,526
Bread board and holder, H. J. Abernathy... 629,416
Brooch safety device, E. L. Logee... 629,580
Brush, electrical chair, A. J. Cook... 629,340
Brush holder, J. M. N. B... 629,418
Buckle, belt, S. Bodwell... 629,486
Burner. See Gas burner. Vapor burner.
Burner, H. M. Hamrick... 629,355
Cabinet or paper case, J. T. Hoyt... 629,566
Cabinet, paper, J. T. Hoyt... 629,566
Camera, multiple attachment for photographic, T. J. Burfield... 629,542
Can. See Liquid holding can.
Can capping machine, Letson & Burpee... 629,574
Can end forming die, J. M. K. Letson... 629,575
Can for petroleum, etc., J. R. Boulton... 629,332
Cane and umbrella, combined, J. H. Nagel... 629,442
Car coupling, J. W. Dury... 629,344
Car coupling, P. C. Ewart... 629,497
Car coupling, T. L. McKeen... 629,587
Car coupling, I. S. Lemire... 629,614
Car coupling, T. H. Smith... 629,422
Carriage, combined, F. H. B... 629,346
Car dust conveyer, C. B. Ebridge... 629,498
Car, street, W. J. Fernandez... 629,398
Cars or vehicles, controller for electric motor, S. H. Short... 629,398
Carbureter, F. L. Martenette... 629,581
Card clothing, E. Ashworth... 629,422
Card shuffling device, F. C. Rollins... 629,470
Carriage, baby, A. J. Horn... 629,688
Carriage loading machine, F. Raymond... 629,393
Case. See Show case. Thread case.
Casein cura, method of and apparatus for treating, L. A. Adel... 629,644
Casting and conveying apparatus, Uehling & Miller... 629,480
Casting machines, metal pot mechanism for, N. Hall & Barr... 629,459
Casting pipe, socket iron for, G. F. Bassett, Jr... 629,338
Chain and bumper, combined, M. F. X. Foley... 629,874
Chain, drive, B. J. Macdonald... 629,515
Chair. See Reclining chair. Revolving chair. Rocking or lounging chair.
Chuck, automatic spindle, E. M. Couch... 629,713
Burn, F. B. McKenney... 629,588
Cigar cutter and advertising device, combined, A. A. Root... 629,612
Cigar tip cutter and advertising device, combined, A. H. Lester... 629,378
Circuit breaker, automatic magnetic, W. M. Scott... 629,397
Circuit, high tension, Davis & Wright... 629,664
Clock lighting attachment, alarm, C. A. Robertson... 629,609
Closet. See Water closet.
Closet ventilating and flushing apparatus, W. S. Brickell... 629,709
Cloth clamp for textile machinery, A. W. Butterworth... 629,741
Cloth clamp for textile machinery, H. W. Butterworth... 629,491
Club, Indian, S. A. Taylor... 621,626
Dutch, J. Brenzinger... 629,651
Clutch mechanism, combined, R. E. Wheeler... 629,328
Coating for metal structures, antifouling, G. D. Coleman... 629,426
Cock, stop and waste, B. W. Boatenreiter... 629,648
Coin controlled machine, C. A. Brewer... 629,334
Color and making same, blue black disazo, Levinstein & Herz... 629,748
Comb, D. Swinwell... 629,703
Commode, J. D. Farmer... 629,434
Compass errors, device for correcting, J. Christensen... 629,757
Compressing machine, F. B. Deane... 629,716
Conduit, P. C. Hewitt... 629,475
Consecutive view apparatus, J. Mason... 629,582
Corn or other cereals, cleaner for, J. O. Adams... 629,484
Corner bending and forming press, F. Wuelfing... 629,412
Cot, invalid, B. F. Cargill... 621,658
Cotton press, F. L. Dyer... 629,345
Coupling. See Car coupling. Hose coupling. Pipe coupling. Pipe or tube coupling. Thill coupling.
Culinary vessel, self draining, H. J. Carden... 629,742
Cultivating and harvesting, power driven mechanism for, R. Romaine... 629,385
Cultivating tool, W. H. Sharpe... 629,475
Cultivator, S. H. & D. Garst... 629,499
Cultivator, W. H. Traphagen... 629,727
Cultivator, Wilkins & Poe... 629,639
Curtain holding device, G. H. Davis... 629,550
Cutter. See Cigar tip cutter. Stalk cutter.
Cycle frame, A. R. Denbigh... 629,448
Cycle speeding machine, A. E. Grosset... 629,667
Cylinder lock, H. G. Voight... 629,630
Damper lock, stove, T. F. Fallon... 629,347
Dental articulator, Snow & Gritman... 629,531
Dental dam, C. C. Allen... 621,324
Dental plugger, C. B. Snow... 629,621
Distilling petroleum, etc., apparatus for, A. Adiassewich... 629,536
Document cover, C. H. Pope... 629,601
Door check and closer, E. Cliff... 628,494
Door holder, C. H. Oumpough... 629,753
Door opener, electric, A. E. T. Wiechers... 629,638
Door, shutter, etc., M. Leaver... 629,448
Draught excluder, P. Capon... 629,711
Draughtsman's curve, C. A. Klintberg... 629,569
Drawer equalizer, L. M. Miller... 629,638
Drawing die, P. M. Haas... 629,501
Drier, for structural shapes, P. M. Haas... 629,501
Dyer, H. H. McDowell... 629,384
Dyeing machine, bank, J. W. Crowther... 629,715
Egg carrier, S. H. Houghton... 629,506
Electric circuit plug receptacle, J. T. Hunt... 629,445
Electric motor controller, Davis & Wright... 629,665
Electric motor controlling apparatus, S. H. Short... 629,399
Electric signal, W. H. Stillwell... 629,624
Elevator buckets to their belts, means for securing, A. V. Allen... 629,707
End gate fastener, F. A. Carlson... 629,492
Envelop mechanism, combined, R. E. Wheeler... 629,348
Excavating and conveying apparatus, F. B. Knight... 629,695

