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 This is for our information, and not for publication.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.

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.

(1) J. T.—For the horse power, multiply the area of the piston by the mean engine pressure, which is always something less than the boiler pressure, and may be computed by knowmg the point of cut-off. This product multiply by the speed of the piston in feet per minute. Divide the last product by 33,000 for the horse power. Your engine probably indicates 23 to 25 horse power. Exact instructions cannot be given for setting the eccentrics of your traction engine without the exact measure of the lap and plan of lever connection. Place the crank on the center and the cams exactly opposite to each other with their central line leaning forward in the direction in which the crank is moving, sufficient to open the port at or near the time of passage of the crank over the center, is a general rule, from which a trial can be made. For casehardening, see SCIENTIFIC AMERICAN SUPPLEMENT, No. 23.

(2) W. M.—The brazing of iron and steel is readily accomplished by first cleaning the surfaces that are to be brazed free from scale or rust and make them to fit closely, as the brass or copper used for brazing does not flow well into open spaces. Rub the surfaces to be united with borax and water, then tie the parts together with iron wire or in any other convenient manner. Sprinkle the edge of the point with pulverized borax and tie on a piece of ordinary yellow brass large enough to fill the joint. Sprinkle the brass with borax powder, and place the work in a forge fire with the brass on the upper side, and heat gently until the brass melts and draws through the joint. Copper may also be used in the same way, it being very suitable and strong for iron. Good tough brass is best for steel.

(3) J. P. B. writes: Some three weeks since, a large barn containing baled hay was burned in this place. The fire was first seen near the floor of the loft, and there were several layers of bales of hay above the fire. The day was warm, although a strong wind from the north. We are anxious to know the origin of the fire. Will baled hay become heated so as to become ignited and take fire? A. Baled hay that has not been well cured is liable to heat and ferment; and if packed closely in a barn, its spontaneous ignition would be possible. A box packed with damp sawdust has been known to ignite in the central portion of the sawdust. A short time since, we saw a smoking barrel rolled out of a store and broken open. It was filled with sawdust as a packing for telegraph insulators. The sawdust on the outer side next the barrel was wet, the interior was charred. The report was that the barrel had been received the day before as freight, and had been wet in a shower. Cotton in bales stowed as freight in ships has been known to take fire. A wet bale was probably the cause.

(4) M. R. W. asks for a weight motor that could be cheaply constructed, to developsay one horse power for about five hours at a time, and whether such motor would be practicable for continuous use. How heavy weights would be required? Also the power needed to drive the works of large tower clocks where weights are used? A. Efforts to utilize large weight motors generally cause loss of both time and money. To maintain a horse power for five hours will require the descent through 30 feet of space of a weight of 1,650 net tons, to which must be added a large percentage for the friction of the machinery. To wind up the weight requires a full horse power for 5 hours and enough more to overcome the friction. The friction alone of such contrivances is almost unavoidably very great. The power to drive an ordinary tower clock is comparatively small, always depending upon its size and perfection. A one man power for half an hour will run the clock a day or a week, according to its construction.

(5) O. S. P.—For casehardening large pieces of steel, a box of cast or wrought iron should be provided large enough to hold one or two of the pieces, with sufficient room all around to pack well with the casehardening materials, which may be leather scrap, hoof shavings, or horn shavings, slightly burned and pulverized, which may be mixed with an equal quantity of pulverized charcoal. Pack the pieces to be casehardened in the iron box so as not to touch each other or the box. Put an iron cover on the box and lute with clay. Heat gradually in a furnace to a full red, keep at an even temperature for from 2 to 4 hours, raise the heat to a cherry red during the last hour, then remove the cover and take out the pieces and plunge endwise vertically in water at shop temperature; 2 per cent of hydrochloric acid in the water improves its tempering qualities and gives the metal an even gray color.

(6) J. T. writes: This bank is heated by steam, and the air is oppressively dry. Is there any device on the market for introducing steam into rooms in a noiseless way? A. You may take steam from the radiators with a very minute air valve. This will have an odor. A better way is to have small tin boxes fastened against the pipes behind the radiator in such a way as to allow of removal for cleaning. Keep them full of clean water.

(7) M. N. B. asks (1) how to take down the rust of old cast iron and steel machines, which have not been in use for ten years. A. Scrape off all rust scales, boil in strong caustic soda and water to remove grease and oil. Then dip in a bath of hydrochloric acid 1 part, water 4 parts, for a few hours or until the rust is removed. Wash in hot water, then dip in strong hot lime water and dry. 2. A receipt for japanning small hooks. A. String the hooks on fine wire dipped in thin japan varnish, and hang in an oven heated to 260° to dry. If varnish is too thick, thin with turpentine.

