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N. Y., and Paris Exposition, 1888.
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factured by Bentel, Margedant \& Co, Hamilton, Ohio. Howard Patent Safety Elevators. Howard Iron Works,

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ing emplorment, or who wish to add to their income, ing employment, or who wish to add to their income,
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ufacturing Co., 87 Maiden Lane. . . Y. This company are the most extensive manufacturers in this country
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The best is the cheapest. New York Belting and Packing Company, 37 and 38 Park Row, N. Y.
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For Solid Wrought Iron Beams, etc.. see advertise-
ment. Address Union Iron Mills, Pittsburgh, , etc.
Best Turbine Water Wheel, Alcott's, Mt. Holly, N. J.

## NEW Books and publications.

 Report of the New Jersey State Commission for the Encouragement of mission for the Encouragement of Mandfactures of OrNiamental and
Textile Fabrics. 1878. Trenton. 8vo., paper, pp. 90.
Thegreaterportion of this pamphlet is devoted to a r
view of efforts made at home and abroad to secure the view of efforts made at home and abroad to secure the
industrial and artistic education of the artisan class, the industrial and artistic education of the artisan class, the
Commission believing that by such means the object aimed at can best be attained. A bureau of statistics aimed at can best be attained. A bureau of statistic carrying out the work.

Crclopedia. 1 vol. 8vo. pp. 810. New
York: D. Appleton \& Co. This volume is intended to make readily accessible th infurmation given in Appleton's Cyclopedia, and must prove a great time saver to such as have frequent occa-
sion to consult that work. It adds to the value of the general volumes as markedly as an elaborate index does to a book having a good table of contents; and at the
same time it provides a handy volume for reference with regard to the spelling and pronunciation of regard to the spelling and pronunciation of names (Eng on. Frequently an explanatory word or phrase is inneed of consulting the general volumes at all. To some extent also it may be helpful in the search for in
tion in other cyclopedias and special treatises.

