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F. O. B. should consult a physician.-R. J W. will if nd directions for gilding on furniture on
p. 347, vol. 31.-S. A. T. will find directions for frosting glass on p. 264, vol. 30. Canvas can be pre-
served from mildew by the method described on p. 90, vol. 31. A black dressing for leather is de scribed on p. 171, vol. 32.-W. 8. O. will find a re-
cipe for walnut stain on p. 90, vol. 32 . Nickel plating is fully detailed on p. 171, vol.30.-C. A. H. will ing is full a method of casting iron free from air
find that a metrin
holes was described on p. 409 , vol. 31 - $\mathbf{Y}$. will gind directions for making concrete gravel walks on $p$. 50 , vol. $32 .-\mathrm{A}$. B. M. will find that the induction coil and its operation have been fully describedo o. 362, vol. 31.-E. B. M. will find a description of
the type writer on p. 79, vol. 27. Shaving soap is the type writer on p. 79, vol. 2 . Shaving soap is
described on p. 251, vol. 32 . For gold ink, see p. 21 vol. 26.-W. M. W. will find recipes for hair wash on pp. 237, 363, vol. 31.-T. B. 8. will find directions
for preserving natural flowers on p. 286, vol. 31 . M.T. D. will find directions for removing hair from the face on p. 229, vol. 28.-8. E. will find di-
rections for casehardening Iron on p. 69, vol. 31D. P. will find details of a remedy for foul water in wells on p. 59, vol. 22.-M. F. will find recipes for Worcestersime sauce on pp. $2 t 1,281$, vol. 26.-R.O.B.
can mold rubber by following the directions on $p$ 363, vol. 30.
(1) G. A. W. says: I noticed in your issue
or March 27 a method for marking out ovals, of March 27 a method for marking out ovals,
which is good as far as the description goes, hut a which is good as far as the description goes, hut a great many mechanics do not know how to se
the two pins to put the string around tomake the oval of a given length and width. The following rule will be found simple and correct: If you wish to mark out an oval 4 inches in length, and 284
inches in wdth, mark out the length and width thus:


Take one half the length (2inches) and measure from
$A, 2$ inches, striking the line of the length at B and $C$ then set pins at $A, B$, and $C$, tle yourstring, $b$, aroun them; then pull up pins at $a^{\prime}$, and use the pencil as you describe
(2) L. A. W. asks: 1 . What is magnetism?
A. Magnetism is the power which certain bodies A. Magnetism is the power which certain bodies
called magnets have to attract iron. Magnets are of two kinds, natural and artincial. Natural magnets consist of the ore of iron called magnetio or of steel, and are magnetized by rubbing agalngt other magnets. No substance is indifferent to the magnet, though iron is most of all affected by it. 2. What is the differencebetween animal magnetism and electricity? A.There is no known connection between animal magnettism and
If any exists, it has yet to be proved.
(3) I. H. asks: 1. How can I obtain the dif a mixture composed of 3 parts nitrate of Make
 Add enough water to form a paste, which is put on the articles to be colored. Place them on an iron plate over a clear fire until they atrain water. Different hues may be had them in cold water. Different hues may be had by varying the
mixture. 2. Is there anything I can putin my silver solution that will prevent it from stripping? A. Clean the articles well and electroplate them slowly; and then the silver will not strip off.
(4) M. A. G. asks : Is there any kind of lamp in which I can burn kerosene oil, that will be safe
if left to burn ina shop all night? A. Use a large if left to burn ina shop all night? A. Use a large
lamp of glass, having a proportionally small burnlamp of glass, having a proportionally small burn-
er, and good kerosene oil, and you will have no er, and go
difficulty.
(5) A. H. H. asks: 1. What is the principle A. A metallic plate is connected to the line and A. A metalic plate is connected to the line and
another to the earth, the two plates being separated by a thin insulating material. The principle upon which the arrester works is that the tension of the atmospheric electricity is so high that it will leap across the insulating substance between the two plages, and then pass oft to the ground, While
the regular current will stick to the wire. 2. Can you give your readers a table showing the eleotro-
motive force of the principal forms of battery
now in use on telegraph lines? A. The electromo tive forces of the various batteries are as follows Daniells', Minotti's, Callaud's, Gianty's, and Hill's, 1. 078 volts; Marie-Davy, 1.524 volts; Léclanche 1.88 volts. Faures arbo battery, 1765 ; Grove 812 ; Bunsen, 1964 ; electropoin huid (bichromai of potash), $202 \mathrm{vols}$. Grene
(6) M. W. M. asks: How can I magnetize of a strong electro-magnet in one direction.
(7) N. A. B. asks: How many methods are there of obtaining pure silver from silver coin, A. Perhaps they? I wantthesilver to platewith character on a small scale is the following: First dissolve your coins in nitrlc acid, and add muriatic
untll no further precipitate forms. Remore the liquid fy fltration and wash torms. Remove the ral times with hot water. Place the filtrate in flask with some small pieces of zinc, and cover them with dilute sulphuric acid (1 to 4). When the zinc is completely dissoived,
will be found in the bottom of the flask as a grayah black mass. The color is due to the fact of th silver being in a very finely divided condition.
you desire to use the silver in the metalic form as an anode), all that is necessary is to melt it in a small black lead cruoible, with a small amount of carbonate of soda.
(8) E. asks: What makes the wet end of a owel darker in color than the dry end? $A$. Lea of the light is reflected from the wet towel, and ore transmitte
(9) G. W. H. asks: Are thereany chemicals that change color in coming in contact with mag wetized steel or other mot know of any.
(10) T. says: The accepted theory is tha our earth was once a molten, incandescent mase na, it is urged that the deeper the earth's crust penetrated, vertically, the greater the degree of
heat is developed. Now why is it that the further heat is developed. Now why is it that the further
we penetrate the ocean, the less is the degree of heat attalned? Will it be urged that the lower the emperature of water, the greater is its gravity d at the areme depths that have reached, shows a lower temperature than $89^{\circ}$ Fah A. What is urged is no objection to the theory of central heat, because the heat penetrates by con-
duction through the materials of the solid crust. But in the waters of the ocean this could not tak
(11) E. E. M. asks: 1. Can an electro-mag net be constructed that will sustain a weight o 100 lbs., with one cell of a powerful bichromat
battery? A Yes. 2. How far will it attract weight of 10 lbs . if it moved without friction? A.
The attraction decreases as the square of the disThe att
(12) D. McK. says: I want to make a small galvanic battery which, when I take hold of the wire, willgive a considerable shock? What is the
best method? A. You cannot get a considerable shock from a small battery except by passing the current through an induction coil. See p.362, vol. 81.
(13) T. W. D. asks: 1. How is phosphide of lime made? A. Phosphide of calcium, com-
monlyknownas phosphide of lime, is obtained by monly known as phosphide of lime, is obtained by the action of the vapur of phos
tic lime at a high temperature.
lif How is at an

