

(31) J. L. W. asks: How can I prevent the twisting of belts? A. By using a good quality of belting, setting the pulley true, and lacing the belt even and straight.

(32) G. W. G. says: 1. I am about building a steamyacht 36 feet long and of 7 feet beam. Are there any objections to using iron for the hull? A. We see no objection to using iron. 2. Of what thickness should the iron be? A. About $\frac{1}{8}$ of an inch thick, or less. 3. Would galvanized iron be the best? A. Galvanized iron will be best on many accounts. 4. Would it be advisable to use side wheels? A. If the boat is to be generally run in smooth water, side wheels will answer well.

(33) J. B. F. asks: What shall I use on the point of a small drill to prevent it from clogging and heating, in boring copper, silver, and gold? A. Lard oil.

(34) R. B. says: I sent you last June the dimensions of a tow boat I was building. At her first trial trip we started out with 65 lbs. of steam, and made the run of 2 miles in 11 minutes, the propeller making 109 revolutions per minute, and the steam being cut off at $\frac{5}{8}$ of the stroke. She has been running and towing ever since, and has proved herself to be one of the best boats in Baltimore. She has towed a three-masted schooner, laden with 750 tons of coal, 20 miles in $3\frac{1}{4}$ hours, and made the run back in 2 hours. She has a 16 x 16 inch square cylinder. Her dimensions are as follows: Length 60 feet over all, width 14 feet, depth of hold amidships 7 feet. She draws 7 feet 4 inches water aft and 4 feet forward. Her propeller is 6 feet in diameter. She cost about \$9,000, complete. A. You seem to have a very satisfactory and powerful boat. We are much obliged for your letter.

(35) F. M. L. L. says: What kind of power is best for operating coal-mining machines? A. Compressed air or steam.

(36) F. W. B. says: Wishing to build a dam and to put up a mill, and having on hand a 21 inch turbine wheel, I desire to learn if, by suitable gearing, I can use the wheel for the small amount of work to be done, say not over 5 hours grinding per day, or from 20 to 30 bushels? The head of water is from 20 to 25 feet. A. As you have a wheel that can exert more power than is needed, you will scarcely experience much trouble in reducing the effect somewhat.

(37) E. B. asks: What is the best method of straightening stencil plates, after cutting the letters, so that they will lay flat on the work? A. Place each plate on a large block of wood, then straighten it with a small block of wood and a light hammer.

(38) S. K. J. says: In your issue of January 1, you speak of the conductor in Mr. Edison's experiments not requiring insulation, and say that it may be wound round large bodies of metal. Will these bodies of metal, round which it is wound, yield the spark? That is to say, will the "etheric" fluid leave its conductor and pass to the mass of metal, and can the spark be obtained from the mass? So also in the case where it has trailed along the ground, or in the water: can the spark be obtained from the ground or the water? Its practical application depends on this very important point. A. It is now generally believed that the "new force" referred to is electricity, consequently it should be subject to electrical laws. Provided insulation is good, we would, therefore, expect to obtain sparks by induction from the bodies about which the wire is wound.

(39) W. K. asks: What is the best remedy for leaks round the flues and seams of a steam boiler? A. Caulk the leaks.

(40) J. H. L. asks: 1. How are the electro-magnets in the Gramme magneto electric machine wound, to make the poles come in their centers? A. The armature coils are wound separately, the inside end of one coil being connected to the outside end of the one next following. Wires also lead from the junctions to strips of metal attached to a cylinder of some insulating substance. The latter is placed on the armature axis. The coils, for what are called the "field magnets," are all wound one way, but the connections are so arranged that north and south poles come on opposite sides of the armature. If coils with like ends pointing in one direction are put on a magnet, similar poles will be produced at opposite ends of the latter when the inside ends of the coils are connected together and the outside ends joined to a battery. 2. Why could not the frame and magnets be cast in one piece, making the magnets of cast iron? There would be no work on this part but to bore out the journals and cover parts intended for the electro-magnets with copper, thus saving considerable cost. A. They are now made that way.

(41) R. B. asks: Which is the correct way to connect a throttle valve on an engine, that is, which end of the valve should take the steam first? A. The steam should enter on the underneath side of the valve, so that it can be packed whether the steam is on or off.

(42) J. N. P. says: In an article in your issue of January 20, the writer claims that the breakage of band saws is due to the saw being obliged to turn a wheel or pulley, which causes friction, straining of the saw, etc. Could not that be very easily remedied by turning the pulleys by a mechanical movement, independent of the saw? A. The device mentioned is already in use. Another and a beautiful device supplies the supplementary outer rim on the upper or loose pulley. The friction of the supplementary rim is sufficient to turn the loose or upper wheel. But when the lower or driving wheel is stopped suddenly, the upper or loose wheel turns inside of the supplementary rim, which effectually prevents the sudden jerk on a thin narrow blade, which causes most of the breakage. Another device is to belt from the shaft of the driver to that of the upper

or loose wheel shaft, so that, when the lower shaft is suddenly stopped, the belt stops the upper one also.—J. E. E., of Pa.

(43) L. R. asks: What is the best substance as a non-conductor of heat, which can be packed in a cavity in iron? A. A mixture of $\frac{1}{2}$ plaster of Paris and $\frac{1}{4}$ alum is a good one.

(44) O. H. Y. asks: What is the fastest speed at which it is safe to run circular saws? A. Nine thousand feet per minute, that is, nearly two miles per minute, for the rim of a circular saw to travel, may be laid down as a rule. For example: Run a saw 12 inches in diameter, 3 feet around the rim, at 3,000 revolutions; 24 inches in diameter, or 6 feet around the rim, at 1,500 revolutions; 3 feet in diameter, or 9 feet around the rim, at 1,000 revolutions; 4 feet in diameter, or 12 feet around the rim, at 750 revolutions; 5 feet in diameter, or 15 feet around the rim, at 600 revolutions. Of course it is understood that the rim of the saw will run a little faster than this reckoning, on account of the circumference being more than three times as large as the diameter. Shingle and some other saws, riveted to a cast iron collar or very thick at the center and thin at the rim, may be run with safety at a greater speed.

(45) E. D. E. asks: 1. What is the smallest shaft, 14 inches in length, that I can put in a steam engine, the crank being 2 inches long and the pressure on the end 600 lbs.? A. Use a $\frac{1}{4}$ inch shaft. 2. What is the best iron for the purpose? A. Low Moor iron or Uster iron.

