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loping Machine. Address W. Manley, Rochester, N. Y. Set of Mechanical Curves, as illustrated in Sci. Am.
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New York.
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Hydraulic Presses and Jacks, new and second hand. Lathes and Machinery for Polishing and Buffing metals.
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valuable for strength and durability. Circulars free ittsburgh Steel Casting Co.. Pittsburgh, $\mathbf{P a}$
M. Shaw, Manufacturer of Insulated Wire for galvanic
and telegraph purposes, \&c., 259 W. 27th St,. N. Y. and telegraph purposes, \&c., 259 W. 27 th St., N. Y.
Shingle, Heading, and Stave Machine. See advertisement of Trevor \& Ca, Lockport, N. Y.
For Solid Wrought iron Beams, etc., see advertisement. Address
Hithograph, etc.
Articles in Light Metal Work, Fine Castings in Brass, Malleable Iron, \&c., Japanning, Tinning, Galvanizing.

See Boult's Paneling, Moulding, and Dovetailing Machine at Centennial, B. 8-55. Send for pamphlet and
sample of work. B. C. Mach'y Co.. Battle Creek, Mich. Wanted-Novel and practical invention, by a reliable house, for manufacturing. Address Post Offlee, Box 25, Chillicothe, Ohio.
strong as malleable iron castings, at abo
price. See their advertisement on page 33 .

## Ry

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rections for drilling glass. $-\mathbf{0}$ o. 0 . will find something on violing on p. 75, vol. 36.-H. E. W.'s query as to lightning rods was answered on p. 44, vol. 36.-H. N. T.
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J. C. R. will find a recipe for a depilatory on p. 186, vol 34.-A. E. H. will find something valuable on the natur of electricity on pp. 195, 228, vol. 33.-D. D. V. will find
a recipe for a shoe polish on p. 73, vol. 26.-J. M. T. a recipe for a shoe polish on p. 73, vol. 26.-J. M. T.
U. M., B. H., J. A. M. J., W. F. C., E. S. B., C. . S. mend books on industrial and scientific subjects, should address the booksellers who advertise in our columns, all of whom are trustworthy firns, for catalogues.
(1) H. L. W. asks: What is the size of the
stones 4 feet 4 inches in diameter and a bolt reel 18 feet city, you will need an engine of from 40 to 50 indicated horse power; but you can do fair work with an engine only half as powerful.
(2) B. H. asks: What pressure will my boiler stand? It is $\frac{8}{6}$ inch thick in the body, and $94 /$ in the ends; it is of cast iron, 4 feet long by $111 / 2$ inches $\ln$
ternal diameter. A. Working pressure, about 100 lb ternal diameter.
(3) J. P. L asks: How can I calculate the power required to punch sheet metal? A. Professor
Rankine's expression for calculating the work in foot pounds per stroke is: $12,500 \times$ circumference of hole thickness of plate) ${ }^{2}$
(4) E. J. D. asks: How many lbs. welght dropping 25 feet, will work three lift and force pumps,
the pumps making 40 strokes per minute each, and rais ing water 60 feet, being each 3 inches dtameter of barre with 5 feet stroke? How long would it take the weight
to descend? A. The question is rather indefinite; but if you will specify your meaning more plainly, we will
in endeavor to answer y
sketch of your device,
(5) E. J. W. asks: 1. How can I find the height and diameter of a smoke stack for a horizonta of the grate surface. 2. Should a boiler set in brick It is not necessary, other thingsbeing equal.
(6) C. H. asks: Please tell me if it is advis able to use a cross pipe on a double-acting water ram,
from the ram to the head? A. We would be glad to receive a sketch and description of the present or proposed arrangement; and
(7) S. S. asks: In the case of pulleys with curved arms, is the strength of the arms at all affecte by the direction in which the pulley is made to revolve
A. We do not think the difference is of much impor
(8) C. B. H. asks: With a pipe $2 \frac{1}{2}$ inches in diameter, with 5 feet head, on a 9 foot overshot wate wheel, what amount of power will I get? A. With a
well constructed wheel, you might obtain $\frac{1}{8}$ of a horse
(9) R. P. D. asks: Is there any difference (9) R. P. D. asks: Is there any difference in the obstruction of the fiow of the water, between
the same rock in the same race (the depth of wa-
ter being the same in both cases) being placed at right ter being the same in both cases) being placed at right
angles, or at an angle of say $45^{\circ}$, with the bottom of the race? A. As we understand
there would be no difference.
