

Would hickory sawdust do to make paper pulp of? A. You should address a wood paper manufacturer.

How is the angle for bevel gearing found? I have a plan for finding it which, if not identical with yours, I will communicate. A. We should be glad to see your method. It is quite a simple problem.

(29) C. B. B. asks: What method is used to obtain the brilliant polish usually observed on steel watch chains, buttons, etc.? A. Use first emery (on belts), then crocus, and lastly rouge or polishing powder.

(30) M. says: I want a 50 horse power boiler, but can get from none of the makers satisfactory information as to what constitutes a horse power. Makers of tubular boilers rate their boilers by the number of square feet of heating surface that they allow to a proportionate amount of grate surface, and they range all the way from 10 to 22 1/2 square feet. We are thus led to infer that a horse power is merely a nominal thing. But there must be something definite that constitutes in all cases a horse power in a boiler. The makers of some sectional boilers claim that the evaporation of 30 lbs. water into good dry steam per hour constitutes a horse power, therefore the evaporation of 1,500 lbs. of water per hour will give me a 50 horse power boiler. This seems like something tangible, but is it correct? Must a boiler evaporate that amount per hour in order to fill the requirements, and should a boiler that falls short of doing this be rated less? A. There is no standard for the horse power of a boiler. The proper way to rate the capacity of the boiler is by the number of lbs. of saturated steam that it will furnish in a given time, as, for instance, an hour.

(31) J. W. F. asks: Please give me directions for crystallizing pears, cherries, etc., to produce articles equal to the French fruits. A. Wash carefully, and then dry, dip in thin gum arabic, and sprinkle with finely granulated sugar.

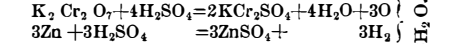
(32) J. N. P. says: "The Catechism of the Locomotive" gives the following rule for calculating the average or mean pressure when steam is used expansively in the cylinder: Divide the length of the piston's stroke in inches by the number of inches at which steam is cut off; the quotient is the ratio of expansion; find the hyperbolic logarithm of the ratio of expansion, add 1 to it, and divide the sum by the ratio of expansion, and multiply the quotient by the mean absolute steam pressure in the cylinder during its admission. The result will be the mean absolute pressure during the stroke." Why do I have to add 1 to the logarithm? A. It is the result of a mathematical investigation too long to be given here, but which you will find explained in works which treat of the theory of the steam engine. 2. How do I find the hyperbolic logarithm of a number? A. To find the hyperbolic logarithm of a number, multiply the common logarithm by 2.302585.

(33) G. B. asks: What can I use to form a hard transparent varnish for paper, that will stand handling and cleaning with water? A. We think that good dammar gum in turpentine will give satisfactory results.

(34) F. C. asks: I. How can I construct and use the simplest battery that can be made for gold and silver plating? A. Put a little sulphate of zinc in a jar of water; place a piece of sheet copper, to which a wire is soldered, at the bottom of the jar, and suspend a piece of zinc at the top. Connect the zinc with the object to be plated. The wire from the copper, which should pass through a glass tube in the jar, is then connected to the other electrode in the plating solution. A few lumps of blue vitriol must be dropped in the battery after it is set up, and more added from time to time, but care must be taken that the blue line does not quite reach the zinc. From one to three cells will be required. 2. Would an unglazed flower pot do for a diaphragm? A. It is probably baked too hard.

(35) E. G. F. says: A friend asserts that a locomotive will pull more than it will push. I contend that its power is equal in both directions. Which is right? A. You are.

(36) A. S. G. asks: 1. What is the chemical reaction in the Grenet battery? The fluid is sulphuric acid, water, and potassa bichromate. No gas is perceptible, but a little vapor condenses on upper part of cell. A.



2. In using a small induction coil I find that, on bringing my finger near one pole of outer coil, sparks pass, seemingly from the finger to the coil. I can feel nothing from the other pole unless the circuit is made through me. Changing the direction of primary current seems to make no difference; the same pole receives sparks, and the other is indifferent. How is this? A. Appearances seem to indicate that one end of the coil is not properly insulated from the base. 3. What is the object of the pole changer on induction coil? A. Convenience in reversing the direction of the current, which is often desirable in experimenting with Geissler tubes and for cutting the battery out of circuit.

(37) S. H. L. asks: Is there any process by which ivory, exposed to the atmosphere, may be made to retain its original whiteness? A. Cover it with some transparent protecting varnish.