(46) G. B. C. asks: Can you give me a good recipe for lathe cement, for holding small articles? A. Use beeswax 1 oz., resin $\frac{1}{4}$ oz., pitch $\frac{1}{4}$ oz.; melt, and stir in fine brickdust.

(47) D. L. R. asks: After a current of electricity has passed through an electro-magnetic engine and done its work, what becomes of it? Does it not pass on in its circuit? If it does, why will it not run another engine of same capacity? A. The energy is absorbed in performing the work.

(48) G. S. D. asks: 1. Will a magnet, placed near a piece of iron or steel, impart its magnetism to the iron and steel to that extent that an equilibrium between the two bodies will take place, and so that neither will have any power to attract the other? A. No. If the iron or steel is free from magnetism, there will be attraction; if not, there will be attraction or repulsion: attraction when unlike poles are opposed, repulsion in the opposite case. 2. Will an artificial magnet always retain its magnetism in full force, without any loss from any cause? A. No, unless special precautions are taken with regard to it. 3. Is an artificial magnet as strong as a natural one? A. Artificial magnets can be made with power greatly exceeding that of natural magnets.

(49) T. P. says: Joshua Rose writes the most interesting articles in your journal. This makes it a pity that he should say that, to divide the circumference of a circle into 60 equal parts, "we have only to divide the radius of our circle into 10 equal parts to get the required distance." A. In "Practical Mechanism," No. XLI, the division of the radius of a circle was given as an aid to setting the compasses approximately; it was not intended to imply that by such a rule the compasses could be set correctly to the exact distance. We are obliged to T. P. and other correspondents for calling our attention to the matter.

50) W. S. says, in reply to J. B. R., who asked for a solution to clean articles after brazing: I have succeeded by dipping, while hot, into a dilution of sulphuric acid in water.

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

G. H. S.—It consists mainly of sesquioxide of iron and silica.—R. B. J.—It is argentiferous galena.—S. P. W.—Write to Professor C. D. Cope, Corresponding Secretary of the Academy of Natural Sciences, Philadelphia. The petrified wood is not rare enough to be of much value.

S. asks: What amount of flour of both grades is contained in a bushel of good wheat, and how much bran and other refuse?—H. V. says: We get from a cow milk of which the cream is of a light red color, as if there were blood in it. Can any one tell me the cause and the remedy?—(J. W. C. asks: How can I repair a rubber comb?—S. asks: Is there any veterinary college in America?—H. G. H. asks: How can I make the flexible composition of which toy heads are made, which looks somewhat like vulcanized rubber?

COMMUNICATIONS RECEIVED.

The Editor of the Scientific American acknowledges, with much pleasure, the receipt of original papers and contributions upon the following subjects:

On the Ocean. By C. O.
On Spontaneous Generation. By S. R.
On Cleaning Chimneys. By W. P. E.
On a New Motor. By A. F. G.
On the Mississippi Jetty. By E. G. F.
On the Life of Matter. By J. R.
On a Pneumatic Tube and Carrier. By A. B. H.
Also inquiries and answers from the following:
B. M. Jr.—C. P. S.—J. E.—W. S. M.—J. L.—Z. & S.—W. C.—C. D.—W. M.—A. B. C.—R. K.—F. C. W.—N. Y.—B. D. W.—N. J.—F. C.—J. T. B.—R. C. N.—W. D.—J. M. C. S.—E. T. D.

HINTS TO CORRESPONDENTS.

Correspondents whose inquiries fail to appear should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them. The address of the writer should always be given.

Inquiries relating to patents, or to the patentability of inventions, assignments, etc., will not be published here. All such questions, when initials

only are given, are trown into the waste basket, as it would fill half of our paper to print them all; but we generally take pleasure in answering briefly by mail, if the writer's address is given.

Hundreds of inquiries analogous to the following are sent: "Who makes galvanometers, and what do they cost? Who makes an economical rotary engine, and what is its cost? Who makes ice-making machinery? Who sells the best amateur printing press? Who sells barber's chairs? Who sells agricultural machinery? Who makes machines for tearing up tarred rope? Who sells the Gramme magneto-electric machine?" All such personal inquiries are printed, as will be observed, in the column of "Business and Personal," which is specially set apart for that purpose, subject to the charge mentioned at the head of that column. Almost any desired information can in this way be expeditiously obtained.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH
Letters Patent of the United States were
Granted in the Week Ending
February 1, 1876,
AND EACH BEARING THAT DATE.

(Those marked (r) are reissued patents.)