(10) J. H. asks: How large a volume of wa ter can a 10 horse engine raise to the height of 150 feet How large a continuous round stream would that vol
ume make if not subjected to pressure? A. It will de pend upon the size of the pipe, which can belarge or
small, and the columns of water will still be solid; but small, and the columns of water will still be solid; bu
the volume discharged in a given time will vary because different amounts of power will be expended in over
(11) T. T. E. asks: Who was the maker of the first steam locomotive in the United States? What
was the man's name whoran it, and where did the tria was the man's name whoran it, and where did the trial
trip take place? A. The first locomotive that ran in this country was built at Stourbridge, England, by Mr
Horatio Allen, and was imported for the Delaware and Horatio Allen, and was imported for the Dela
Hudson Railroad. This was in the year 1829.
(12) W. W. B. asks: Is there anything that I can do to the glase in my show windows to preven dampness freezing thereon? A. The remedy is to keep
the air inside the store dry, so that there shall be no the air inside the store dry, so that there shal
moisture to fornn ice crystals on the windows.
(13) J. A. W. asks: What is the proper number of the wire used for winding the magnet for the engine described in the Scientific American Supple
ment of May 6,1876 ? What is the proper size for the magnet? A. Engines of this kind can be made of vari magnet? A. Engines of this kind can be made of var
ous sizes; a small one with cores about an inch and a half long, and wound with about 200 feet of copper wire,
will work well with one or two cells of battery of low resistance.
(14) E. A. S. says: A friend and I want to put up a short telegraph line. Will it work without a relay instrument? If so, how many $1 / 2$ gallon cells of
the Callaud battery will it take at each end? To work without the relay. how many feet of No. 22 insulated copper wire will it need around each core of the electromagnets of the sounder? Will it work with ground cir
cuit, or would it be best to use double wire? cuit, or would it be best to use double wire? If we use
the ground circuit, how large an iron plate the ground circuit, how large an iron plate shall we
bury? Will silver do, instead of platinum, for tips on the sending key? A. It is difficult to answer your ques From six to mile length without a relay, the sounders having 250 o
300 feet of No 32 copper wire each. The ground cir 300 feet of No. 32 copper wire each. The ground cir
cuit should not be used for very short lines. Silver is not a good substitute for platinum contacts.
(15) A. S.-Use a little litharge in your ink The burnishers used in finishing plated goods are of va rious forms; some of usually made of hard, polished steel or bloodstone.
(16) P. F. asks:1. How can I dissolve bones with acid? A. Digest the bones for some time in warm,
strong hydrochloric acid. 2 . Is sulphuric acid best for strong hydrochloric acid. 2. Is sulphuric acid best
this purposes A. No. Hydrochloric acia is best. ware or porcelain-lined iron are best. 4. How much acid is required to dissolve a ton weight of bones? A. The amount of mineral salts contained in bones varies
to some extent with the age of the animal from which to some extent with the age of the animal from which
they were obtained, the younger bones contain the smaller proportion. The average amount of inorganic constituents of the bones of cattle is from 40 to 70 per phosphate of lime. In practice, it will be found that a phosphate of lime. In practice, it will be found that
weightof acid equal to that of the bones is needed.
(17) J. B. asks: What is a good prepara mon for prepariug canvasduck or cotton cloth to preven in a bath of ammonia
with plenty of water
(18) J. V. B. asks: What oil is the best to soften lithographic rollers? A. Cover the rollers with glycerin, not oil.
Would a coati
teel 9 A. Yes.
(19) A. F. asks: How are hairpins var-
nished A. A. The varnish consists of gum copal or anime with fine ivory black, turpentine, and a little boiled oil. The coating is applied by dipping the smooth pins in a very thin solution of the aoove, and drying at as high a temperature as the varnish will bear without in-
(20) M.