## 

(1) M. B. writes: Could you inform me i there are any set rules for the signals between the pilot and engineer on a steamboat, and give the signals the pilot uses in signaling boats? A. The ordinary
code of engine signalsisasfollows: Engine stopped, 1 stroke on gong, goahead slow; engine stopped, 2 stroke n gong, back slowly. Engine going ahead or back back slowly 1 stroke on gong stop; engine going ah o or back fast, 1 stroke on gong, slow engine. The pilo signals are: Steamers approaching head on-Each steamer must pass to the ight of the other, and the pilot who firtet determines to turn givess one short blast of the steam whistle, which must be immediately an wered by the other pilot. Two short blasts, answered by other pilot, when first pilot considers it safer to pass
to the left. Series of short blasts, in rapid succession, ot the left. Series of short blasts, in rapid succession,
signifes that the pilot who makes them is in doubt as to the signals of the other pilot, and wishes to have hem repeated. One long blast to be given within pilot of any other steamer within hearing. Onelong blast in a fog signifes that the steamer is under way.
Three blasts in a fog signifies that the steamer is driftThree blasts in a
ing or at anchor.
(2) W. W. S. writes: We bave a $3 \times 4$ inch vertical yacht engine, with variable (link) cut-off,
and we wish to get all the power we possibly can from and we wish to get all the power we possibly can from
it. 1. What kind, size, and pressure of boiler shall I require: A. Make a boiler 28 inches in diameter and 45 inches high, for 130 lbs . of stcam. 2. What is the most
power I can get from it? It ix built strong. A. Prob ably about 5 horse power.
(3) E. J. P. writes: I have stated to a friend that the moon can never be absolutely full,which
he denies. I base my assertion on the fact that if the moon were to be absolutely farth' A. You are right.
(4) G. S. McG. asks if there is a formula given to calculate the height that water can be raised
by suction at different elevations above the level of the sea, say from 8 to 10,000 feet. A. Multiply the height of the barometer in inches (reduced to a temperature of
$32^{\circ}$ Fah.) by $1 \cdot 133$. The result is the height, in feet, of $32^{\circ}$ Fah.) by $1 \cdot 133$. The result is the height, in feet, of
(5) P. C. asks for a recipe for harnes blacking. The principal requirements are that it hould make the leather flexible, waterproof, give a easy of application, quick drying, not injurious to the exture. A. The following composition is said to give excellent results: Orange shcllac, 1 lb ;; alcohol ( 48 per
cent) or wood naphtha, 1 gallon; dissolve; asphaltum ent) or wood naphtha, 1 gallon; dissolve; asphaltum
(genuine), 1 lb .; neat's foot oil (hot), 4 fluid ozs.; soften the asphaltum with the oil and mix it with the lac sollution; then add fine ivory black, q. s., and bitter almond
oil. 1 oz. Agitate until uniform mixture is effected, oil, 1 oz. A
and bottle.
(6) C. G. asks: Does the generating of steam rapidly cause any extra strain on boilcrs when
not allowed to go beyond a certain pressure, say 60 lbs. 9 A. Ordinarily, when a boiler is forced, it deterioratcs ore rapidly than when the combustion is slow.
(7) M. J. C. writes: I piped a stationary engine the other day, and ran the exhaust pipe 25 fee horizontal and 25 feet perpendicular: would the engine run better if I run my pipe down through the floor? A.
If theexhaust pipe is suffciently large, there would not If theexhaust pipe is sufficiently large, there would not
be much advantage in the change. Data insufficient in be much advantage in the change. Data insufficient in
first query.
(8) K. F. asks: Can the sound from a number of voices or instruments of any kind be heard at a greater distance than the sound from one voice or in
strument, and what is the ratio of distance as compared with the combined number of sounds? A. Yes. "The intensity of cound is inversely as the square of "he distance of the sonorous body from the ear, consequen can be heard twice as far as the sound produced by one voice or instrument.
In making a phonograph from drawings in Scientipic American Supplement, are we not liable for in-
fringement of Edison's patent? A. See editorial Rights of Investigators," in No. 9 of current volume
(9) C. N. O. asks: Which will support the eater weight, a 12 foot 8 inch diameter solid column, umn A. The former.
If a machine were made to use any natural force, as gravity, continuously, wouid it be perpetual motion, as
that term is generally used? A. Yes
(10) W. H. B. asks fora method of preparing paper blue for clothes. A. Mix dry Prussian blue potassium ferrocyanide (yellow prussiate) in powd of pass the mixture through a fine sieve, dilute it with a little hot water, and pass the dry unsized paper through the solution, and expose it to warm air until dry.
(11) G. A. R. asks: What is the best and cheapest substance to enamel bricks, and the mode appertaining? A. Ordinary red tiles may be enameled or
glazed by subjecting them, while well heated, to the action of the vapor of common salt fused in the fur
(12) J. W. S. asks for a good black dye for restoring color on hats without boiling them in it, and
also what makes a good dye for dyeing black by boilalso what makes a good dye for dyeing black by boil-
ing9 A . Water, 100 parts; acid, $0 \cdot 5$; boil and add ferrous sulphate, 3 parts, copper sulphate, 1. 2. For 100 parts of goods, camwood, 8 parts, alum, 1 ; argol, 1 ; boil for 30 minutes, then let 3 part, allow, the goods to stand over night. Then boil for an hour in logwood, 45 parts, fustic, 8 , sumac, 4
(13) R. B. writes: 1. We have a telephone circuit of about a mile; there arc notelegraph wires
near it, and of late the clicking sound has become great that at times the person speaking cannot be heard. Will you please inform me of the cause of the clicking sound A. It is probably due to earth currents. 2. II
there a remedy for it, and if so, what is it A. Use a return wire, or puta small resistance coil at each end of the line.
(14) F. F. C., W. A., and others: An ordinary induction coil may be made in the following man ner: Turn a spool, A, of wood or hard rubber, 4 inches spool should be $4 / 4$ inch internal diameter thin. Opon this spool wind two layers of No. 16 insur thin. Upon this spool wind two layers of No. 16 insu-
lated copper wire, as shown at B. Place around the coil thus formed two or three thicknesses of paper which has been soaked in melted paraffn. Upon the paraffin paper wind from 300 to 400 feet of No. 40 silk covered copper wire, placing under each layer a thick-
ness of paraffin paper. The ends of the wire of the inner or primary coil extend outward through the flange of the spool, and one of them is connected with a post, E, to which is attached a current breaking spring, supthe end of the spool. Thecurrent breaking spring has