Annunciator, electric, E. Gray.....	172,993
Bale tie, T. Bailey.....	172,917
Bale tie, Burrow & Nichols.....	172,845
Bale tie, J. C. Rietmüller.....	172,936
Bale tie, R. S. Steaton.....	172,897
Bales, check for, J. C. Rietmüller.....	172,937
Bathing apparatus, D. Jewett.....	173,015
Bed bottom spring, W. R. Van Houghton.....	173,090
Bed bottom, spring, J. C. Fish.....	172,957
Bed, camp, F. A. Leavitt.....	172,883
Belt coupling, J. K. P. Shelton.....	173,070
Belt stretcher, F. L. & W. Spies.....	173,077
Bird cages, awning for, A. H. Mood.....	173,040
Boat, submarine torpedo, J. Jopling.....	173,018
Boiler explosions, preventing, C. W. Sulzbach.....	172,898
Bolt thread cutting machine, R. W. Deely.....	172,851
Boot, Bennett & Barnard.....	172,957
Boot heels, trimming, A. McDowell.....	172,886
Boots, nailing, W. C. Budlong.....	172,911
Boot soles, etc., screw wire for, E. Fromentin.....	172,990
Bottle and jar lock, J. W. Roberts.....	173,061
Bottle-corking machine, M. S. Valentine.....	173,083
Bottle neck, M. S. Valentine.....	173,088
Brick machine, C. S. Bigler.....	172,964
Button, cuff, G. F. Sparrow.....	172,895
Buttoner, shoe and glove, J. A. Smith.....	172,893
Camp stool, W. G. Phillips.....	173,054
Cannozzle, oil, S. S. Newton.....	172,929
Can, oil, J. Knowlden.....	173,023
Can-sealing device, R. Wells.....	173,093
Can-soldering machine, W. J. Gordon.....	172,921
Cane juice, extracting, A. Mitchell.....	173,039
Car axle, S. & S. L. Hall.....	173,000
Car axle, divided, I. C. Plant.....	173,056
Car brake shoe, W. H. Ward.....	172,837
Car coupling, W. Bishop.....	172,958
Car coupling, W. Camp.....	172,846
Car starter, A. H. Crozier.....	172,915
Car, stock, J. R. McPherson.....	173,035
Cars, trough for stock, C. McIntosh.....	173,033
Cars, ventilating, E. E. Hargreaves.....	173,003
Carpet cleaner, C. Elssasser.....	172,919
Carpet stretcher, H. S. Wing.....	173,097
Cartridge shells, making, Frazier & Co.....	172,853
Casting chills, moldboard, J. Oliver (r).....	6,896
Chairs and stools, base for, W. T. Doremus.....	172,981
Chair, invalid, C. B. Sheldon.....	173,071
Chamber, portable, E. Deetz.....	172,980
Check box, restaurant, A. M. Putnam.....	172,892
Clock, electric, R. J. Sheehy.....	173,072
Clockwork torpedo, J. Jopling.....	173,017
Clothes stick and tongs, S. Poole.....	172,891
Coal bunker, L. C. Smith.....	172,829
Coal scuttle, J. Pfeiffer (r).....	6,898
Colter, S. T. Ferguson.....	172,872
Corkcrew, W. R. Clough.....	172,868
Corset, H. M. Chapman.....	172,969
Corset, M. J. C. Vanorstrand.....	172,901
Cotton pickers, supporter for, W. J. Lynch.....	173,100
Crank speeder, J. D. Hazlett.....	173,005
Cream tartar, making, J. W. Haas.....	172,999
Croton oil, applying, J. W. Elliot.....	172,871
Culinary vessel, H. H. Huntley.....	172,857
Cultivator, N. C. Cole.....	172,869
Cultivator sweep, etc., E. Halman (r).....	6,887
Curry comb, F. D. Baker.....	172,848
Curry comb, C. W. Salassee (r).....	6,900
Curtain rollers, cord guide for, T. Noonan.....	172,889
Cutlery, table, J. D. Frary.....	172,874
Cutting apparatus, C. Wheeler, Jr.....	173,094
Damier, W. Culveyhouse.....	172,914
Digger, potato, W. Peebles.....	172,826
Door spring, A. A. Stimson.....	173,080
Door spring attachment, C. E. Miller.....	172,887
Dress shield, F. Wittram.....	172,941
Drilling machine, rock, Ball & Owen.....	172,949
Eaves trough hanger, Abbott & Trissler.....	172,841
Eaves trough, wooden, N. M. Miller.....	173,037
Electroplating, cobalt, T. Adams, Jr.....	172,862
Elevator, hydraulic, T. Stebins.....	173,896
Elevator, mortar and brick, F. Barnett.....	172,950
Embossing machine, J. Steinlehn.....	172,831
Engine and water wheel, S. Lucas.....	173,030
Engine, direct-acting steam, W. H. Wilcox.....	172,839
Engine governor, steam, M. W. Shapley.....	173,069
Engine, portable steam, H. M. Murphy.....	172,916
Engines, valve for direct acting, C. Rogers.....	173,063
Envelope, J. S. Woodworth.....	172,902
Evaporator, C. W. & E. A. Jones.....	173,011
Evaporator, C. W. and E. A. Jones.....	173,016
Pyeglass, C. C. Parker.....	172,932
Fare box, C. T. Armstrong.....	172,944
Fats, etc., rendering, W. E. Andrew.....	172,912
Fence, portable, A. Todd.....	172,824
Filters, construction of, J. F. Crease.....	172,849
Fire arm, breech-loading, Anson & Dealey.....	172,943
Fire escape, J. T. Cowles.....	172,970
Flag staff holder, Pincus & Hart.....	173,035
Floats, manufacture of, L. B. Benton.....	172,950
Flour and meal bolt, Sigel & Graham.....	173,074
Flower pots, making, L. A. McNeill.....	172,820
Fluting iron, F. R. Sutton.....	173,082
Fount and brush for liquids, I. M. Rose.....	172,064
Fracture apparatus, C. R. Parker.....	173,051