(8) J. T. T. writes: We are having iron castings made in which we cast a ¾ inch wrought iron rod, and we find after the casting is cold that the rod is loose. How can this be prevented? A. Tin the rod or such parts as are required to adhere.

(9) Subscriber asks what chemical preparation becomes ignited on coming in contact with water. A. Metallic potassium. It is very dangerous, as it explodes when thrown upon water. Phosphide of calcium ignites when moistened.

(10) O. D. asks (1) if an induction coil would be injured by using too many cells to operate it. A. Yes; you must be very careful not to use too strong a current. 2. How can I get a copy of the Smithsonian report? A. Address your representative in Congress, or the Secretary of the Smithsonian Institution, Washington, D. C.

(11) A. J. asks: What acid is used in engraving on glass, causing the picture to appear as if ground? A. Hydrofluoric acid is used in glass etching, and the sand blast is often used to effect the result described.

(12) H. A. R. asks: 1. Can you tell, as as closely as possible, what lengths of No. 28 (B. & S. gauge) copper and German silver wire represent one ohm, according to the standard determined by the Paris congress, read of not long ago? A. Of No. 28 copper wire 67·542 feet are given as corresponding to 1 ohm resistance. This is only approximate in practice, as every particle of impurity affects the conductivity of wire. The resistance of German silver varies also with its composition. The relative resistances of German silver and copper are given as 21·17 (German silver) is to 1·616 (annealed copper). 2. Why is the E. M. F. of Daniell's cell sometimes given as 1·079, 1·105, and 1·122 volts? Is the first the actual working E. M. F. and the last two potential or chemical E. M. F.? A. The E. M. F. of a. Daniell cell varies with the solutions used. 3. Will a differential galvanometer do to measure the E. M. F. of a battery by Wheatstone's method? What is a convenient resistance for such a galvanometer? A. For Wheatstone's method any sensitive galvanometer will answer. A good galvanometer, giving resistances, etc., is very fully described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 628. 4. Will a gravity Daniell do for measuring, or has it too high resistance, and what form of the same cell has the lowest resistance with least polarization? A. A good Daniell standard battery is described in the SCIENTIFIC AMERICAN, vol. 56, No. 24, page 370. The gravity is not suitable for a standard. A large sized porous cup Daniell has the lowest resistance for a non-polarizing battery.

(13) C. H.—The position of foul air in a room depends entirely upon its kind. The foul air caused by the escape of gases (as coal gas) rises to the top of the room, and the carbonic acid gas from burning gas or a stove is only carried to the top of a room by the heated currents.

(14) O. E. V. asks how the world is weighed and its density and mass computed. A. The density, mass, or weight of the earth was found by the observed force of attraction of a known mass of lead or iron for another mass; or of a mountain by the deflection of a torsion thread or plumb line. In this manner the mean density of the earth has been found to be from 4·71 to 6·56 times the weight of water, 5·66 being accredited as the most reliable. The weight of a cubic foot of water being known, and the contents of the earth being computed in cubic feet, we have but to multiply the number of cubic feet by 5·66 times the weight of 1 cubic foot of water to obtain the weight of the earth in pounds, or units of gravity at its surface, which is the unit usually used. Another method of determining the mean density of the earth is founded on the change of the intensity of gravity in descending deep mines.

(15) A. R. D.—Professor C. V. Riley makes the following reply: The twig of *Euonymus* (*latifolia?*) sent is infested with a scale insect, *Chionaspis euonymi*, Comstock, described and figured Rep. Dept. Agr. 1880, page 313, plates v., Fig. 3, xvii., Fig. 2. It is common on Euonymus, and has also been taken from orange in Louisiana. Those remedies which have been successful against scale insects infesting orange trees will prove successful against this. The most successful wash is the kerosene emulsion, made by either of the following formulæ:

1. Kerosene..... 2 parts.
   Milk.....1 part.

Sour milk (not buttermilk) is preferable, as the emulsion is more stable when thus made. Instead of milk, water can be used by adding a small amount of soap. The proportions remain about the same. The following formula is a very convenient one to use for small quantities:

2. Kerosene.....2 quarts.
   Water.....1 quart.
   Whale oil soap..... ½ pound.

In either case the milk, or soap and water, should be heated to boiling, and with the latter the soap thoroughly dissolved, then the kerosene added while hot, and the mixture thoroughly agitated until it forms a homogeneous mass of cream-like consistency. It can be agitated by churning, shaking, or otherwise, but where a force pump is at hand, the most convenient method is to pump the liquid back in upon itself violently, forcing it through a small nozzle. This continued for five to fifteen minutes will produce a good emulsion, if proper care has been taken in preparing the mixture. The emulsion will remain stable for an indefinite period, and should be diluted only as wanted for use. The strength required varies for different insects, also some plants will bear it stronger than others. This wash can safely be used on orange 1 part to 10 of water. The treatment should not be repeated until first application has had time to be effectual, say ten days or two weeks. It is best not to apply during freezing weather. On a small scale application may be made with brush or cloth, but the most convenient and effective method is with force pump, using a fine spray nozzle like the cyclore or some other good nozzle. The treatment of such insects has been fully discussed from time to time in my official reports, and especially in Hubbard's report on Insects Affecting the Orange.