(20) M. G. P. asks: Are not meerschaum pipes, after they have been used a time, subjected to are sometimes artificially colored with annatto and to
(21) W. M. says: I have discovered a new or partly new method of case hardening: Heat the cast with prussiate of potash, pulverized, until the metal This is a quick red; then dip the metal in muriatic acid
(22) J. L. I. asks: 1 . Is it practicable to increase the steaming capacity of a small portable
engine by a smaller upright tubular boiler suspended in the smoke chamber in such manner that
the heated gases shall surround a part of the auxiliary boiler and also pass up through its tubes, head first to the vuxiliary boil and the per pipe inserted in its shell at the height of its proper water line, to the main boiler? Steam is to be also taken by a pipe from the top of the anxiliary boiler to the steam
dome of the main boiler. A. This arrangement mayanwer, if the products of combustion leave the boiler at a ery high temperature. 2. How can I burn coal dust in a small portable engine? A. The general idea is to in-
crease the draft, and prevent the coal dust from forming crease the draft, and prevent the coal dust from form
into large masses so as to choke up the air spaces.
(23) G. T. asks: 1. What power can be obained from a small engine, the cylinder of which is $2 \times 6$ inches stroke, with steam at 60 or 70 lbs . pressure, run-
ning at 150 revolutions per minute? ning at 150 revolutions per minute? A. About 1 -horse
power. 2. What size boiler, horizontal and set in brick, ter, and 3 fcet high.
(24) T. K. says: In a work on engineering, this rule is laid down for finding the working pressure
of steam boilers: $34,000 \mathrm{lbs}$, per square inch is the tensile strength of boiler iron; the rule for 3 inch plate is to divide 4,250 by the diameter of the boiler in inches The quotient is the working pressure, being one sixth of the bursting pressure. And it says that the rule for $1 / 2$
inch plate is to divide 56666 by the diameter of the boilinch plate is to divide 5666.6 by the diameter of the boil-
er in inches, and the quotient is the working pressure
I I find that the figures in the firstrule are got by dividing
and the tensile strength by 8 , and the figures in the latte rule by dividing the tensile strength by 6 . What b, obtained? A. These numbers are assumed, it being considered advisable to allow a large margin on the safe (25) A. W. S. asks: Where can I find the method for working out the transit of Mercury of 1878 ?
A. In the Nautical Almanac, published by the Bureau of A. In the N, Washington, D. C., the figures are published
Navigation,
three years in advance for the purpose of ships which are taking long voyages.
(26) G. H. W. asks : Can egg or blood al bumen be preserved for several months? A. Yes. Dry
it perfectly by allowing to stand in a close vessel over pumicestone moistened with oil of vitriol.
(27) J. R. asks: Where can I get silica for making infusible brick ? A. The dried sand from the sea shore, or calcined and gro
pure silicic acid) will answer.
(28) M. D. K. says: I have a safe with wo vaults inside, and a combination lock on each. One
of them is now locked, and the combination lost. wish to get it open, but see no way but to drill a hole on a line opposite to the holes that are in the tumble combination. The place where I want to drill is 21 nches thick and of chrome steel, so hard that no stee drill will have any effect on it. Can I use a diamond
drill \& A. The best forms of diamond drills are patent ed, and you will probably find itcheaper and more satis factory to obtain one, with full directions for use, from a manufacturer. It is quite likely, however, that you can soften the metal sufficiently, by the aid of a blowpipe, to penetrate it with an ordinary quently be picked without great trouble by experts; and if you can have the safe opened in this manner, it will
probably be more satisfactory than either of the others.