Fruit dryer, J. J. Yunker.....	173,099
Furnace, cupola, E. Voisin.....	172,836
Furnace, hot air, J. F. Pease.....	172,890
Furnace, slag, treating, F. Player (r).....	6,894
Furnace, door frame, etc., J. C. Longland.....	173,028
Game board, J. Enderharter.....	172,918
Gas tap, F. St. J. Jones.....	172,881
Gate, L. F. Haze.....	172,852
Gate, E. C. Oppenheim.....	172,930
Generator, sectional s. eam, B. Densmore (r).....	6,893
Gigging machine, Gerber & Woelfel.....	172,991
Glassware, manufacture of, T. B. Atterbury.....	172,946
Globe holder, H. B. Stillman.....	172,832
Grain binder, G. W. Nichols.....	172,045
Grain binder, C. A. Postley.....	172,933
Grain dryer, C. B. Stacy.....	173,078
Grappling hook, Beeman & Phifer.....	172,954
Grate and hot water heater, C. D. Harvey.....	173,004
Greenhouse rafter, F. A. Lord.....	173,029
Gun cotton, etc., making, F. Greening.....	172,995
Gun wiper, E. McI. Gregg.....	172,996
Hair curler, R. I. Hopper.....	172,855
Hame, W. H. Kirksey.....	173,022
Hame, A. L. Weakes.....	173,092
Harness, B. H. Cross.....	172,978
Harness clasp or coupling, Salmon & Cogswell.....	173,066
Harrow, J. M. White.....	172,838
Harvester, A. R. Reese (r).....	6,899
Harvester guard finger, M. Stone.....	173,081
Harvester rake, J. Barnes.....	172,952
Harvester rake, S. W. Morrison.....	173,042
Harvester rake, J. F. Selberling.....	172,102
Hay loader, W. Cook.....	172,972
Heater and filter, feed water, J. Armstrong (r)...	6,891
Hinge, spring, J. G. Reynolds.....	172,935
Hod, D. Nolan.....	172,888
Horse feed, manufacturing, H. H. Beach.....	172,863
Hose couplings, clamp for, O. T. Earle.....	172,942
Ironing apparatus, Wiles & Adams.....	173,096
Jack, lifting, H. W. Cornell.....	172,973
Jacks, lifting, J. O. Joyce.....	172,924
Knitting machine, J. H. Vinton.....	172,940
Knitting machine, circular, W. Franz.....	172,989
Knitting machine, rotary, O. Twombly.....	173,086
Lamp, J. K. Hicks.....	172,923
Lamp, Sherwin & Hoople.....	173,073
Lamp, street, P. S. Underhill.....	173,087
Latch, reversible knob, B. Erbe.....	172,920
Latch, reversible knob, C. S. Jennings.....	172,880
Lathe centering device, J. E. F. Leland.....	173,027
Leather, waterproofing, M. Bird.....	172,908
Letters, forming perforated, Robertson & Pearce.....	173,062
Lock combination, W. H. Bachtel.....	172,905
Lock for doors, Jenks & Pease.....	172,859
Lock for drawers, etc., W. H. Taylor.....	172,899
Loom let-off motion, G. E. Taft.....	172,833
Looms, rewinding warp in, L. J. Knowles.....	172,926
Lubricator, steam cylinder, E. McCoy.....	173,032
Meat, preserving, A. Heizen.....	172,878
Medical composition, M. J. Rogers.....	172,828
Metal surfaces, ornamenting, L. B. Smith.....	172,894
Meter, fluid, T. W. Lane.....	173,024
Milk pan cover, A. F. Morgan.....	173,041
Millstone and spindle, reversible, H. D. Coleman.....	172,847
Mineral wool, J. Player (r).....	6,958
Mining coal, etc., machine for, J. Gallicher.....	172,875
Mitering machine, C. S. Benjamin.....	172,955
Mold board, J. Oliver (r).....	6,897
Motor, E. Anthony.....	172,904
Nail plate feeder, Leach & Dearborn.....	172,860
Newspaper file, H. S. Noble.....	173,047
Nut lock, S. A. Brumbaugh.....	172,960
Nut lock, F. W. Carpenter.....	172,967
Nut lock, J. T. Parks.....	172,824
Nut lock and bolt, Deeds & Toole.....	172,870
Organ, reed, J. R. Lomas.....	172,884
Ornamenting surfaces, M. J. McColl.....	172,818
Pan lifter, G. W. Conrad.....	172,848
Paper bag machine, Josett and Ross.....	172,019
Paper barrels, mold for making, E. Hubbard.....	172,856
Paper clip and weight, J. Cain.....	172,963
Paper binder, temporary, W. Chase.....	172,968
Pencil holder, lumber, O. Cleveland.....	172,867
Pencil, pocket, M. Safford.....	173,065
Pencil, pocket, D. M. Somers.....	173,076
Pick, J. T. Fewkes.....	172,964
Picket stake, W. A. Durrin.....	172,917
Pillow sham, Knight and Abbott.....	172,859
Pin, safety, A. V. Sargent.....	173,067
Pipe, tobacco, H. B. Stephenson.....	173,079
Pitcher, L. B. Woolfolk.....	173,098
Pitman, J. D. Nix.....	173,016
Pitman or connecting rod, elastic, R. Adams.....	172,908
Planter and plant setter, L. H. Page.....	173,045
Planter, corn, A. C. Kent.....	173,020
Plow, W. A. Jennings.....	173,014
Plow, slidehill, J. Neff, Jr.....	172,928
Plow, sulky, J. Pattinson.....	172,825
Pneumatic signal, W. E. Prall.....	172,934
Poke, J. P. Oip.....	172,828
Post driver, I. W. Norton.....	173,043
Press, balling, Campbell and King.....	172,965
Press, steam drying, S. Swarts.....	173,083
Printing and embossing skirts, H. J. Davies (r).....	6,892
Printing press, C. B. Cottrell.....	172,974
Printing ink apparatus, C. B. Cottrell.....	172,975
Printing ink apparatus, S. D. Tucker.....	173,085
Propeller shafts, etc., raising, Atkinson <i>et al.</i>	172,945
Pump, W. D. Baxter.....	172,842
Pump, bilge, W. W. Turnbull.....	172,900
Pump, steam, J. Mathieson.....	173,031
Punching and cutting machine, etc., H. Wisler.....	173,840
Railroad rail joint, A. B. Ibbotson.....	173,012
Railroad rails, treating, A. J. Gustin.....	172,998
Railroad signal, F. Culham.....	172,979
Railroad signal, J. D. Hugheson.....	173,008
Railroad tie, A. J. Leveque.....	171,861
Railroad time signal, H. H. Ford.....	172,873
Rake, hand, E. Brown.....	172,866
Rake, horse hay, M. C. Burr.....	172,961
Refrigerators, J. Fink.....	172,985
Reinholder, E. B. Gulland.....	172,997
Running gear, G. W. Gilmore.....	172,992
Safe, kitchen, G. W. Bollenbacher.....	172,909
Saw, scroll, J. and W. F. Barnes.....	172,951
Sawteeth, setting, L. O. Orton.....	172,931
Scales, platform, W. W. Reynolds (r).....	6,888
Scraper, road, R. A. Haw.....	172,876
Separator, grit, W. M. Jackson.....	173,013
Sewing machine plates, Caner and Sloan.....	172,969
Sewing machine treadle, E. J. Turner.....	172,833
Shears, T. Humphries.....	173,011
Shears, revolving, R. W. Deely.....	172,873
Sheet metal, cutting, J. M. Jay.....	172,878
Shutter, metallic, W. H. Havens.....	172,922
Skimmer and fork, E. E. Flagg.....	172,987
Smoke bells, making, J. S. & T. B. Atterbury (r).....	6,888
Speaking tube annunciator, J. R. Creighton.....	172,919
Spoke-tensioning machine, J. G. Peace.....	173,055
Square and bevel, carpenter's, E. Simonin.....	172,881
Square, thinner's, D. H. Metcalf.....	172,881