attached to it a small disk of platinum, which rests against the adjusting screw in the post, D . This post is
connected with the battery, F , and the latter communi cates with the termimal of the primary coil. The ends of the wires of the outer or secondary coil extend
through the flange of the spool and are connected with through the flange of the spool and are connected with binding posts. It will be noticed that the outer coil has
no connction whatever with the inner one. The secondary current isinduced with the inner one. The sec
ond coil. To regulate the strength of the secondary current a bundle of soft iron wires is inserted into the spool (15)
(15) C. B. writes: My brownstone front stoop is covered with a green mouldy substance that
looks bad. Please give me a recipe for removing it and not injuring the stone. I notice a great deal of it in all citics, only on the sooth side of the street. A. Try a
little strong aqueous solution of caustic soda. It should remain ten minutcs in contact with the stone, which, after washing with water, should be well rubbed with
a stiff brush or broom.
(16) D. W. A. writes: I want a cheap and simple method of manufacturing gas for an experimen-
tal air carriage, not out of coal. Also the size of a cigar shaped balloon large enough to raise about 300 lbs. A. Where coal gas is not obtainable the gas (hy
drogen) is prepared by decomposing dilute sulphuric acid (oil of vitriol 1 part, water 3 parts) with scrap iron acid (oil of viriol 1 part, water 3 parts) with scrap iron
in capacious wooden vessels or casks. For the amount of matcrials required, etc., see p. 107 (22) and (8), cur rent volume, Scientific American, also p. 64, vol. 32. 1. What do you mean, when you say, in speaking of 16 inches? Do you mean that the screw is of such an angle that if continued around the shaft it would make one revolution around it in that distance? A.
Yes 2. And for a small screw, say of 10 or 12 inches diameter formall cano, what pith shonld it have and straight? A. A true screw with three blades, pitch $11 / 6$ times the diameter, will do very well.
(17) H. B. asks what size a boiler and en gine should be for marine use (size of engme 2 inche
in diameter and 3 inches stroke), double engines. I wan the engines for a row boat. with speed from 6 to 8 miles per hour. A. Make a tubular boiler, 24 to 28 inches in diameter, 4 feet high.
(18) A. E. R. writes: 1. I am running orliss engine, made about the year 1863. The cylinder bs. steam. In setting the valves I gave the cut-off valves $\frac{1}{3}$. lead, and the exhaust valves $\frac{1}{4}$. I do not think the boiler safe above 60 lbs ., and the engine has to
work rather hard to do the work required of it. Am I getting the best results with the valves set asstated
A. We think these are good proportions; but the only A. We think these are good proportions; but the only
way of telling certainly whether the valves are set to the best advartage would be by an indicator diagram. 2 . How can I test sperm oil to tell if it be pure, and is it
considered the best oil for cylinders? A. We do not
know of any very simple tests except that of use. Some know of any very simple tests except that of use. Some
of the natural oils are much used for cylmder lubrica tion.
(19) S. K. asks if the United States Steam Boiler Explosion Commission will experiment again this
year. A. We believe the Commission has adjourned sine (20) D. S. E. asks: Is it at all possible for and has boiler to burn out if it is kept free from scale a forced fire or a blast, can the boiler receive any in jury when the above care is taken? A. If the hoiler is so designed that there is not a free circulation, it can be
burned, when perfectly cleaned, by a powerful blast.
(21) C. E. G. asks: I wish to raise the great st amount of water possible, using a 5 or 10 horse power engine. Please give the best machine for that purpose. A. We think a good rotary pump will give
(22) G. W. writes: As we contemplate building a stcamboat we have clubbed (six of us) to-
ether, and we come to you for advice. We should like to build a boat to carry about 20 persons. Can you fiveus anidea how to have it built, such as length, width, size of boiler, engine, and screw, and about the
cost? A. We take the following from the price list of a well known builder of steam yachts: Hull, 38 fect over all, 71/2 feet beam, $3 \frac{1}{\frac{1}{4}}$ feet draught. Engine, 516 $x 7$ nches. Propeller, 3 feet diameter, 4 reet pitch. Boile 3 feet diameter, $43 /$ feet high, 170 square feet of heating arface. Price $\$ 2,300$.
(23) J. J. N. asks if vertical retorts for the distillation of coal are much in use. A. Such retort re rarely employed in this country.
(24) H. H. C. writes: In a back number ive engineer shat if a person wanted to become a locomotherefore I ask: 1 . Would it make any difference whether I worked in the machine shop of a foundry or car hop? A. A locomotive manufactory would be the best.
. Is there any work published on "Locomotive Engi. Is there any work published on "Locomotive Engi-
neering?" If there is, please state the title and author. A. Forney's "Catechism of the Locomotive" is a use ul work. 3. What is the average pay for locomotive
engineers on our Western railroads 9 A. From $\$ 2.50$ to $\$ 3$ a day will probably represent a fair average. 4. After having shop experience, how should I proceed to be come an engineer? A. Try and procure a situation as How many miles of railroad does Australia possess? . In 1876 there were in Australia $1,680^{\circ} 5$ miles of rait oad in operation, and 1,376 miles in course of construc (25)
(25) G. W. M. asks: Can I obtain a liquid greater specific gravity than sulphuric acid
(Specific gravity at $32^{\circ}$ Fah)