(29) J. E. F. says: In answer to G. W. R., ou say: "Use 10 to 13 lbs. sulphuric acid to 100 lbs. olein, thus separated, what is the proportion of acia to 100 lbs. tallow ? A This method is not employed in the manufacture of but-
(30) J. R. C. asks: Please publish a recipe for printers' red ink 9 A. Boil linseed oil till smoke arises, then apply a lighted paper stuck in a cleft stick;
and then remove the pot from the fire, allowing the oil and then remove the pot from the fire, allowng half an inch ong. Add 1 lb . rosin for each quart of oil, and $1 / 2 \mathrm{lb}$. dry brown soap cut into slices; put the latter in cau-
tiously, as the water in the soap causes a violent commotiously, as the water in the soap causes a violent commo-
tion. Then grind up the oil with sufficient pigment.解d the a stone with a muller.
(31) C. P. B. asks: If a ball be fired from a gun resting on the ground in a perpendicular position,
willthat ball have acquired the same velocity and mo. mentum in its descent when it reaches a point 10 foefrom the muzzle of the gun that it had in its assent when it was at the same point? And will it penetrate as far into a piece of wood in its descent, say 10 feet from
the muzze of the gun, as it would have penetrated the muzzle of the gun, as it would have penetrated
in its ascent had the ball struck the wood at the same distance from the muzzle of the gun ? A. No; but in a
vacuum it would.
(32) M. L. F. says: I have a water tank 18 inches in diameter and 3 feet high. How many lbs.
weight will it require to force the water 30 feet high through a $\%$ inch pipe? A. It will depend upon the velocity. It will take a weight of about 3,300 lbs. to just
sustain the column of water in the pipe; and by insustain the column of water in the pipe; and by in-
creasing the weight, the water will be forced out.
(33) J. K. asks: How much power (rated as horse power in a ateam engine) can be got from a suspended weight weighing 5 tons and falling 5 feet per hour?
A. Your figures give 0 O282 of a horse power, nearly $\%$ ?
(34) J. H., Jr., asks: What is a safe working steam pressure per square inch for an upright boiler 30 inches in diameter, by 6 feet thigh, with twenty 3 inch
flues, 4 feet long, made of $3-16$ inch iron
A. From 50 nes, 4 feet long, made of $3-16$ inch iron? A. From 50 (35) E. J. B. asks: What is the chemical symbol for attar of roses ? A. It consists of two com-
pounds, one of which has but little odor. It is polymeric pounds, one of which has but intte odor. F . it pollymenc
with oleflant gas, but its composition is not accurately known. Miller giv
(36) H. H. B., Jr., says: I have made several mall models of sheet brass and cast brasss, and in
finishing I use a dipping bath of nitric acid, which
 but the castings turn a dirty, coppery back color. How
can I remedy this \& A. The rolled brass usually contains a largeg percentage of zinc (yellow brass); besides
its surface is denser and more niform than that of cast brass. Use ise monser and more uniform than that of caste acid, and touch it up a little
brean absequently with rouge or tripoli powder.
(37) W. E. C. asks: I wish to use secondband tomato cans, and a good many of them are very
nusty. What solution can I steep them in to take off the rust, so that they can be wsed again \& A. Try a pickle of dilute oil of vitriol. We do not think it advisable to attempt using the cans again for fruits or vegetables
without first having retinned them, which is notimprac.
(38) C. M. M. Co. says: We tried acetic acid with glue for covering silver on mirrors, but it did other methods? A. Use genuine asphalt (free from coal tar) and spirits of wine. After the addition of the latter allow to stand some time before using. Make of a
suitable strength for using, and give as many coats as equisite fory your purpose.
(39) G. H. B. asks: What is the best disinfecting agent to use in a room where persons sleep at
night, and are also employed during the daytime ? On building a fre, a close heavy smell fills the room. Carbolic acid and water sprinkled on the floor seems inadequate and evaporates rapidly. Can you suggest any harmless agent that will kill the close smell q A. The
first thing to be done in a case of this kind where carbo lic acia, which is one of the most powerful disinfectants known has been tried, and found, as you say, inadequate, is to investigate the room and its surroundings, and discover the cause. It must be remembered that disinfec-
tants at the best but palliatives of the evil; and if the source remains, the smell and perhaps miasm may be generated faster than its capacity for in jury is destroyed by any disinfectant, however powerful. A room without such positive source of noxious gases, should not be-
come positively offensive, even when occupied by a come positively offensive, even when occupied oy a
number of persons day and night. Instead of beingregarded as a substance easily volatile, carbolic acid is one of the most persistent disinfectants, and the objection to it is not the thoroughness with which it does the work, but that its odor is so penetrating as to be to many
unendurable. Use chloride of lime exposed in shallow nendurable. Use chloride of lime exposed in shallow
vessels, if not too disagreeable to you. This does the vessels, if not too disagreeable to you. This does the
work of disinfection very thoroughly. Or you can use a more elegant, though somewhat more expensive disinfectant, in the shape of permanganate of potash; and a
solution of this salt in water containing persulphate of iron (Condy's fluid) is excellent.