- Excavating apparatus, H. C. Lowrie... 629,576
Exercising apparatus, W. J. Bryon, Jr... 629,655
Extractor. See Stump extractor.
Farm register, G. F. Rooke... 629,471
Farm gate, G. A. Brown... 628,420
Faucet, venting, L. Barger... 629,327
Feed trough, W. Zonker... 629,415
Feed water heater and purifier, G. W. Laughton... 629,723
Feeding apparatus, boiler, J. Scott... 629,615
Fence, portable, J. C. Simmons... 629,529
Fence weaving machine, wire, G. W. Whittington... 629,637
Fifth wheel, Griffin & Pullar... 629,500
Filter press, J. Wilson... 629,642
Firearm sight, G. Durrenberger... 629,670
Fire escape, J. L. Cranford... 629,548
Fireproof and insulating material, A. Imshchennetzky... 629,567
Fireproof structure, J. Ray... 629,468
Flushing apparatus, A. N. Pasman... 629,463
Furnace door hinge, heating, J. A. Jensen... 629,447
Furnaces, injector burner for hydrocarbon, G. Chelmsky... 629,338
Fuse block for electric circuits, H. P. Davis... 629,663
Fuse, shell, Dawson & Buckham... 629,552
Galloyanin-leuco derivative and making same, De la Harpe & Vaucher... 629,666
Garbage box, E. B. Caneley... 629,710
Garment, I. Goldberger... 629,678
Garment supporter, C. C. Hansen... 629,358
Gas burner, F. A. Cortis... 629,430
Gas burner, acetylene, D. M. Steward... 629,623
Gas furnace, J. C. Swinwell... 629,478
Gas generator, acetylene, T. O. Bateman... 629,485
Gas generator, acetylene, W. J. Bauleu... 629,738
Gas generator, acetylene, J. B. Holmes... 629,720
Gas generator, acetylene, H. M. Schofield... 629,701
Gas generator, acetylene, J. J. Volz... 629,481
Gas, producing and liquefying acetylene, Dickerson & Snickert... 629,669
Gas purifier, W. J. Bauleu... 629,739
Gas washer, H. J. Smith... 629,400
Gate. See Farm gate. Water gate.
Gate, S. D. Hathaway... 629,360
Gate, W. M. Kent... 629,509
Gate, T. Vertman... 629,766
Glass bulbs, tool for manufacturing, F. Panta... 629,555
Glass furnace, E. Ford... 629,557
Gold dredger elevator, R. H. Postlethwaite... 629,602
Grain binder knotting device, C. A. A. Rand... 629,522
Grain cleaner, G. Wellington... 629,407
Grain hulling and polishing machine, A. B. Couch... 629,547
Graphophone mandrel, R. Wolf... 629,534
Gromet or eyelet, R. M. Popham... 629,754
Guns, breech mechanism for rapid fire, F. F. Fletcher... 629,673
Guns, firing and extracting mechanism for breech loading, D. M. Popham... 629,551
Handkerchief holder, L. M. Churchill... 629,680
Hanger. See Lamp hanger.
Harrow, C. A. Brostrom... 629,652
Harrow and clod crusher, rotary, W. M. Cook... 629,428
Harrow and cultivator, J. A. Underwood... 629,629
Harrow, rotary, W. Secombe... 629,674
Harvester knife fastener, W. C. Bush... 629,656
Heat regulating device, F. Lamplough... 629,375
Heating liquids, R. L. Mond... 629,520
Hides, apparatus for treating, J. R. & J. S. Brown... 629,490
Hinge, W. Schuch... 629,336
Hoisting jack machine, M. J. Graham... 629,352
Hoisting machine, portable, C. A. Bassett... 629,737
Hook, K. Williams... 629,640
Hook sizing and flaring machine, H. O. Hem... 629,444
Hose coupling, air brake, J. Cowell... 629,657
Hose supporter, J. W. Farramore... 629,391
House. See Smokehouse.
Hub, carriage wheel, D. Quintal... 629,467
Hub for wheels, split, J. J. Scheffeld... 629,525
Hydraulic apparatus, S. Robertson... 629,611
Index, B. D. Le Gras... 629,573
Indicator. See Station indicator.
Inhaler, W. Wagner... 629,482
Injector, steam boiler, L. E. Hogue... 629,582
Insulated conductor, J. N. Keller... 629,508
Joint for parts of machinery, A. C. Culver... 629,549
Junction box cover, Kern & Cladin... 629,573
Knitting machine, J. D. Hemphill... 629,503
Knob attachment, W. A. Gibbs... 629,755
Ladder or telescoping water tower, fire, J. F. Chazotte... 629,496
Ladder, step, J. Owen... 629,589
Lamp, arc, E. M. Cashion... 629,424
Lamp or lantern, combined, T. H. Jones... 629,692
Lamp, electric arc, P. F. H. Queisser... 629,613
Lamp, electric handlight, H. P. Wellman... 629,631
Lamp hanger, adjustable incandescent, Thorp & Normant... 629,406
Lamp lighting device, F. A. Cortis... 629,451
Lamp or lantern, combined, T. H. Jones... 629,692
Lasting machine, W. H. Dorman... 629,535
Lasting machine, boot or shoe, A. E. Strickler... 629,476
Leather scouring and setting machine, Holmes & Bradford... 629,687