(38) P. K. W. asks: 1. If a filter be built of brick in a cistern closed at the top, and covered with water, will not pumping out of the filter draw more water into the filter? A friend claims the pumping does not help to draw the water in the filter, that it only runs in of its own accord. A. Your friend is right. 2. I claim that air can be forced in the filter until it will exceed the pressure of the water outside the filter, and keep the water out. Is this so? A. Unless the top of the cistern be airtight, you cannot force air into

the filter to a greater pressure than that of the atmosphere without; and if it is airtight, and the spring is near the bottom of the filter, the water will still enter the filter as high as the top of the spring, or until it traps it. If the spring is in the top of the filter, the water will entirely displace the air, and fill the filter, no matter what is the pressure.

(39) J. S. S. asks: How much power is required to run a 3/4 feet burr, to grind 6 bushels of meal per hour? A. From 4 to 5 horse. It would be more economical, however, to use a smaller mill for this limited amount of work.

(40) C. B. B. says: I have a toy steam engine, and the engine, which screws on to the boiler, is rusted in so that I cannot unscrew it. How can it be unscrewed? A. Heat the connection in a gas flame.

(41) W. W. says: I read, on p. 187, vol. 33, in reply to G. D.: "It is likely that the law of your State, forbidding the sale of goods manufactured under your patent without a seller's license, may be enforced," etc. As letters patent under the law of Congress are to grant unto the patentee, his heirs or assigns, for the term of 17 years, the exclusive right to make, use, and vend his invention throughout the United States and the Territories thereof, will not State legislation, which imposes conditions and burdens on the rights thus guaranteed, in effect abrogate a law of the general government? A. Any State law which imposes special taxes upon patented goods, or aims to interfere with the free exercise of a patentee's privileges in the sale, manufacture, or use of his patent or invention, is invalid. This has been so decided by the United States Courts. On the other hand it has also been held that States have a right to impose equal taxes for the support of their local governments: have a right, for example, to tax their own citizens and all other persons who vend goods within the State. All vendors are treated alike, and the vendor of patented goods is not excused from such taxation.

(42) E. M. R. recently asked: "Why does water shorten a rope?" One of our learned professors charged with the answering of this query gave the following reply: "We were under the impression that wetting a rope exposed to strain caused it to stretch." The absurdity of this answer has been noticed by several of our correspondents. Everybody knows that the wetting of a rope exposed to strain or when not exposed to strain causes it to shorten. This is doubtless due to capillary attraction, by which the water is drawn in between the fibers with such force as to push them apart, thus causing a longitudinal contraction of the rope. The energy of the contractile force developed by wetting strained ropes is often usefully applied, and there have been many remarkable examples. C. L. T. tells that he was riding on a train when the locomotive got off the track; it required lateral movement of two inches for replacement. No appliances were at hand except a large dry rope. This was attached to the locomotive and to the trunk of a neighboring tree, then strained as tightly as possible. All hands were set to work to wet the rope, which quickly began to contract, and soon the locomotive was on the rails again. J. A. T. says: In the army a man is always supposed to be left in charge of a certain number of tents, to loosen the stay ropes in case of rain; and I recollect, upon one occasion when this precaution was neglected, a heavy rain coming on, all the posts to which these guys were attached were drawn out of the ground by the shortening of the ropes, and the tents were soon flying before the wind. B. says: All housekeepers have an experimental knowledge of the contractile power of wetted clothes lines in drawing the rope posts out of perpendicular.

(43) L. K. L. says, in reply to a query as to the maximum speed ever attained by steamboats: The Daniel Drew, the Mary Powell, and the Chauncey Vibbard, Hudson river steamers, are the three fastest steamboats in the world, remarkable time having been made by all. I have been informed that the Daniel Drew has made 25 miles per hour. The Mary Powell has beaten this, having made 27 miles an hour. But best of all, and I get it from good authority, the Chauncey Vibbard has run from West Point to Newburgh, 10 miles in 20 1/2 minutes, or at the rate of a little less than 30 miles an hour.

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 Coast of Texas. By F. W. R.
On Steam Boiler Phenomenon. By W. B., and by P. K.
On Gravity on the Earth and the Moon. By F. C.
Also inquiries and answers from the following:
J. C. - R. K. T. - J. C. - J. S. - J. B. H. - E. B. - C. A. A. - J. S. B. - W. H. R. - L. F. - C. W. J.

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.

Enquiries 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 thrown 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 sells aneroid barometers? Who is the best steam pressure gage? Who makes telescope objectives? Why do not makers of ships' compasses advertise in the SCIENTIFIC AMERICAN?" 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
September 28, 1875,
AND EACH BEARING THAT DATE.