Stairs, Stewart and Conwell.....	172,830
Stave-cutting machine, Burns and Wass.....	172,962
Stench trap, L. Brandels.....	172,865
Stencil plate, S. W. Reese.....	173,058
Stool seat, R. W. Myers.....	173,044
Stove and furnace, J. F. Quimby.....	173,057
Stove, base-burning, E. Smith (r).....	6,890
Stove funnel attachment, H. Vatter.....	173,091
Stove grate, G. R. Moore.....	172,822
Stove, oil, E. R. Blood.....	173,101
Stove pipe joint, D. R. Brownlow.....	172,844
Stove, base-burning, E. Smith (r).....	6,889
Stove fire-back wall, J. C. Burdine.....	172,912
Sugar carrier, movable, A. Mitchell.....	173,038
Surveying instrument, Schneider and Kraft.....	173,068
Suspender and other loops, J. W. Bradley.....	172,959
Swarm box, A. Harbison.....	173,002
Table, folding, G. K. Hoff.....	173,007
Table, ironing, J. Closs.....	172,970
Tablet, writing, J. H. Hodder.....	173,006
Tag and seal, combined, E. A. Locke.....	172,927
Teaching penmanship, copy for, A. A. Connolly.....	172,971
Telegraph coupler, G. F. Green.....	172,994
Tent, F. A. Leavitt.....	172,882
Thill coupling, W. O. Hanby.....	173,001
Tinner's fire pot, J. H. Whitting.....	173,095
Tire upsetter, C. H. Reynolds.....	173,060
Tobacco, etc., stripping, D. H. Hull.....	173,009
Tobacco pipe, H. B. Stephenson.....	173,079
Tongs for coal, etc., L. J. Baldwin.....	173,906
Trap, fly, D. S. Kidder.....	173,021
Treadle, Banijum and Dial.....	172,953
Treadle, H. Reese.....	173,059
Valve, pressure, F. A. Cramer.....	172,917
Valve, rotary, J. F. Sweet.....	173,084
Vehicle, bracket band for, J. G. Leder.....	173,026
Vehicles, slide bar for, E. J. Sprong.....	172,939
Vessels, ballasting, J. A. Bidwell.....	172,907
Wagon tongue, F. Larson.....	173,025
Wash bench, J. B. Fellows.....	172,983
Washing machine, Camp and Osterhout.....	172,964
Watch case spring, I. N. Hopkins.....	172,827
Watch, stem-winding, A. Philippe.....	173,053
Watch cannon pinion, Hunter and Moseley.....	173,011
Watchman's time detector, A. Meyer.....	173,036
Water closet valve, J. E. Boyle.....	172,843
Water pressure regulator, E. Hays.....	172,877
Wax leaves, tool for veining, M. J. McColl.....	172,819
Wells, ventilating driven, J. Suggitt.....	173,108
Wheel or pulley, E. Brown.....	172,910
Windmill, W. F. Mann.....	172,885
Windmill, E. S. Smith.....	173,075
Window washer, A. J. Mosher.....	173,043
Window weather strip, J. S. McIntire.....	173,034
Wrench, J. J. Grant.....	172,854

DESIGNS PATENTED.

8,936.—FAN.—S. M. Dudley, Detroit, Mich.	
8,937.—LOCKET.—G. W. Gill, Philadelphia, Pa.	
8,938.—BADGE.—J. F. Naulty, Philadelphia, Pa.	
8,939 to 8,941.—TOBACCO PIPES.—L. Nax, Phila., Pa.	
8,942.—GLASS DISHES.—J. Proeger, Pittsburgh, Pa.	
8,943.—CIGAR STAND.—W. E. Ryder, Sing Sing, N. Y.	
8,944.—BREASTPINS, ETC.—C. T. Sloan, New York city.	
8,945.—TYPE.—D. W. Bruce, New York city.	
8,946.—CARD RECEIVER.—G. E. Hatch, East Cambridge, Mass.	
8,947.—FURNACE BRICK.—G. H. Nott, Hyde Park, Mass.	
8,948.—SADDLE CLIP.—M. Seward, New Haven, Conn.	
8,949.—ARM CHAIRS.—M. Sulzbacher, New York city.	
8,950.—ADVERTISING CARD.—J. P. Thomas, N. Y. city.	
8,951.—TEA SET.—W. C. Beattie, Taunton, Mass.	

SCHEDULE OF PATENT FEES.

On each caveat.....	\$10
On each Trade mark.....	\$25
On filing each application for a Patent (17 years).....	\$15
On issuing each original Patent.....	\$20
On appeal to Examiners-in-Chief.....	\$10
On appeal to Commissioner of Patents.....	\$20
On application for Reissue.....	\$30
On filing a Disclaimer.....	\$10
On an application for Design (3 1/2 years).....	\$10
On application for Design (7 years).....	\$15
On application or Design (14 years).....	\$30

CANADIAN PATENTS.

LIST OF PATENTS GRANTED IN CANADA,
January 28 to February 5, 1875.

5,632.—H. Varner, Montreal, P. Q. Fruit gatherer.	Jan. 31, 1876.
5,633.—E. Bartlett, Renfrew, Ont. Machine for digging and picking potatoes.	Jan. 31, 1876.
5,634.—B. and C. Hickox, Brantford, Ont. Breast iron.	Jan. 31, 1876.
5,635.—P. Williams, Detroit, Mich., U. S. Wagon body and hay rack.	Jan. 31, 1876.
5,636.—F. Bramer, Little Falls, N. Y., U. S. Wheel harrow.	Jan. 31, 1876.
5,637.—F. S. Malloch, Brockville, Ont. Rounding and straightening metallic rods, etc.	Feb. 2, 1876.
5,638.—L. and J. Gaffney, Osgoode, Ont., et al. Combination and burglar-proof lock.	Feb. 2, 1876.
5,639.—A. J. Millikin, Smith's Falls, Ont. Shirt bosom.	Feb. 2, 1876.
5,640.—C. E. Carpenter, Syracuse, N. Y., U. S. Side platter.	Feb. 5, 1876.
5,641.—G. H. Little, Peabody, Mass., U. S. Injector and ejector.	Feb. 5, 1876.
5,642.—C. A. Shaw, Boston, Mass., U. S. Nail-cutting machine.	Feb. 5, 1876.
5,643.—J. L. Whiting, Boston, Mass., U. S. Making brush handles.	Feb. 5, 1876.
5,644.—W. Pearson, Philadelphia, Pa., U. S. Hosiery-sewing machine, etc.	Feb. 5, 1876.
5,645.—W. Vassie, Hamilton, Ont. Lamp holder for sewing machines.	Feb. 5, 1876.
5,646.—P. K. Dederick, Albany, N. Y., U. S. Wire baling tie.	Feb. 5, 1876.
5,647.—W. T. Nichols, Maywood, Ill., U. S. Road scraper.	Feb. 5, 1876.
5,648.—E. D. Wright et al., Springfield, Vt., U. S. Lamp chimney.	Feb. 5, 1876.
5,649.—F. G. Farnham, Hawley, Pa., U. S. Glove fastener.	Feb. 5, 1876.
5,650.—C. Corby, London, Ont. Nut lock.	Feb. 5, 1875.
5,651.—W. T. Doremus, New York city, U. S. Chair base.	Feb. 5, 1876.
5,652.—C. E. Patric, Springfield, Ohio, U. S. Grain drill and seeding machine.	Feb. 5, 1876.
5,653.—E. Curtiss, Findley, Ohio, U. S. Cider mill.	Feb. 5, 1876.
5,654.—H. P. Fontaine, Montreal, P. Q. Hand blower.	Feb. 5, 1876.
5,655.—E. Fisher, Kincardine, Ont. Machine for cutting boiler plate.	Feb. 5, 1876.
5,656.—S. Warrick, Montreal, P. Q. Steam engine.	Feb. 5, 1876.