(16) P. G. asks: What kind of paint can I use to keep cold water iron tanks from sweating? A. Thoroughly dry and clean the tanks. Paint with 2 coats Prince's metallic paint in boiled linseed oil, first coat to be dry before painting second coat. No paint will entirely prevent sweating, but it does diminish it.

(17) A. M. D. asks if the use of sal soda to clean the scale and grease from a steam boiler would be detrimental to the boiler. A. Sal soda and caustic soda are both used for cleaning boilers. They are not injurious. See also for other boiler cleaners, "Davis on Boiler Incrustation," which we can furnish for $2.00.

(18) R. W. J. asks if one 2 inch pipe will carry more water than four 1 inch pipes, all things being equal. A. Area of 2 inch pipe equals 3·1416 inches; area of four 1 inch pipes equals 3·1416; the internal surface of 2 inch pipe=6·2832; the internal surface of four 1 inch pipe=12·664; the coefficient of discharge for one 2 inch pipe is 26·66; the coefficient of discharge for four 1 inch pipes is 18·84. These figures give the proportionate discharge of one 2 inch pipe or four 1 inch pipes for any length.

NEW BOOKS AND PUBLICATIONS.

POPE'S ESSAY ON MAN, WITH RESPONDING ESSAY, MAN SEEN IN THE DEEPENING DAWN. By Caleb S. Weeks. Fowler & Wells Co., Publishers. Paper. 25 cents.

On one page is given Pope's grand essay, and on the opposite page Week's responding essay—the latter being written in like form, like meter, and with the same number of lines as the original. It is designed to explain and amplify the prototype in the light of the learning and philosophy of the present century.

STANDARDS OF LENGTH AND THEIR PRACTICAL APPLICATION. Edited by George M. Bond. The Pratt & Whitney Company, Hartford, Conn.

This book affords a *resume* of methods employed, by the enterprising company publishing the work, for the production of standard gauges, to insure uniformity and interchangeability in every department of manufactures. It includes reports by Professor William A. Rogers, the Committee on Standards and Gauges of the American Society of Mechanical Engineers, and other valuable information, all illustrative of the great care and thoroughness with which the company conduct their manufacture of standard gauges.

The Pope Manufacturing Company has issued a calendar for 1888, in pad form, with blank for memoranda on each leaf. Upon each slip also is printed something pertaining to cycling, a collection of quotations illustrating the popularity and universality of cycling.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

December 27, 1887,

AND EACH BEARING THAT DATE.