(26) J. S. Q. writes: I have a tugboat, 60 feet long, 14 feet wide, scow bow and stern. She runs
$71 / 2$ miles per hour up stream, and makes all the steam want to carry, 120 lbs ., with lump coal. I wish to use slack instead of lump coal, and will ask your advice in making alterations for burning slack. The engme is 10 nch, 12 inches stroke; boiler is firebox make, $111 / 2$ feet ong; boiler shell is 8 feet long, 36 inches in diameter, has 43 flues $23 / 2$ inches in diameter, 8 feet long; frebox is 3 by 3 feet, the grate bars have 36 inch opening. She
exhausts in the chimney; the exhaust pipe nozzle is 12 inches above top of flues, and is cramped from $2 \%$ to 13 inches. The smoke box door at theafter end of boiler is not tight, leaks great deal of air; the fues are coated with a heavy ecale, and still she makes plenty of steam with lump coal. I propose to remove all the scales,
which I can do, and keep the flues clean, and reduce the opening in the grate bars to $1 / 8$ inch, and cut the nozzle off even with the top of the flues, and leave the opening $21 / 2$ inches, and make the smoke box door at the after
end of the boiler air tight, and then I think I can make 120 lbs. of steam with slack. My chimney is 12 inches wide. A We think it quite probable that your plan will be successful. Y
dranght by a steam jet.
(27) W. McC. writes: Having had some oors to varnish, I was asked if I could leave them so fat. Now I would like to have you tell me if there is anything that will kill the gloss on varnish and still not injure it. A. You might rub them down with fine pul-
verized pumicestone and leave the surface without verized
(28) D. W. B. writes: 1 . The switching engine No. 60 of the N. Y. \& N. H. \& H. R. R., after the steam has been shut off, and while fetching, makes a
heavy thumping noise, apparently in the cylinders. The engineer does not know how to account for it. that it may be due to water in the cylinder, or contracion of some of the stcam connections, but the data are carcely sufficient to enable us to form a very intelligent opinion. 2. How is the air exhausted for the vacuum brakep A. By a steam ejector. 3. How can I ply the mean pressure on the piston in pounds, by the iston speed in feet per minute, and divide the product 33,000
(29) C. F. B. asks: Can any reader of the Scifntipic American give me a rule to measure rubber
belting in the roll? A. The following rule is given in celting in the rolls A. The following rule is given in
Cooper's work on belting: $D=$ diameter of outer coil Cooper's work on belting: $\mathrm{D}=$ diameter of outer coil
in inches. $d=$ diameter of inner coil in inches. $n=$ number of coils. Length in feet equals 0.1309 $n \times$ +a)
(30) W. H. A. asks for a formula for preserving insects. A. Laboulliere recommends for the
preservation of insects in a fresh state, plunging them into a prese vative fluid consisting of alcohol with an