1. How in ballon with dilute sulphuric acid, or common illumina ting gas (coal gas) is used for this purpose. 2. Will the gas from a kerosene lamp do\% A. No. 8. How many square feet of gas will it take to ralse a five
lb. balloon? A. It will require about 140 cubic petof coal gas,
pure hydrogen.
How is gunpowder made? A. Saltpeter, su
How is gunpowder made? A. Saltpeter, sulder, mixed, made into a paste with water, drled and reground.
(14) H. S. asks: Would it improve the
illuminating qualitles of coal oil to mix a portion of sperm, lard, or other similar fixed oil with it A. No. Use a better kerosene. It should not (15) A. C. C. asks: Will you tell me wha to put on glass so that I can take a photograph dieven flm of photographic collodion, and is the placed in a bath of nitrate of silver for a shor time. It is then transferred to the camera, and after exposure is washed, frst with a solution of sulphate of iron, and then with a solution of hyis unterly useless for one to be mentioned that who has not devoted some time to the practical study of it. We would refer you to some work on the subject. If the back of the negative, obtained by the method as above described, be blackened, it will give to the plate, when looked at, the ap(16) J P L
(16) J. R. L. says: I want to make a preparation to use on black tobacco to prevent one lump from sticking to the other, and at the same time
give the tobacco a good gloss. A. Try plumbago. Tinfoil cannotbe dissolved so as to make it possible to add it to a misture of ofl and glycerin.
(17) C. G. D. says: I am manufacturing chromate of potash, prusslate of potash, powdered gum arabic, and water. After the ink is first bottled, there is a scum formed at the mouth of the bottle; but when this is removed there is no more formed. What is the cause of this? A. It is probably due to impurities in the materials user.
Allow theink to stand some time before bottilng. Sulphate of quinine is sometimes used as a rem-
(18) G. A. W. says: I have read the follow-
ing directions for drawing an octagon in a given ing directions for drawing an octagon in a given
square: Make AC equal A B ; then draw the square