(40) U. S. A. asks: How can I make a liquid for shampooing the hair? A. Take carbonate of ammonia $1 / 2$ oz., carbonate of potash 1 oz., water 1 pint.
Dissolve these, and ald tincture of cantharides 5 fluid ozs., rectifled spirit 1 pint, good rum 3 quarts. Moisten ozs, rectifled spirit 1 pint, goor rum 3 quarts. Moisten then wash with cold water.
(41) H. J. asks: 1. How high above the watine on a return flue boiler can $I$, with safety or withA. The fire should not strike any part of the boiler above thewater line. The products of combustion, after passing through the flues and having been cooled down, are sometimes returned along the sides and over the top
of the boiler. 2 . How can I tell the horse pow of the boiler. 2. How can I tell the horse power of a boiler and of an engine 9 A. We do not know what is
meant by the horse power of a boiler. As foryourengine, the power will depend upon the pressure of steam, the point of cut-off. and the piston speed. See p. 33, vol. 33.
(42) L. W. S. asks: Will a two flue boiler, feetlong and 48 inchesin diameter, supply with steam
engine $16 \times 36$ inches, running at 75 revolutions per minute, if I double the length of the grate bars, making hem 7 or 8 feet long, using dry pine slabs for fuel 9 A. The boilerwill be large enough for average work if the engine iswell designed, but probably will not supply sufficient steam to run the engine up to full power, with leam following for 28 or 78 of
(43) C. C. B. asks: What kind of lamp is most efficient for heating the boiler for a small steam
engine? Whatoil is the best? A. Good alcohol is the
best fiuid for use in any lamp where luminosity is not re-
quisite, and smoke is objectionable. For this purpose crude metty ylic alcohol (methylated spirit wood naphtha)
is nearly, if not quite, as useful, and is very much is nearly, if not quite, as useful, and is very much
cheaper. Any of the heavier oils, sueh as lard, sperm, mineral sperm, and many of the heavier distillates of petroleum, may be used for this purpose with very good
results, provided a suitable tubular boiler and a tall chimney is employed. Under these conditions complete combustion is obtained and there is no soot deposited.
(44) A. B. Y. says: 1. I have been making clay moulds from type, and I have taken a beautiful im Is there anything that would prevent its cracking? A Add a little plaster of Paris and salt; dry at a very mod crate temperature at first, and the mould will not crack crate temperature at first, and the mould will not crack
2. What could be putinto the clay that would make it very hard afterit was dried? A. Try a strong solution
(45) J. L. A. says: Is there any known acid that will cut or eat glass? If so, what is it kept in,
and what use is made of it? A. Hydrofluoric acid is used or this purpose. The acid is usually kept in vessels of gutta percha or lead. It is obtained by gently heating together fluorspar and strong oil of vitriol in a suitable retort, and dissolving the
hydrogen) in distilled water.
(46) F. E. K. says: 1. Our boilers are 22 fcet long, and 44 inches in diameter, thickness of shell is $3-8 \mathrm{inch}$, of heads $1-4 \mathrm{inch}$, with two 16 inch fues. The heads are stayed with 5 stay rods, and 20 stay bolts.