5,657.—A. J. Griffin, Lowell, Mass., U. S. Hydro-carbon burner and gas generator. Feb. 5, 1876.
5,658.—N. Seibert, San Francisco, Cal., U. S. Lubricator. Feb. 5, 1876.
5,659.—J. J. Hathinger, Hyde Park, Mass., U. S. Carpet sweeper. Feb. 5, 1876.
5,660.—J. L. Whiting, Boston, Mass., U. S. Making brushes. Feb. 5, 1876.
5,661.—H. Dieston, Philadelphia, Pa., U. S. Hand saw and handle. Feb. 5, 1876.

Advertisements.

Back Page ----- \$1.00 a line.
Inside Page ----- 75 cents a line.
Engravings may head advertisements at the same rate per line, by measurement, as the letter press. Advertisements must be received at publication office as early as Friday morning to appear in next issue.

Wanted.—To Manufacturers and Patentees—Useful patented articles for manufacture, suitable for sale by hardware dealers. Cash will be paid for patents, or advance made for royalty. Address F. R. PRATT, Cape Pratt & Co., Buffalo, N. Y.

LESSONS IN MECHANICAL DRAWING.—By Professor C. W. MacCord. This excellent series of instructions in drawing, given regularly in the SCIENTIFIC AMERICAN SUPPLEMENT, is accompanied by carefully prepared examples for practice, with directions, all of simple and plain character, intended to enable any person, young or old, skilled or unskilled, to acquire the art of drawing. No expensive instruments are involved. Any person with slate or paper may rapidly learn. The series will embody the most abundant illustrations for all descriptions of drawing, and will form the most valuable treatise upon the subject ever published, as well as the cheapest. The series begins with No. 1 of SCIENTIFIC AMERICAN SUPPLEMENT. These instructions will be worth to the possessor far more than the yearly cost of the paper, which is only \$5. The series will be illustrated by probably not less than 400 special engravings, added to which will be the many plates and engravings of the finest examples of machinery and engineering works, contained in the regular issues of the SUPPLEMENT. The year's numbers of the Supplement will, it is expected, contain not less than 2,000 engravings, and a vast amount of reading and useful scientific information. Subscription \$5 a year. Address MUNN & CO., 37 Park Row, New York. Single copies 10 cents. To be had of all News Agents throughout the world.

10 DECALCOMANIE.—or TRANSFER PICTURES, with book of 24 pages, containing full instructions for the new and beautiful art, sent post paid for 10 cts. 100 neat pictures, 50 cts. They are Birds, Landscapes, Animals, Birds, Fossils, Flowers, Autumn Leaves, Comic Figures, &c. They can be easily transferred to any article as to imitate the most beautiful paintings. Also, beautiful GEM CHROMOS for 10 cts., 50 for 50 cts. Agents Wanted. Address J. L. PATTON & CO., 322 Williams Street, New York.

DEVICE FOR TRUING, SHAPING, AND SHARPENING all kinds of Solid Emery Wheels. Simple! Effective!! cheap!!! C. VAN HAAGEN & CO., Phila.

Ladies can make \$5 a day in their own city or town. Address ELLIE M'P'g Co., Waltham, Mass.

THE ORIGIN OF LIFE AND SPECIES. A new Theory. Price 10c. Address J. B. POOL, West Pittsfield, Ms.

THE LATEST AND BEST COMBINATION Sash Lock and Fastener. It locks both the upper and lower Sash of the Window with one Rod. Agents Wanted and Rights for Sale. Address H. FISCHER, Columbus, O.

OUR SPECIALTY
STEAM PUMPS
AND
BOILER FEEDERS.
SEND FOR ILLUSTRATED CATALOGUE.
COPE & MAXWELL MFG CO.
HAMILTON, OHIO.

DREDGING AND DITCHING MACHINERY. The latest, most extensive, and successful machinery, now in practical operation at Lake Michigan. With scale drawings and details, showing construction, operation, and economy. By M. A. Bresse, M. E. A most excellent and valuable paper upon the subject. Contained in SCIENTIFIC AMERICAN SUPPLEMENT No. 8. Price 10 cents. To be had at this office and of all News Agents.

A MACHINIST, WITH \$5,000, CAPABLE OF managing men and manufacturing specialties, can secure a profitable interest in an old established house now doing a large trade. Address MANUFACTURER, care of American Engineer, Baltimore.

Pond's Tools.

ENGINE LATHES, PLANERS, DRILLS, &c.
Send for Catalogue. DAVID W. POND, Successor to LUCIUS W. POND, Worcester, Mass.

A Hygroscope for Fifty Cents by Mail.
The Chemical Hygroscope.

This indicator of atmospheric moisture is as accurate as the costly ones. Rooms heated by furnaces or stoves are almost invariably so dry as to be damaging not only to health but to furniture. Some people take the consequences, others keep water on the heater. The Hygroscope shows at a glance whether the air is too dry or not. AGENTS WANTED. CHEMICAL HYGROSCOPE CO., Phila.