C F D, and line fromb to E whl be oue side of the octagon. Proceed In the same manner in the ect method? A. Yes.
(19) F. D. S. asks: Is there any chemical which I can mix with lard oll so as to retard o prevent oxidation when exposed tothe air? A.
No.
(20) P. S. G. asks: Is there any kind of oating suitable for umbrellas that will make th
alpaca or gingham tops waterproof? A. Try the ollowing: First sponge the cloth on both side with a solution of 1 part sulphate of alumina in 10 parts water, then with a solution of soap, which prepared by boiling 1 part light colored resin nd one of crgstalinzed carbonate of soda with 1 parts water, until the resin is dissolved. The resin
soap thusformed is to be separated by the addition of common salt. This soap is then dissolved to gether with 1 part soda soap, by boiling in 30 part water. After this last sponging, inse in the rain. (21) P. P. W. asks: How can I take the printed heads off an account book, so as to beable write others in theirstead? A. We do not know (22) J. G. C. asks: Is there any simpl method by which an amateur in chemistry may acertain the strength of a given sample of nativ
lack oxide of manganese? A. The commercial black oxide of manganese? A. The commercial the proportion of chlorine which a given weigh of it will liberate when it is heated with hydro chloric acid. This quantity of chlorine varies much in different samples, and is dependent upon the proportion of oxygen which the oxide of man sanese contains in excess of that
(23) J. E. C. asks: 1. Is there a liquid that will erase ink marks from paper, and leave the carface in a smooth state? hair pencils, dipped alternately in solu tons of cyanide of potassium and oxalicacid. 2 is there any substance that will resist the ac tion of mucilage when dry, except hard and vul-
$\begin{array}{ll}\text { canized rubber? } & \text { A. Yes. Most metals will do }\end{array}$ this.
(24) S. H D. says: Located near Titusville, Pa., is an immense gas well, struck nearly 4 year rrst struck, it was accompanied by a curious phe nomena. The gas was led away from the mout of the well by 4 pieces of tubing, and this tubing was coated with ice from $\frac{1}{16}$ to 34 of an inch
thicknese. This was with an August sun beatin down on the pipes; small pieces of ice were als hrown out of the well with considerable force of course the pressure on the pipes must hav gas passing through them, and I should hav thought the friction would have caused heat instead of the reverse. A. It is a well known fact that,when a gas is allowed to escape from where it has been under pressure, it absorbs heat rapidiy
from surrounding bodies, and that this chilling effoct is proportional to the pressure from which the lect is proportio
gas is $4 b e r a t e d$.
(25) A. S. asks: How can I restore the polish to a nickel- plated stove which has been disc
ored by heat? A. Usechalk and chamois shin. (26) C.A. B. asks: 1. What can I put in wacolor the clothes yhave used sal soda, but it win plished either by boiling the water for some time or by the addition of the proper quantity of clear lime water. 2. What is used to bleach clothes in a
hort time without injury? A. In bleaching cotton goods, the first operation consists in scouring them in a slightly alkaline solution, or, what is better, by exposure to steam. They are afterwards put into a basket and rinsed in running water. The immersion of cotton in an alkaline ley, howarthy deposit. It is well known that cotton beara the action of acids better than hemp or flax; that time is even necessary before the action of them can be prejudicial to it; and by taking advantage of this valuable property in regard to bleaching, deposit by pressing down the cotton goods in a very weak solution of sulphuric acid, and aiterwards removing the acid by washiug, lest too long
remaining in it should destroy the cotton. 3 . Is remaining in it should destroy the cotton. 3 . Is
there any way of polishing shirts, collars, etc., besides the ordinary irons? A. Put a bit of paraffin, the size of a hazel nut, in each bowl of starch. (27) D. A. D. asks: Can you give me the method by which Berthelot was able to obtain alcohol by syntiesis? A. By the formation of a 80 olves of olefiant gas in onl of vitriol. 20 the disluting the mixture and submitting Itto distillation. Small quantities of dilutealcohol are thus obtained with facllity. Tritylic alcohol has been obtained by acting on tritylene in a similar manner.
(28) H. W. says: In your answer to A.C.R. you say that, if the first flooris set high up from to health are in favor of the house with no cellar. The fact is that a great many dwellings are bullt
on solid aad close foundations and without ventilation, and the real question is: Are they healthy I think not. In Illinois, there were three settle ments within visiling distance of each other, alto-
gether containing about 30 families. One fall every family of the three settlements (with one exception) was sick with the prevaling fever of theseason. The excepted household had an upper
floor to their house (a half story) which was used for sleeping in by all the family, consisting of pa rents, 3 children, and a workman, and they all escaped the fever. All the rest of the inhabitants
lived in one story houses, and of course slept and kept all the stores on one floor. In a house with a close solid foundation, we found that things would moldif left standing for a few days. Preserves, placed upon a top shelf, in a short time became moldy; out when placed in the second story, they all kept well. A barrel of hour was kept standing on the floor; when abouttwo thirdsused, thesponge bakings of bread, it not being fit to eat. The barrel and flour were then taken out of doors and placed in the sun, so that the air could circulate
freely around and under it, and after standing freely around and under it, and after standing
thus about 6 hours, it was replaced on the floor and thus about 6 hours, it was replaced on the floor and
set on two strips of board one inch thick. By this set on two strips of board one inch thick. By this good to the last. I could cite many other instances. A. All receptacles for foul air under or near a dwelling should be very closely attended to, and so opened as to be thoroughly ventilated, as the instances
lustrate.
(29) S. V. C. asks: If a student learns telegraphy on a Tom Thumb electric instrument, will he be able to work an ordinary railroad office in-
strument correctly? A. If a student learns to read well by sound, he can operate in any office where sound instruments are used.
(30) A. K. asks: Is the beech tree a negatricity? Ilived for 25 years where one fourth the timber was beech, and never saw one that was injured by lightning. A. The beech tree has no polarity; but it is a good conductor when green
and full of sap. (31) F. C. B. asks: How are those batteries made in which lead is one of the elements, and
what is the solution? A. Similar to the Callaud, What is the solution? A. Similar
using sulphate of copper solution.
using sulphate of copper solution.
(32) C J. M. asks: 1 . Can you give me di-
rections for making a constant battery for ringrections for making a constant battery for ringfeet? A. Use any form of a sulphate of copper battery. 2. What size of wire, and how much, shall I use on the poles of an electromarnet, to be operated with the above battery and circuit?
A. Use 200 feet of No. 24 insulated copper wire.
(33) E. A. D. says: I wish to deposit copper
on a very frail non-metallic substance. I cannot on a very frail non-metallic substance. I cannot
apply plumbago, nor use any composition in apply plumbago, nor use any composition in
which phosphorus occurs. The application to render the article a conductor must be in a liquid tried soaking your model in melted paraffin, and then applying plumbago?
(34) A. F. B. asks: 1. What size of insulanet, with an iron core 3 of ant on anelectromag net, wit an in depends upon what use you wish to put it
A. to. 2. Would an electromagnet made of one bar,
bent in the form of a $U$, be more powerful than bent in the form of a U , be more powerful than
one made of two bara, and the ends connected by one made of two bars, and the ends connected by
an armature, other things being equal? A. No.
(35) J. E. M. says: 1. If I have two pairs of magnets, and one pair, placed at a distance of
94 inch apart, will be drawn together, and the 84 inch apart, will be drawn together, and the
other pair will be drawn together if placed 1 inch tance apart, say $1 / 6$ inch, would not the weaker magnets be drawn together with as great rapidity
as the stronger? A. No. 2. If I were to place a as the stronger? A. No. 2. If I were to place a
permanent steel magnet without a keeper inside a hollow glass globe, and then exhaust the air from the globe, would the attractive power of the
magnet remain exactly the same? A. Yes.
(36) J. W. McM. says: I have an electromagnetic machine. The battery consists of two
zinc plates with a thin platinum plate between zinc plates with a thin platinum plate between
them,and the platinum plate has been destroyed by the acid. Would not a copper plate answer the same purpose? If so, should it be the same thick-
ness asthe platinum one, or thiciser? The acid is ness as the platinum one, or thicker? The acid is
dilute sulphuric. A. Copper will not answer; use a dilute sulphuric. A
thin plate of silver
thin plate of silver.
(37) J. E. L. says : I have a hot air furnace which warms 16 rooms. It is set in brick doubl walls the inside wall being 16 inches from radia.
tor. I would like to sometimes draw the hot air from the hall; so $I$ put a $10 \times 14$ register and a 9 inch and a damper in the outdoor cold air box. I closed the damper to see if it worked, but it did not ; then I closed the registers, but I left 3 openings, and it will draw the air from the hall through one of
the hot air registers. A. It is necessary to keep a the air will then descend through the lowest reatis the a
ter.
(33) C. W. E. asks: What substance is the know of any
(39) A. N. W. asks: 1. What is the most
lasting and cheapest batery that I can work an lasting and cheapest battery that I can work an
alarm bell with, with No. 20 fine copper wire in a circuit of about 100 feet? A. Smee's or Léclanché's. 2. In using one of Grove's cells, if I take out the ture of the two acids impair the strength of bat
tery? A, Slightly. a. How long will one of Grove's
cells last without being renewed?
A. That de pends upon how much it is used. 4. What is about the cost of a Rhumkorif's coll and condenser? A without machinery to coll the wire on the core . Possibly, but it requires a good deal of skil ably flind more economical to buy it.
bly flid more economical to buy it.
(40) I. M. L. says: 1. I have a line 650 feet ong of No. 12 galvanized wre, with relays of ohms each on the line. How many Hill's jars will
be needed? A. Three. 2. With a line of a given length, with 3 relays of 55 ohms each, if I replace the relays with 3 of 10 Cohms each, will it require moreor less battery? A. Less.
(41) W. D. says: A fair trial of galvanized ron for roofs has had very unsatisfactory result
in Canada. Under the contracting and expanding influence of heat and cold, the cross joints open, and leakage on the first thaw is the result. Eve the gutters on mansard roofs part at all the joints,
and have utterly failed for the purpoes intended to the great annoyance of those who have eithe recommended or used this material. One method has been to solder and rivet the joints, the rivet beling about 94 or 1 inch apart, but in spite of this the seam opens visibly. What is the remedy? A. In this vicinity, tin in small sheets 18 almost universally used for the purpose. The tin is cllached sheets, the less the effect of the contraction and expansion on the joints. Galvanized inon is used for cornices and other molded work.
(42) A. M. S. says: I have a large Newsmell. Can you tell me how to remove it? Wash him with carbolic soap.
(43) C. W. H. says: We have a copper tank, ing water. The water in the copper tank is much softerthan that in the cistern. The water in the cistern probably takes up some of the lime from
the sides and bottom of the cistern. Can a cistern be covered with silicate of soda or with paraffin, and thus avoid the trouble? A. A ooat of hydraulic cement will be the best remedy for the difflculty.
(44) H. F. N. asks: Is there any substitute for oll for drilling cast steel and wrought iron? A. Soapy water is sometimes used.