There is one 4 mich safety valve for the two boilers. I once asked you what is the greatest pressure they wil once asked you what is the greatest pressure they will
safely bear. You replied: From 50 to 60 lbs. Do
you consider them term "low pressure" is rather indefimite. Thus, 50 o 60 lbs. per square inch might be considered high pres-
sure for marime boilers, and low pressure for small sure for marime boilers, and low pressure for small
stationory boilers. In the case of your boilers, the presure is not much below the average that is msintained in boilers of about the same size. 2. What is the safes water, load the safety valve to the desired pressure with heat the water gradually.
(47) P. W. S. says: I have a tank or cisern holing $W$. ping it out? A. If it becomes too thick to be taken out with a dipper, it is scarcely probable that an ordinary pump can be used. You might employ some form of
steam ejector in which the steam would first soften the tar, and then force it out; or a steam pipe might be in roduced into the tank, and when the tar was softened it
(48) J. J. S., and others: The specific heat of water is found to be higher than that of any other sub-
stance, and for this reason is taken as unity. If we take stance, and for this reason is taken as unity. If we take
1 oz. water at $174^{\circ}$ Fah., and 1 oz. ice at 32 Fah., and put them together, we shall have, when the ice has melted, 2
ozs, of water at $32^{\circ}$. The ounce of water has therefore parted with $142^{\circ}$ of its heat in melting the ice, which heat is said to have bec its maximum of temperature. Here again this apparently anomalous phenomenon occurs. When the temperature of the water reaches $212^{\circ}$, it becomes stationary; and urther addition of heat is absorbed in converting the water inte steam, which has the exact temperature of endered latent, with an accompanying change in form ondere wherm water to steam: or from solid to liquid, from liquid to gaseous. On condensation of the steam and reconrendered latent team condensed at $212^{\circ}$ gives out 950 of latent heat. its descent from $212^{\circ}$ to $32^{\circ}$, it gives out $180^{\circ}$ sensible heat, and again in its recongelation it restores $142^{\circ}$ of latent heat, amounting together to $1,272^{\circ}$. Pressure in
fluences the boiling point of water, and for that reaso water may, by the application of adequate pressure, be heated so as to melt lead. Likewise, as the pressure de-解 8 Alps, which is 8,400 feet above the sea, water boils at $184^{\circ}$ Fah.
(49) J. M. L. says: Please tell me the best method of clarifying cotton seed oil? A. The best method is to treat with sulphuric acid, and afterwards
with steam, as follows: The agitator is constructed of wood, lined with lead. After introducing, say 500 ga ons oil, the agitator is set in motion, and 26 lbs. oil of vitriol are added by means of a perforated leaden trough, so as to spread it as a shower over the whole
surface of the oil. The time employed in the addition of the acid should not be less than 30 minutes, and the agitation should be continued for 8 hours. It is then al allowed to stand for 10 hours, the acid drawn off, and the oil pumped into a steaming tank of iron. It should then be steamed for 8 hours with $1 / 2$ inch steam pipe, at
20 lbs. pressure. Allow to stand for 30 hours, draw off 20 lbs, pressure. Allow to stand for 30 hours, draw off
water, and pumped into receiving tanks (of wood lined with lead). A competent carpenter should be able to
construct the apparatus. The lead lining should of construct the apparatus. The
(50) S. E. E. asks: Please find enclosed some powder called porous silica, for polishing metals,
etc. Can this be made artificially? A. A similar article may e prepared by treating a strong solution of water glass (silicate of soda) with a small quantity of strong oil of
vitriol. If the solution has been sufficiently strong, after standing a few hours $\dot{\mathrm{m}}$ a warm place it will completely gelatinize. Wash this well with cold water, decant or
filter off the washwater from the gelatinous silica (hyrated silicic acid), place the latter in a suitable vessel and dry over a good fire. See also articles on pp. 20 and
240, vol. 35 .
(51) J. McI. asks: 1. What is the most simple process of converting chloride of calcium into chloride
of lime (bleaching powder)?
A. This is not feasible. Hypochlorite of lime (chloride of lime, bleachingpowder) is commercially prepared by exposing slightly moist slaked lime to an atmosphere of chlorine gas, which ab-
sorbs it largely. 2. Is not muriates of lime the same
ent names for the same substance. The latter is the
proper appellation. 3. Can dry silicate of soda be dissolved by water alone, hot or cold? A. It is quite soluble
in boiling water. Cold water does not dissolve it very rapidly.