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

Addressing machine, T. C. Eberhardt..... 375,481
Alarm. See Burglar alarm. Clock alarm.
Arches, device for constructing, F. Gorman..... 375,620
Armor plate, mould for, B. Atha..... 375,666
Ash pan, C. W. Eckerson..... 375,416
Automatic lubricator, H. Billeter, Jr..... 375,597
Ax, E. Wickert..... 375,588
Ax blanks, die for forming, A. Siegel..... 375,573
Axle lubricator, car, R. Faas..... 375,700
Axle, vehicle, J. L. Gilmore..... 375,548
Axles, forming carriage, C. L. Sheldon..... 375,587
Axles, making carriage, C. L. Sheldon..... 375,588
Baling press, S. W. Trabue..... 375,584
Bank register, J. B. Dennis..... 375,609
Bar. See Check rein bar.
Battery. See Electric battery. Galvanic battery.
Bedstead attachment, H. J. McCormick..... 375,645
Bedstead, wardrobe, R. Steel..... 375,591
Belt tightener, J. W. Funk..... 375,673
Belting, leather, C. T. Bodifield..... 375,333
Block. See Brake block. Printing block.
Boat. See Life boat.
Boiler cleaner, steam, W. B. Moore..... 375,648
Boilers, pedestal for range, A. P. Creque..... 375,412
Bolt, M. S. Cedarvall..... 375,604
Bookbinding, G. Huether..... 375,488
Boot, felt, J. Berkey..... 375,331
Boot jack, J. Berkey..... 375,330
Boot or shoe, M. Wise..... 375,663
Boot or shoe buttonhole piece, Thomas & Phelps. 375,581
Boots and shoes, machine for moulding counters or stiffeners for, G. A. Knox..... 375,494
Boots or shoes, detachable sole for, J. Wust..... 375,718
Bottle and stopper, combined, G. A. Fullerton..... 375,347
Bottle show stand, F. F. Cummings..... 375,413
Box. See Electric call box. Lunch box.
Box, J. M. Waddill..... 375,518
Brake. See Car brake. Elevator brake. Hoisting machine brake. Vehicle brake.
Brake block, M. Potter..... 375,383
Brick machine, A. D. Thomas..... 375,000
Brooder for rearing young chickens, J. M. Bodge. 375,692
Brush, blacking, A. W. Brown..... 375,336
Building blocks, machine for moulding, H. S. Palmer..... 375,377
Burglar alarm, D. H. Kime..... 375,637
Burner. See Gas burner. Refuse burner.
Button, G. Heidmann *et al*..... 375,629
Button, E. H. May..... 375,373
Button, J. E. Totten..... 375,582, 375,583
Button and button fastening, J. Ewig..... 375,698
Calelectric generator, E. G. Acheson..... 375,408
Calendar stand, Fowler, Jr., & Pope..... 375,545
Calipers, dividers, etc., leg joint for, C. P. Fay..... 375,703
Calipers, dividers, etc., leg joint for, L. S. Starrett..... 375,668
Can. See Paint can.
Can opener, M. C. Lilly..... 375,451
Cane crushing mill, sugar, J. H. Man..... 375,679
Car brake, automatic, J. P. Wood..... 375,407
Car coupling, D. E. Bowling..... 375,488
Car coupling, E. M. Reynolds..... 375,386
Car coupling, W. L. Schlager..... 375,460
Car coupling, S. Trowbridge..... 375,399
Car coupling, W. H. Van Buskirk..... 375,661
Car door, grain, W. McGuire..... 375,449
Car mover, C. B. Dean..... 375,443
Car, stock, O. Newell..... 375,562
Car wheel, B. J. Westervelt..... 375,466
Cars, apparatus for heating, T. R. White..... 375,521
Cars, fastening device for grain doors of freight, J. M. Griswold..... 375,447
Carriage top, J. W. Leek..... 375,558
Case. See Egg case. Pocket case. Tape line case.
Casting chains, mould for, W. Penman..... 375,567
Cement, hydraulic and other, R. Bosse *et al*..... 375,599
Chair, S. Hayward..... 375,448
Chair, J. A. Rosen..... 375,570
Chair back and head rest, F. Binder..... 375,471
Check rein bar, D. A. De Nisi..... 375,477
Chest. See Flour chest.
Chopper. See Cotton chopper.
Churn, G. W. Snadon..... 375,430
Cigar mould and lifter, combined, W. F. Newhoff. 375,713
Cigar moulding machine, G. D. Elges..... 375,615, 375,616
Cigar wrapper cutting machine, H. C. Myers..... 375,502
Clasp. See Garment clasp.
Clasp, S. E. Cattell..... 375,475
Clamp. See String clamp.
Cleaner. See Boiler cleaner.
Clock alarm, McGlynn & Howells..... 375,497
Clothes rack, G. W. Langford..... 375,639
Coat and vest, combined, H. L. Basch..... 375,595
Coffee roaster, C. H. Madsen..... 375,641
Commutator or electric circuit breaker, C. D. Baker..... 375,328
Composing stick, P. S. Kellogg..... 375,360
Conduit cover and means for controlling the same, slotted, H. C. Lowrie..... 375,370
Converter, motor, and generator, electrical, R. Eickemeyer..... 375,542
Copy holder, Parkinson & Locke..... 375,425
Corkscrew, F. W. Livermore..... 375,368
Cotton chopper, J. D. Schofield..... 375,429
Cotton chopping and siding machine, Johnson & Belton..... 375,492
Cotton, machine for opening and preparing, R. Kitson..... 375,362
Counter gate for banks, etc., C. W. Clinton..... 375,532
Coupling. See Car coupling. Hose coupling. Pipe coupling. Thill coupling.
Crane, J. S. Worth..... 375,675
Crate, fruit, G. H. Brown..... 375,500
Cuff fastener, G. N. Dutton..... 375,672
Cuff fastener, spiral, T. M. Jenks..... 375,358
Cultivator, J. R. Wyatt..... 375,719
Cultivator attachment, A. E. Kunderd..... 375,638
Cultivator, gopher, T. O. Thorson..... 375,514
Curtain fixture, R. P. Trimble..... 375,585
Curtain ring, M. Nixson..... 375,563
Cutter. See Hog tendon cutter. Thong cutter.
Cylinder lock, T. Donahue..... 375,540
Dental syringe, W. H. Richards..... 375,427
Derrick, windmill, T. O. Perry..... 375,378
Derricks and cranes, attachment for, J. Q. Dickinson..... 375,610
Digger. See Post hole digger. Potato digger.
Distilling wood, apparatus for, G. Hunziker..... 375,490
Ditching and tile laying machine, O. C. Carr..... 375,602
Door check, A. L. Buskirk..... 375,337