1. Is it an established fact that there should be oo oil used it the steam chest or cylinder of an engine? A. No. 2. If grease to ne
best, oil or tallow? A. Tallow.
(45) C. T. asks: Would any mechanical contrivance which supplied the power which
it in motion be deemed perpetual? A. Yee.
(46) F. W. J. asks: What will weld iron and steel together without the aid of aand or borax? A. Brush clean with a wine brush fre
quently while heating, and when quently while heating, and when maken out to
weld.
(47) J. P. says: 1.1 have an engine of 3 inch king a boat, 25 feet long $x 43 / 6$ or 5 feet beam, with
2 feet depth of hull. I propose to make a boiler 4 feet long by 22 inches diameter, with a 13 inch flue running the whole length. I set my grate insidethe flue to runabout 16 inches back. Shelland
tlue are of $\frac{s}{\text { in }}$ inch, heads of $1 / 4$ inch, Hue are of $\frac{1}{16}$ inch, heads of $3 / 4$ inch, charcoal iron. carry 75 lbs . of steam. 2. At what speed (in still water) can I run ? A. Probably 6 or 8 miles per hour. The other englnes you describe may answer
for a boat 14 to 18 feet long. The inclination of haftand position of propeller depend greatly on the dealgn of the
(48)
(48) W. H. S. asks: 1. In making hydrogen from sulphuric acid and zinc, for an oxyhydrogen
light, will a plain bottle do for a vessel ? A. Yes. light, will a plain bottle do for a vessel ? A. Yes.
2. What is the proportion of commercial acid to What is the proportion of commerc
water? A. About 18.5 per cent water
(49) B. J. says: Please state the diameter A. Five inches.
(50) W. W. D. asks: How large a boat could I run with side wheels3 feet in diameter, and an lbs. of steam? A. From 25 to 30 feet long.
(51) W. F. H. asks: 1. How high can waproduced in top of pipe by the escape of steam, as In an ordinary steam siphon? A. From 20 to 25 feet. 2. What length of time is required ton raise ing at is ibs. presence in boher, and toe phpe through which the water is to be raised, of 30 inch-
es diameter? A. Less than a minute, with plenty es diameter? A. Less than a minute, with plenty
of steam. 3. Is this way of producing a vacuum economical? A. Not yery.
(52) J. M. says: 1. I intend building a scow 30 feet long $x 20$ feetwide, with stern wheel. What size of engine would you advise me to get A. An
engine with cylinder $15 \times 15$ will do. 2. What size of stern wheel will be necessary, the above men-
tioned scow drawing 4 feet when light,and ranning at 6 mileaper hour? A.One of from 8 to 10 feet di-
(53) C. D. P. asks: We wish to warm a furnace in the by 70 feet by 18 feet high, with a furnace in the basement. The smoke fue will furnace, where it enters the perpendicular flue What should be the dimensions of the horizontal smoke pipe and of the chimney? A. The smoke
pipe may be 10 inches in diameter,and thechimney fue 12 by 12 inches.
(54) J. W. W. asks: To what depth can a iver descend in the A tlantic Ocean, using a divngg bell? A. We could not fix the limit. It would
depend on the weight of the bells and the capacidepend on the weight of the bel
$i y$ of the compressing pumps.
(55) J. J. H. asks: 1. By what standard are
shot guns gaged A .