Table listing inventions with names and page numbers. Includes entries like Addressing machine, Alarm, etc., Ash pan, Awning, Awning, blind, etc.

Continuation of the index of inventions table, listing items like Knife polisher, Knife scourer, Knitting machine, Ladder, firemen's, etc.

DESIGNS PATENTED.

Table listing patented designs with names and locations. Includes entries like 8,663.—GLASSWARE.—J. C. Gill, Pittsburgh, Pa., 8,664.—CHILD'S CARRIAGE.—L. B. Harrington, Jr., Boston, Mass.

**SCHEDULE OF PATENT FEES.**

On each Caveat.....	\$10
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On issuing each original Patent.....	\$20
On appeal to Examiners-in-Chief.....	\$10
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On application for Design (7 years).....	\$15
On application for Design (14 years).....	\$30

**CANADIAN PATENTS.**  
**LIST OF PATENTS GRANTED IN CANADA,**  
 September 28 to October 2, 1875.

- .216.—R. H. St. John, Springfield, O., U. S. Sewing machine. Sept. 28, 1875.
- 5,217.—J. S. Bogle, Springfield, O., U. S. Seeding machine. Sept. 28, 1875.
- 5,218.—H. Courteille, New York city, U. S. Manufacture of blasting powder. Sept. 28, 1875.
- 5,219.—H. S. Wolf, South Bend, Ind., U. S. Cleansing gas retorts. Oct. 2, 1875.
- 5,220.—L. E. De Waru, Philadelphia, Pa., U. S. Forming seams of boots, leather, etc. Oct. 2, 1875.
- 5,221.—G. S. Thompson, Port Hope, Ont. Threshing machine. Oct. 2, 1875.
- 5,222.—J. Nickerson, Simcoe, Ont. Machine for keeping milk and meat. Oct. 2, 1875.
- 5,223.—H. A. Howe, Detroit, Mich., U. S. Harvester. Oct. 2, 1875.
- 5,224, 5,225.—R. L. Downton et al., St. Louis, Mo., U. S. Middlings purifiers. Oct. 2, 1875.
- 5,226.—C. B. Clark, Buffalo, N. Y., U. S. Brush, cloth, and mop holder. Oct. 2, 1875.
- 5,227.—H. A. Williams, West Medway, Mass., U. S. Machine for rolling crimping tacks, etc. Oct. 2, 1875.
- 5,228.—R. D. Chatterton, Cobourg, Ont. Railway car coupler. Oct. 2, 1875.
- 5,229.—H. M. Macdonald, Lowell, Mass., U. S. Skirt protector. Oct. 2, 1875.
- 5,230.—F. Alden, Pittsburgh, Pa., U. S. Compound steam engine. Oct. 2, 1875.
- 5,231.—W. H. Reed, Chicago, Ill., U. S. Gas carbureter. Oct. 2, 1875.
- 5,232.—I. C. Mayo, Gloucester, Mass., U. S. Culinary boiler. Oct. 2, 1875.
- 5,233.—E. G. Graves, Rome, N. Y., U. S. Snow plow. Oct. 2, 1875.
- 5,234.—D. Maxwell, Paris, Ont. Straw cutter. Oct. 2, 1875.
- 5,235.—C. B. Clark, Buffalo, N. Y., U. S. Lock hinge. Oct. 2, 1875.
- 5,236.—B. W. Thurman, Gordonsville, Va., U. S. Stump extractor. Oct. 2, 1875.
- 5,237.—C. C. Holman, Hamilton City, Ont. Box. Oct. 2, 1875.
- 5,238.—G. W. Copeland, Malden, Mass., U. S. Boots and shoes. Oct. 2, 1875.
- 5,239.—R. C. Gwathmey, Louisville, Ky., U. S. Machine for holding objects, etc. Oct. 2, 1875.
- 5,240.—F. Erdmanski, St. Louis, Mo., U. S. Razor. Oct. 2, 1875.

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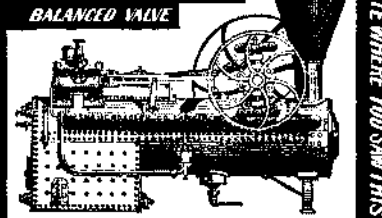
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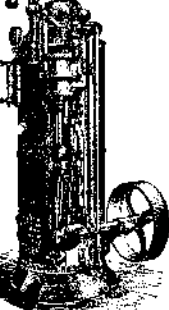
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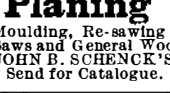
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