(Continued on page 94)

Advertisements.

ORDINARY RATES.

Inside Page, each insertion, - 75 cents a line
Back Page, each insertion, - \$1.00 a line
For some classes of Advertisements, Special and Higher rates are required.
The above are charges per agate line—about eight words per line. This notice shows the width of the line, and is set in agate type. Engravings may be advertised at the same rate per agate line, by measurement, as the letter press Advertisements must be received at Publication Office as early as Thursday morning to appear in the following week's issue.

WOOD or METAL WORKERS
without steam power can save time and money by using our
Foot and Hand Power Machinery
SEND FOR CATALOGUES—
A—Wood-working Machinery.
B—Lathes, etc.
SENECA FALLS MFG. COMPANY.
695 Water St., Seneca Falls, N. Y.

POWER & FOOT SHAPERS, PLANERS, DRILLS
LATHES
MACHINE SHOP OUTFITS, TOOLS
AND SUPPLIES. CATALOGUE FREE
SEBASTIAN LATHE CO. 120 CULVERT ST. CINCINNATI, O.

Queen Transits and Levels
High Grade Instruments with the Latest Improvements.
160 page Engineering Catalogue on application.
THE QUEEN
240 page Mathematical Catalogue on application.
ENGINEERS' AND DRAFTSMEN'S SUPPLIES
QUEEN & CO., Optical and Scientific Instrument Works,
59 Fifth Ave., New York. 1010 Chestnut St., Phila.

THE FORBES PATENT DIE STOCKS.
Two and three inch pipe can be threaded by a boy using only one hand on a crank.
Send for illustrated catalogue
CURTIS & CURTIS,
No. 30 Hand Machine, Range 1/4 to 2 1/2" R. & L. 6 Garden St., Bridgeport, Conn.

BARNES' UPRIGHT DRILLS
Complete line, ranging from Light Friction Disk Drill to 42" Back Geared Self-Feed. Send for New Catalogue.
W. F. & JOHN BARNES CO.
1999 Ruby Street, ROCKFORD, ILL.