|  |  |  |  |
| :---: | :---: | :---: | :---: |
| 6.... | 0.92+ |  | $0.83+$ |
| $7 . .$. | 0.89 |  | .... 0.83 |
|  | 084+ |  | ........ $0 \cdot 88+$ |
|  | 0.80+ |  | $0.81+$ |
|  | 0.79 | 24. | ${ }^{0.61}$ |
| 11........ | ${ }^{0.78+}$ |  | 0.60+ |
|  | ${ }^{0.75+}$ |  | 0.59+ |
| 13. | 073+ |  | 059 |
|  | 0.71+ |  | ... 0.58+ |
| 15. | 070+ |  | 0.57+ |
|  | ${ }^{0.68+}$ |  | 0.57 |
| 17 | ${ }^{0.67+}$ |  | 0.56+ |
| 18. | 068 |  | .. $0.55+$ |
| 2. By what standard are shot numbered ? A |  |  |  |
| No. Diameter | No. | Diameter ininches | Dtameter in fnches |
| 12....... 0.05 |  | .....0.12 | в в........0.18 |
| 11....... 0.08 |  | .....013 |  |
| 10........00\% |  | .....0.14 | T.......0.29 |
| 9....... 0.08 | $2 . .$. | ....0.15 | т T...... 0.21 |
| 8.......0.09 |  | ..016 | F.......0.22 |
| ......0.16 |  | ....0.17 | FF.......0.23 |
| 6.......0.11 |  |  |  |

A. Each maker has his own thandard. The United states standard is as follows: Musket, grains be ween 0.03 and 0.00 inches. Mortar,grains between 0.00 and 0.10 inches. Cannon, grains between 0.25
and 0.35 inches. Mammoth, grains between 0.00 and 0.35 inches.
and $0 \cdot 90$ inches.
(56) F. H. F. asks: Please give me a rule describing a heart cam that will give a perfectly
uniform motion and at the same time pe easily yinform motion and at the same trme be easily
driven? A. Divide the lenth of stroke, $\mathbf{A}$ B, into any number of equal parts, and describe circles