(52) M. B. asks: How can I remove the pitch stams from an engraving? The stains were from the colored gom exuding from the retaining board of the frame. A. Soak the print for some time in hot water, and then $\dot{\mathrm{m}}$ a solution (strong) of chloride of
lime. This will remove the stain without injuring the
$\underset{\text { engraving. }}{\text { (53) A. }}$
(53) A. J. D. says: 1. I wish to make some of the glue by the recipe given in your reference book, but do not know what kind of ether to use? A. Use
good petroleum naphtha instead of the ether. It is maintained by many that this gives much better results.
The naphtha should be warm. 2 . Will vulcanized rue naphtha should be warm. 2. Will vulcanized
rubber answer9 A. Vulcanized rubber will not answer Use crude caoutchouc. The ether referred to in the or common ether.
(54) E. J. B. says: One work on chemistry mentions oil of rose as an essential oil containing oxygen, and another says it contains no oxygen. Can
you tell me its composition? A. The essential oil of rose is destitute of oxygen; it is a carbo-hydrogencompound. he proper formula is $\mathbf{C}_{20} \mathbf{H}_{20}$
(55) T. H. K. asks: What can be done with copal varnish when it gets thick and candied? Can it be thinned, so that can be used A. It will be necessary to medt the candied varnish, and, while fused, to add a should be exercised in order to avoid accidental ignition of the violently boiling turpentine. The vessel should mediately after the turpentine is added. In many case it is advisable to add a little raw oil to the fused varnish ore introducing the turpentine
(56) D. P. W. says: In Supplement No. 19 is given a description of a small electric locomotive. Can one be made to run with Leclauché battery of 4 small :
cells? If so, please give about the size to make the cells? If so, please give about the size to make the
different parts of the locomotive. A. The Leclauche battery is not saitable for such work. See answer to $G$.
U. S. on this page. (57) G. U. S. says: I wish to construct an electric locomotive the same as described in the Scien-
tific American Suppiement, No. 19. Of what size should the magnets and cores be, and with what size and quantity of wire should they be wrapped to give the A. Use about 230 feet of No. 18 copper wire for the four helices and make the cores about $11 / 2$ inches long.
(58) A. B. L. asks: 1 . How many and what size cells will be necessary to produce an electric light A. Fifty half gallon cells will answer well. 2. What form of battery will be the best? A. Grove or Bunsen.
3. What will be the approximate cost for same, per hour? A. Probably about 50 or 60 cents What should be the diameter, shape, and focus of the lenses composing the condenser? A. Double convex and three or four inches in diameter; they are supplied with the lamps. 5 . Can the effects of the heat on the object filled with ammonia-sulphate of copper, alum, or analogous solution between the copper, alen, or some slide? Would it have the same effect if the cell were interposed between the light and the condenser? A. Yes;
but, as a general thing, it is scarcely necessary 6 but, as a general thing, it is scarcely necessary. 6
Will the electric light give off enough heat to necessi tate the use of iron for the camera, or would old mahog any well clamped inside do as well9 A. The lamp should be of sheet iron. 7. Should the condenser be there be means of varymg the distance between stage Where, if anywhere, can I find detailed description electric light or oxyhydrogen gas microscope9 A. See
remarks on solar microscope in almost any work on physics
(59) F. J. S. asks: 1. I want a solvent for vulcanized rabber or old rubber shoes, etc., to make a cheap solution, which, on cooling, will leave a coating of rub-
ber. A. Place the material, cut in small shreds in a ber. A. Place the material, cut in small shreds in
strong (boiler fron) air-tight vessel, provided with
good safety valve, and introduce into it 4 or 5 parts of
bisulphide of carbon for each part (by weight) of rubbisulphide of carbon for each part (by weight) of rub-
ber. Close all the openings, and place the vessel over a suitable water bath, or,what is better, have a small steam boilling point of water. This will insure the complete solution of the rubber. The vapor of the bisulphide is very inflammable; and when mixed with air, it is ex plosive when ignited. For these reasons, as well as
because of the offensive odor of the solvent the opebecause of the offensive odor of the solvent, the ope heat only.