IMPORTANT FOR ALL CORPORATIONS AND MANUFACTURERS. Baer's Watchman's Time Detector, capable of accurately controlling the motion of a watchman or patrolman at the different stations of his beat. Send for circular.
J. E. BAER, P. O. Box 979, Boston, Mass.
N. B.—The suit against Imbause & Co., of New York, was decided in my favor, June 10, 1874. Proceedings have been commenced against Imbause & Co. for selling, contrary to the order of the Court, and especially the clock with a series of springs in the cover, and marked Pat'd Oct. 20, '74. Persons using these, or any other clocks infringing on my Patent, will be dealt with according to law.

Todd & Rafferty Machine Co.

MANUFACTURERS OF
The celebrated Greene Variable Cut-Off Engine; Lowe's Patent Tubular and Fine Rollers; Plain Slide Valve Stationary Engines; and Portable Engines; Rollers of all kinds; Steam Pumps, Mill Gearing, &c., &c.; Sills; Tow Cables; Bagging; Rope; Flax; and Hemp Machinery. Agents for the New Haven Manufacturing Co.'s Machinery Tools; for Judson's Governors and Stop-Valves; Sturtevant's Blowers; and Differential Pulley-Blocks. **WAREHOUSES, 10 BARCLAY STREET, NEW YORK. WORKS PATERSON, NEW JERSEY.**

PLANING AND MATCHING
MACHINES
UNIVERSAL WOOD WORKERS
WOOD WORKING
MACHINERY.
BENTEL, MARGEDANT & CO.
HAMILTON, OHIO.
Send for Circulars and Price List.

REVERSIBLE
HOISTING ENGINE
FOR ALL PURPOSES.

Cheap, simple, durable, and effective.
LIDGERWOOD MFG CO., 165 Pearl St., N. Y.

PATENT
COLD ROLLED
SHAFTING.

The fact that this shafting has 75 per cent greater strength, a finer finish, and is truer to gauge, than any other in use renders it undoubtedly the most economical. We are also the sole manufacturers of the CELEBRATED COLLINS' PAT. COUPLING, and furnish Pulleys, Hangers, etc., of the most approved styles. Price list mailed on application to J. JOYCE & A. COLLINS, Try Street, 2nd and 3rd Avenues, Pittsburgh, Pa. 190 S. Canal Street, Chicago, Ill.
Stocks of this Shafting in store and for sale by FULLER, DANA, & FITZ, Boston, Mass.; GEO. PLACE & CO., 121 Chambers St., N. Y.; PIERCE & WHALING, Milwaukee, Wis.

PATENT
Planing and Matching

and Molding Machines, Gray and Wood's Planers, Self-feeding Saw Arbors, and other wood-working machinery. S. A. WOOD'S MACHINE CO., 91 Liberty St., N. Y. Send for Circulars, etc. 67 Sudbury St., Boston.

HOUSEHOLD ORNAMENTS. By George M. Hopkins. A paper containing directions for the easy manufacture of a great variety of beautiful objects for the adornment of the parlor and the home of wood, but finished in imitation of bronze ware, including vases, urns, medallions, card receivers, brackets, match safes, picture frames, and hundreds of other articles. With 6 illustrations. Price 10 cents. Contained in SCIENTIFIC AMERICAN SUPPLEMENT No. 7. To be had at this office and of all News Agents.

Boult's Patent
Reverse Motion
Planing, Moulding
and
Dovetailing
Machine.
cuts Panels of any design or style of mould in the solid wood with neatness and dispatch. Is a first class Sander, Edge and Scroll Moulder. Does general Dovetailing with thick or thin stuff. Simple, Durable, and Efficient.
Send for Pamphlet and Sample of work.
Improved Solid Steel Cutters for all kinds of Variety Moulders made to order, and warranted by the
H. C. MACHINERY CO.,
Battle Creek, Mich.

RICHARDSON, MERIAM & CO.,
Manufacturers of the latest improved Patent Daniels' and Woodworth Planing Machines, Matching, Sash and Moulding, Tanoning, Moulding, Boring, Shaping, Vertical and Circular Re-sawing Machines, Saw Mills, Saw Arbors, Scroll Saws, Railway, Cut-Off, and Rip-saw Machines, Spoke and Wood Turning Lathes, and various other kinds of Wood-working Machinery. Catalogues and price lists sent on application. Manufacturing, Worcester, Mass. Warehouse, 109 Liberty Street, New York.

Blowers
FOR
All Purposes
The CHEAPEST
and BEST now in use.
ALL WARRANTED.
EXETER MACHINE
WORKS,
Sole Makers,
140 Congress St.,
Boston, Mass.

GEO. W. READ & CO.,

STEAM BAND SAW
AND VENEER-CUTTING MILL.
186 to 200 LEWIS ST., foot 5th & 6th Sts., E. R., N. Y.
Always on hand, FULL STOCK OF SEASONED

Hard-Wood Lumber

AND CHOICE FIGURED VENEERS.
The LARGEST STOCK! The GREATEST
VARIETY! The Lowest Prices!
Enclose Stamp for Catalogue and Price-List.
Orders by mail promptly and faithfully executed.

Water Wheels.
More than four times as many of Jas. Leffel's Improved Double Turbine Water Wheels in operation than any other kind. 24 sizes made, ranging from 5 1/2 to 96 in. diam., under heads from 1 to 240 ft. Successful for every purpose. Large new pamphlet, the best ever published, containing over 30 fine illustrations, sent free to parties interested in water-power. JAS. LEFFEL & CO., Springfield, O., 109 Liberty St., New York City.

INDIA RUBBER.

For Inventors and the Trade, made into any pattern at short notice, by F. H. HOLTON, 45 Gold St., New York. Established in 1860.

WROUGHT
IRON
BEAMS & GIRDERS

THE UNION IRON MILLS, Pittsburgh, Pa.
The attention of Engineers and Architects is called to our improved Wrought-Iron Beams and Girders (patented), in which the compound welds between the stem and flanges, which have proved so objectionable in the old mode of manufacturing, are entirely avoided. We are prepared to furnish all sizes at terms as favorable as can be obtained elsewhere. For descriptive lithograph, address Carnegie Brothers & Co., Union Iron Mills, Pittsburgh, Pa.