on whicu the cum turns. 1 Alvide the outer circle nto, and draw radil from the points of division The points in which these radil cut the corresponding circles are points of the cam.
(57) A. L. F. asks: How many horse power
will an engineof 18 inchee cylinder by 3 feet stroke ateo turns a minute, with steam cut-of $\frac{1}{2} \$ 4$ stroke, and pressure at 60 lbs. per square inch, give? A. This question can only be answered deflitely by
experiment. All we could do from the data would be to guess at the mo from the data sen Would be to guesi at the mean effective pressure.
You can do this if ou like, thus: Product of mean efifective pressure in pounds per square inch $\times$ area
of piston in square inches $\times$ speed of piston in feet 0011 (58) J. H. K. asks: How can I find the log arithm of a number, asy 25, without using a book
of tables?
A. Theformula is as follows : Let $a=$
any number. Then log. $\left(\frac{a}{a-1}\right)=0.888889 \times\left\{\frac{1}{2 a-1}\right.$
$+\frac{1}{3 \times(2 a-1)^{5}}+\frac{1}{5 \times(2 a-1)^{6}}+\frac{1}{7 \times(2 a-1)^{1}} 1+$ etc. $\}$ In
$\left\{\frac{12}{13}+\frac{1}{3} \times\left(\frac{12}{13}\right)^{2}+\frac{1}{5} \times\left(\frac{12}{13}\right)^{0}+\frac{1}{7} \times\left(\frac{1}{13}\right)^{\prime}\right.$
You can work this out if you feel inclined; but we imagine that you will not care to use this for
mula for flading the logarithms of many numbers (58) A. L. K. eays: 1 . There is a sawmill with two engines and two sets of boilers, each set
having an iron smoke stack 65 feet high 56 inches diameter. the other set are plain cylinders. All burn sawdust. The latter have good draft, but the other, The question is whether, if one of the exhaust pipes ( 7 inches in diameter) is inserted in the flue boller stack, the draft will be inproved. A. It is very probable that the change will improvethe draft 2. If so, at what distance from bottom should the exhaust enter the stack? A. Insert the pipeso that it discharges a intleabove the top of
the bollers.
(60) F. J. asks: 1. What is the best size, cylinder 94 inch diameter by $11 / 9$ inches stroke? A Make it of copper, upright, with a tlue in the cenUse charcoal for fuel.
(61) J. P. asks: Will it require more power
o drive a paddle boat, of two hulls, like the Castalia, than one large hull of the same draft and hull. (62) J. M. asks: 1. About what length, when folded up, would Peaucellier's parallel mo
thon have to be to describe an arc of a circle of 5 feet radius? A. Between 7 and 8 feet long. 2. In what work are quarter twist bells illustrated? A.
In Rankine's " Machinery and Millwork." 3. Are Rankine's works of any use to any one excep those who understand algebra? A. In "Rules and
Tables" scarcely any of the rules are expressed
(63) O. P. says: Two pipes, the shells o Which are of equal thickness, the diameter of one
being one foot, the other one hundred feet, the pipes being filled from the top by forcing wate In: which will burst first, and at what hight? A If the material in the pipes is of equal strength
throughout, the largeat pipe will burst first, as the at the bot $y$ as the diameter; and it will burst
tom, as the pressure is greatest there.
(64) C. P. W. asks: Having had a contro opinion. If we place side valves, I write for your overthe ports of an engine, and make an exact duplicate and attach it to the other, the tw valves being back to back, so that one will make
a steam joint on the cover of the steam chest while the other makes a similar Joint over the not, if you mean a perfectly balanced one.
(65) E. M. says: I have an engine with a to 500 revolutions per minute. What should be the diameter and pitch of screw, and the length much water ought she to draw? A. You can make he boat from 15 to 18 feet long, 5 to $51 / 2$ feet beam. Boiler, 2 feet diumeter, 3 feet high.
(66) W. S. asks: Can water be injected in What is the lowest pressure by which an injector may be worked? A. This will depend upon the construction of the injector, several forme being
in use.
(67) H. W. S. asks: 1. I am about to putin a turbine water wheel, using 75 inches waterin a
circular sawmill, under 16 feet head; the wheel will be 40 feet from the dam, and the water conducted to the wheel through a round tube of 3 feet internal diameter, the tube sloping down to the wheel. In closing the gate of the wheel suddenly, will the momentum or shock, caused by the sudden stop-
page of the flow of water, strain or injure the tube, and will a safety valve be necessary near the
wheel? A. In closing the gate with speed, no safety valve will benecessary; but when the closure takes place instantaneously, you can provide a stand pipe, three or four feet high, con-
taining air, which will act as a cushion. 2. Would taining air, which will act as a cushion. 2. Would the 3 feet diameter tube be large enough for a
wheel uilng 75 inches water, under 16 feet head? $A$. wheel using 75 inches water, under 16 feet head? A.
Yes. 3. Would friction gear answer well to ruo an edging saw for edging stuft from 1 to 4 inches
thick? A. Yes. 4. My neighbor has a turbine wheel 4 feet in diameter, venting 200 inches of water, under 17 feet head, taikng the water through
an incline tube of 3 feet internal ciameter and 200 feet long; the of 3 feet internal ciameter ander this head is rated by the builder at rohorse power, but with the gate
wide open it will not run one run of atones. What 3 the matter with it? A. The wheel may be (88) F. some of the parts jammed.
(68) F.W. asks: I am about to put up a ends I propose to place, on the outside of the posts and studding, one inch plank, to this put on a
sheeting of tar paper, and on this ordinary flooring. Will this answer the same purpose, in every efpect, as putting the inch boards on the inside of the posts, the flooring on the outside, and fill in
the space, of say 4inches, with sawdust? A. The sawdust flling is likely to be the warmer of the
(69) L. R. B. asks: What power does the engine whose pitman is below the center of the
axles exert on a locomotive? I claim that the cogine whose piston is moving ahead and whose crank wrist is above the center of axles is the only one which is doing ang service. A. The ef-
fect is the same, whether the crank is above or be-
(70) E. R. M. asks: 1. How can I make a battery that will last a good while without needing renewing, and be always ready for use? A. The
Minottis one of the best forms of battery for this Minottl is one of the best forms of battery for this
purpose. 2. Of the ordinaryliquid batteries, which is the most powerful? A. The Grove or Bunsen is the strongest.
(71) C. L. T. asks: How are letters placed on glass in street advertislng by thecalcium light?
A. The plain letterings are painted or written, and . The plain letterings are painted or written, and
the more elaborate ones are photographed, on the
(72) T. A. P. asks: How can I construct a small and cheap camera obscura for sketching obnch burning lens, and a plane reflector, 4 by 6 inches. Will these answer? A. These will answer the black on the inside, in an aperture in the top of which place yourlens, and over this your reflector at an angle of $45^{\circ}$.
What is the best recipe for green ink? A. Digest 1 part
blue ink.
(73) J. E. B. asks: Where oils, reduced or can I prevent the mixture from becoming cloudy? A. The sirup does not dissolve freely in your oil
(74) G. B. A. asks: What is the best prepa ration for rendering cotton freproof? A. A solu
(75) D. B. B. says, M reply to J. G. R., who asks how to construct a cheap oxy hydrogen blow ipe: Take a round plece of wood about 4nche
long and 1 inch thick, and two brass tubesabout nches long; to an ond of each of the tubea attach a gun nipple. Bore holes in the wood obliquely and of such a diameter that the brass tubes, whe nserted, do not move easily. Bring the gun nipples to about three eighths of aninch apart. The be the larger, so as to allow twice as much gas as be the larger, 80 as to allow twice as
comes from the oxygen tube to eecape.
(76) A. W. L. says, in reply to W. S., who
sles how to kill or drive of flegs and sand fles: Let him procure crude p: troleum, just as it comes out of the wells, and apply it to those parts of the
body whloh are exposed to the attacks; and he body whloh are exposed to the attacks; and he
w山l not be much troubled by them, if he is even will not be much troubled by them, if he is even so much as molested. On Lake Superior, mosqui-
toees and sand Hiles (the latter so diminutive that oee and sand iles (the latter so diminutive
they are scarcely visible) will not bite us when we have black oll, as it is termed, on our hands and faces; and it is a never failing remedy for the extermination (after one or two applications) of bugs from household furniture. Of course when used on the person the odor is not very pleasant; butin purniture
(77) D. R. K. says: H S. C. asks how much fuer is required to melt 1 tun of iron. You anhavean ordinary cupola, and we can melt 2 tuns harean ordinary cupola, and
iron with 800 lbs. Lehigh coal.
(78) M. W. M. says, in reply to H. B, who
asks : Does the hair grow after death? Steelo's "Pbysiology" says that the hair is sald to grow after death. This is due to the fact that, by the shrinking of the skin, the part below the surface is
caused to project, which is especially noticeable in caused to p
the beard.
Minerals, etc.-Specimens have been re ceived from the following correspondents, and examined, with the results stated:
C. D. H.-It is an impure quartz sand.-L. J. S.It is similar in composition and properties to fullr'searth. Your clay was probably not of the same obaracter as ordinary clay, which is a hydrated silica of alumina containing some oxide of
iron. Other substances were most likely present Lime could be mixed with clay so as to be imper vious. But the hydraulic lime will only be of goo quality when the lime and clay are mixed in proper proportions and calcined at a proper temperature. The wet soil you mention beoame pulverized owing to the loss of water on drying, whic substance being at the same time destrioned of th M.-It is partly decomposed muscovite, a variety of mlea.-F. McC -As to your spaclmen of cheese and the poisoning resulting therefrom, similar cases bave been brought to our notice where perons have become sick after eating cheese, and pieces of cheeso in character similar to that for-
warded have been examined without yielding traces of ordinary poisonous bodies. It would fa cilltate an explanation of the unwholesome char aoter of such cheeses if it were known whethe the milk was of proper Hind, or whether there ring ting unubal in the processof cheese maby drinking milk from a oow which had eaten animal itself being unaffocted.-W. J. L.-No. contained oxide of iron, alumina, and ellico, with a small amount of carbonate of lime. Also lime potash, and soda salts. The solubility of these zal imparts a ealine taste to the powder. No. 2 differ rom No. in the considerable amount of soda and potash salts, and also baryta. They exist partly in combination with sulphurlo acid, as sulphates.
J. E. M. asks: What do cake bakers pat in
their iring to make it hold the shape?-J. S. B . their iring to make recipe for the curo of chick en oholera?-J. A. Jr. asks : How do the English prepare and finish bone, produolng a beautifully
smooth surface?-J. R. S. asks: Can blindness in a horse, causedby having blind teeth, be cured?-H. E. W. asks: Is lime a year old asgood for tanning as that made three months ago ?-S. D. P. Jr. says: I have a new carriage from which mud has taken off the varnish in places. Can I restore the work to its original app

## COMOUNICATIONS RECEIVED.

The Editor of the goirritific Ambrions acknowledges, with muoh pleasure, the receipt of or iginal pap
On the Earth and the Moon. By M. D. H On Botanical Classifcation. By J. W On Frozen Water Pipes. By H. S. C. \& Co., and by T. G. B.
On the Age of the World. By D. C.T. On the Sun's Orbit and Rate of Motion. By J. H. G.
On the Flight of Birdg. By R. O. D., and by F.G.F.

## A lso enquiries an danswers from the following .

## F. A. L. Jr.-J.N. Q.-O. A. F.-8. T. W.-F

-C. W.-E.A.M.-G.W.M.-H. F.J.-P.S.-A. V
R.S. R. - C. S. P.-E.P.L. - M. B. - S. A. H. - C.F.
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 deollnee them. The addrese of the writer should al

## ways be given.

Enquiries relating to phteats, or to the patente-
b'lity of inventions, ssiphments, etc., will not be b.lity of inventions, essiphments, etc., will not be
published here. All suoh questions, when finitials 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 mall, if the writer's address is given. Hundreds of enguirtes analogous to the following Wre sont. etc.? Who sells talking machines? Whose is the best method of shorthand writigg? Who makes
the best hydraullo elevators? Who makes a rella
ble rain gage? Who makesan effectivecalorio en gine? Who sells milk-condensing apparatus: all such pergonal inquirles are prinied. as will be observed, in the coumen of "Bualiness and Pe pose, subject to the charge mennoned at the bea can in this way be expeditioualy obtained.
[OFFICIAL.]
INDEX OF INVENTIONS
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Gaaretort, W. F. Welble
Gate, farm, S. R. Holt...


## or

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 Grial aryer, R, s. R. Reynoldas (ry...Grat Grain scourer, T. W Allace.
Grate bar, A. W. Cram......
Grate bar, R. C. Graves (r) Harnees कnap. L. Humbert...
Harvester, J. H. Elward (r).
Harvesters, J. H. Elward .. Harresters, $\begin{aligned} & \text { Harveter. Buxton and Howe (r) } \\ & \text { Harvester, S. S. Loudenslager.. }\end{aligned}$. Garvester rake, J. P. Monnet.
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Zorseehhoe nalle. making. A. D. Bingha
 Hose, drying and atretch
Hose jolnt, E. Daston... gose, making hydraulic, J. .........iley
tce macLine, W. H. H. Bowera... ron, manufacture of, J. F. Bennett
Jack, thill coupling, J. H. Combe... Siln, peat, W. E. Wright
Lamp chimney aitachmeth, H. Johnsion Letter box a alumg, J. Harrison..........
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Pin and clamp, Pipe Attings, tapping, J. Kacerovsky
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Plow, ditchng, A. L. Harned. Plow, ditching, A. L. Harn
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Rairoad signal, electric, Slemens Rake, horse hay, D. P. Sharp...
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Screw, wood, A. Cumming

$$
\begin{aligned}
& \text { Screw, wood, A. Cummings........... } \\
& \text { Screw, wood, Litchneld and Booklen. } \\
& \text { Screws of rolls, operating, J. S. Wor }
\end{aligned}
$$

$$
\begin{aligned}
& \text { Seal, metallic, E. J. Brooks... } \\
& \text { Sewing machine, H. A. Blanch }
\end{aligned}
$$

$$
\begin{aligned}
& \text { Sewing maohine, \&. A. Blanchard..........161,471. } \\
& \text { Sewwing machine, J. . . Burr.............. }
\end{aligned}
$$

$$
\begin{aligned}
& \text { Sewing machine, O. Farrar.................... } \\
& \text { Sewfing machine attachment, D. M. Mellox. } \\
& \text { Sewing machine button hole, J. McClioske }
\end{aligned}
$$

$$
\begin{aligned}
& \text { Sewing machine button hole, J. McCloske, } \\
& \text { Sewing machine feet guide, G. Vincent... }
\end{aligned}
$$

$$
\begin{aligned}
& \text { Sheet metal die, N. C. Stlle } \\
& \text { Shoe, C. Perliy (r)... }
\end{aligned}
$$