THE CENTENNIAL INTERNATIONAL EXHIBITION OF 1876.

The full History and Progress of the Exhibition, maps of the grounds, engravings of the buildings, news and accounts of all the most notable objects are given weekly in the SCIENTIFIC AMERICAN SUPPLEMENT. Terms \$5 for the year; single copies 10 cts. To be had at this office, and of all news agents. All the back numbers from the commencement on January 1, 1876, can be had. Those who desire to possess a complete and splendid illustrated Record of the Centennial Exposition, should have the SCIENTIFIC AMERICAN SUPPLEMENT.

Gardiner's Pat. Centring & Squaring Attachment

FOR
LATHE.
R. L. STATE & CO., Springfield, Ohio.

COMPRESSED AIR MOTIVE POWER.—For particulars of the most recent practice, send 20 cents for SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 1 and 2, containing 5 engravings of the "Compressed Air" Locomotives now in use at St. Gothard Tunnel Works, with dimensions, etc.

With Disston's Saws.
Sold by Hardware Trade LAGDON MITCHELL CO., Millers Falls, Mass. Send for Circular.

FOR CHARLIE'S PRESENT.

Get the TOM THUMB TELEGRAPH, put up in neat little boxes containing working sounder, telegraph apparatus, battery, key, wires, and chemicals, complete, ready for operation. Price \$3.50, with full directions. Can be seen in practical operation at the "Scientific American" office, 37 Park Row; at Packard's Business College, 805 Broadway; and many other places. Besides telegraphing, many beautiful experiments can be made, such as the magnetic curves, electric light, lifting weights, making compasses, magnetizing knives, electro-plating, &c. F. C. BEACH & CO., makers, 246 Canal St., near Center St., New York.

Bollinger's Patent Turbine WATER WHEELS AND Mill Machinery.

For Circulars, address
YORK MANUF'G CO.,
York, Pa.

HOME-MADE TELESCOPES.

Directions for their construction, with engravings showing the proper arrangement of lenses and tubes. By Prof. Van der Weyde. Price 10 cts. Contained in No. 1 of SCIENTIFIC AMERICAN SUPPLEMENT, to be had at this office, and of all news agents.

THIS MOUSTACHE produced by the use of DYKES BEARD EXTRACT without injury, or will forfeit \$100. Safe and sure. With full directions postpaid, 25c. A. L. SMITH & CO., Artists, Palestine, Ill. N. B. For A HEAVY GROWTH use this preparation. Mention this paper.

ELLIPTICAL GEARING.

By Prof. C. W. MacCord, of the Stevens Institute of Technology. With Eight Engravings. A most clear and excellent exposition of the subject. Price 10 cents. Contained in "Scientific American Supplement," No. 2. To be had at this office, and of all news agents.

DISSOLUTION—CHIPMAN, HOSMER & CO.—

The partnership heretofore existing between N. P. Chipman, A. A. Hosmer, C. D. Gilmore, J. C. Smith, and E. W. Anderson, has been dissolved. E. W. Anderson will continue the business at his offices, 637 F St., Washington, D. C.—Washington, Jan. 26, 1876.

Machinery of Improved Styles for making SHINGLES, HEADING AND STAVES.

Sole makers of the well known IMPROVED LAW'S PATENT SHINGLE and HEADING SAWING MACHINE. For circulars, address
TREVOR & CO., Lockport, N. Y.

FINE TOOLS

For Machinists, Jewelers, Engravers, Watchmakers, Amateurs, and others. Also, a fine assortment of File and Steel Wire Supplies, at FRASSE & CO.'S, 62 Chatham Street, New York.

IRON BRIDGE BUILDING—A complete description, with dimensions, working drawings, and perspective of Girard Avenue Bridge, Philadelphia, Pa.

With four editions of plans. Ten engravings. Price 30 cents. Contained in Nos. 1, 2, and 4 of SCIENTIFIC AMERICAN SUPPLEMENT, 10 cents per copy. To be had at this office, and of all news agents.

CENTENNIAL DRILL CHUCKS ARE A SUCCESS.

They hold 1-64 to 1/2 in. and warranted. Sent by mail, prepaid, for \$4.25. Send for new reduced Price List of Lathe and Drill Chucks.
A. F. CUSHMAN, Hartford, Conn.

BEAUTIFUL EVER-BLOOMING ROSES

Strong Pot. Roses, suitable for immediate flowering, sent safely by mail, postpaid. Five splendid varieties, all labeled, \$1.15 do. \$2.15 do. \$3.26 do. \$4.35 do. \$5. For 10 cents each, additional, one magnificent Premium Rose to every dollar's worth ordered. Send for our new GUIDE TO ROSE CULTURE, and choose from over 300 finest sorts. We are the largest Rose Growers in America, and the only ones allowing purchasers to make their own selections. Satisfaction guaranteed. Address THE DINGEE & CONARD CO., Rose Growers, West Grove, Chester Co., Pa.

NEW BOOKS.

SPONS' ENGINEERS' & CONTRACTORS'
Book of Prices of Machines, Tools, Ironwork, and Contractors' Material, for 1876. Thick 4to, 544 pp., \$3.

PHYSICS OF THE ETHER. By S. T. Preston. 8vo, cloth. 30.

PROGRESSIVE LESSONS IN APPLIED SCIENCE. Part 3.—T. gonometry, Vision, Surveying Instruments. By Edward Sang. Engravings, 8vo, cloth. \$1.25.

DESIGNING BELT GEARING. By E. J. C. Welch. 8vo, paper. 20 cents.

*Descriptive Catalogue sent mail-free.
E. & F. N. Spod, 446 Broome Street, N. Y.

ON THE CAUSES OF KNOCKING IN HIGH PRESSURE ENGINES.

By Joshua Rose. With Nine Engravings. A valuable practical treatise. Price 20 cents. Contained in No. 1 of "Scientific American Supplement," to be had at this office, and of all news agents.

PERFECT NEWSPAPER FILE

—O—
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 low price of \$1.50 by mail, or \$1.25 at the office of this paper. Have heard sides; inscription, "SCIENTIFIC AMERICAN," in gilt. Necessary for every one who wishes to preserve the paper.

Address
MUNN & CO.,
Publishers "SCIENTIFIC AMERICAN."