## Shoe, c. Perley ( $\mathbf{r}$ )

Shoe Boles, drying, A. F. Smith (r)
Shoes, exhibiting, R. T. Leaverton
Shoes, exhibiting, R. T. Leaverton.
Shoemakers, awl for, S. A. Smith.
Shovel, T. J. Blake...... ..............
Shuter and blind fastening, , H. Cral Shutter fastener, C. Russell. Shuttle mechantsm, G. Crompton. Sicer and corer, apple, SHer \& Brooks. Spinning ring die, Forehand
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Stereotype blook regiter, A. J. O'She Stove, E. Smith (r).
Stove, magazine, E. Bubsey.......
Stump extractor, w. H. Fut
Stump extractor, W. H. Fulton.............
Sugar, manufacturing arard, F. O. Mathie Bsen
Sugar, manufacturing oard, F. O. Mat
Tabbe, converttble, F. A. GIlbert......
Table, folding extenion, A. W. Fay... Table, rolding extension, A. W. Fa
Table implement. O. W. Taft.... ... Table implement. $\mathbf{O}$. W. Taft.
Thill coupling, A. w. Forwoo
Thread, twine, etc., making. Sutherland et $a$
Tile molding machine, c. Diebold..
Tlppet and muff, oomblned, J. Engel.
Tobacco machine, lump, D. W. De Fore
Toy block, C. M. Crandall ( $r$ )
Toy pital, T. Case.......
Trap, fis, H. B. Earing
Trap, Ay, D. E. Roe ..
Trimming, J. T. Roas
Trimming, J. T. Ros.
Truck, hand, H. Parker


EXTENSIONS GRANTED


$$
\begin{gathered}
\text { HKen. } \\
31,578 .-P_{\Delta P}
\end{gathered}
$$

DISCLAIMER FILED.
31,578.-PAPER Folding Machine.-W. H. Milikenet al.
DESIGNS PATENTED

## s.229 and 8,230. ron, Mich.

 ESB.-T. B. Atterbury, Pitebburgh Pa ,233 to 8,236.-CARPETs.-R. R. Campbell, Lowell, Mass 8,240 to 8,244 -TyPE.-C. E. He eser, Boston, Mas6.
8,245.-TyPE.-P. A. Jordan, Phladelpha, Pa.

 ,253.-Carpets.-T. J. Stearna, Bobton, Mase 8,253-CARPET8.-T. J. Stearn S, Boston, Mass.
8,254 -TowzL RACz.-C. Ten Eyck, White Hoase Sta
tion, N. J. 255 and 8,256.-Robber Boots, ETC.-A. R. Trotter
Providence, R. I.

## TRADE MARKS REGISTERED

 dale, Mase.




 2,ssi.-Boors, ITC.-Grair \& Co., Phlladelphla, Pa.
2,3s2.-Corron Prints.-Hamiton Woolen Co., South_
 2834.- PETROLEUM, yTO.-Power \& Co., London, Eng. 2,335.-FLoor Cloths, XTC.-F. Walton, Staines, Eng.
2,3s6.-CIDR MILLB.-Whitman Works, St. Louls, Mo.
2397.-Atoutzers.-Young et al., New York city. $2,337 .-$ AtomizErs. - Young el al., New York city.


CANADIAN PATENTS.
MARCH 23 to April 1, 1875.

A. Pease, Boston, Mass., U. S. Lamp. Marc
$28,1875$.
ss7.
.L.
Schwendler,
March 27, 1975 ,
graph. March 27,1975 .
,5s8.-J. A. McMartin,
${ }^{27,593 .} 1875 \mathrm{~W}$. m . Bell et al., Guelph, Ont. Tubes for reed 4, organe. March 29.1875 .
4,540.-J. H. Barbarick, C S1, 1875.
4,541.-E. W. Phelpe et al., Newark, Ohto, U. s. Har. Vester grinder. March 11, 1876.
,542. J. Sugden et al., Lawrence, Mass., ©. s. Horte ,542.-J. Sugden et at.,
check. March 31,1875 ,
$4,543 . \rightarrow$ T. Hodgson, Amh
 er. April 1, 1875 . ,is45.-E. A. Hornbastel el at., Guelph, Ont. Wood and
metal tap. Aprll 1, 1875. metal tap. Aprll 1, 1875.
$516 .-$ F.Marsh, Montreal,

April. 18 . Morgan, Andover, N. H., $\boldsymbol{J}$. s. Wedge cut
ter. Aprll 1 , 1875. ter. April 1, 1875 .
4,548.-G. B. Dixwell, Boston, Mass., U. S. Steam en
gine and bofler. $\uparrow$ I. rili, 1875.
$4,549 .-$ I. Bridgman, Toronto, Ont. Ratlway cars. Ap rll 1, 187K.
 ,551.-J. W. West, Boston, chine. April 1,187 chine. April 1, 1875.
.552 - J. Porth et all, New York city, J . s. Nafl ma.
chine. April 1,1875 . chine. April 1, 1875.
4.559.-H. Bland, Lliston. Eng. Sewing mactine and ac
ceesories.

 4,556 and 4,657.-1. Do witt. Grand
Wabhing machine. April 1, 3885 .