How can I recover the sulphuric acid from the waste, of sulphuric acid from to a roasting process with a plentiful supply of air, and the resulting sulphurous acid gas, together with nitric acid vapor and steam, is conducted into a series of large, lead-lined chambers, the floors of which are covered
with a layer of water, which dissolves and condenses the sulphuric acid as fast as formed. Sulphuric acid cannot be manufactured economically on a small scale by any of the methods
(60) F. S. asks: 1. Can you give me a recipe for making good, clean gonpowder? A. Rifle powder
consists of sulphur, 10 parts, finest charcoal consists of sulphur, 10 parts, finest charcoal, 15 parts,
nitre, 75 parts. Each of the several ingredients is first dried and reduced to an Impalpable powder; then they
are mixed thoroughly, and moistened with water. The paste is then ground together between stones to insure a close and uniform admixture, after which it is removed,
pressed into blocks and dried. When dry, these blocks pressed into blocks and dried. When dry, these blocks
are brought against a revolving toothed wheel, which granulates the powder. The granular powder is then granules, and prepared for market. It is difficult to
manufacture good gunpowder on a small
manufacture is attended with some danger.

1. Is it safe to use cocculus indicu sfor catchingfish, and it (bruising the berries and mixing them with fiour paste). and after gutting the fish they seil them to the Chinese.
A. The berries do contain poisonous fuids, and should . The berries do contain poisonous fuids, and should
not
used for any such purpose. 2. Is it lawful? A. We
(b1) F. H. ant
(61) F. H. asks: About how strong a solution of bichromate of potash would you use in mixing In dian ink for drawing purposes, by the method given on
pag, vol. 369 A. Reduce a small quantity of the bichromate to powder and dissolve in a limited quantity of yond whatis taken up by the water. When the solution has cooled, pour it off from the residue, and bottle.
When required for use, dilute the solution with about ne third its volume of water, and it is ready for use.
(62) W. K. D. says: In reply to A. L. C., who asks how to protect lead pipe laid in the ground, from frost: Do not under any circumstances use saw-
dust to fill in around the pipe if you can dig a ditch only feet deep. Unless you can get this pipe below the frost sawdust will be utterly useless. If you can dig 3 feet deep, and fill in hard with dry coal culm, you will find your object attained. If you can get but 2 feet below say 1 foot square, the whole length of the pipe, and fill in with dry culm, laying the pipe in the center. Make pipe, then fill full with culm, and nail top board on. If you have plenty of culm, fill
before throwimg in the dirt.
(63) W. N. asks: How can I refine petroleum irst washed by agitation with water, then with sulphuri acid (oil of vitriol), and the last traces of acid removed by washing again with water. It is then ron into caheat applied, when the lighter products, naphtha, ben zime, etc., immediately begin to distill over and are condensed and collected separately. As the temperature is raised from time to time oils of greater specific gravity 808 of the Scientific American Suphiement for full
(64) C .
(64) C. C. says: I have a Brussels carpe which has been damaged by rain; and the green dye
from a wool mat has run into it. What will take that color out and restore the carpet as before? A Before we can give you any defimite advice we must see a sample of the material, or know what constitutes the
(65) S. W. D. E. asks: 1. What are the component parts of firebrick, and how are they proportioned
and mixed? A. They consist principally of an impure variety of fireclay (silicate of alumina) containing a very small quantity of organic matter. The clay is freed as
far as possible from any gravel which it may contain, noistened thoroughly with water, moulded into the re quisite form by suitable machinery, and dried in the air When sufficiently hard to bear handling, they are sub-
jected to a moderate heat in a kiln, and afterward heated strongly. This treatment removes the last trace of moist to the square inch will firebrick stand? A. This depends
and a great deal upan the quality of the brick and the way in which the strain is applied. The limit of tensile strengt
lbs.
(66)
(66) W. B. H. says: Will you give me a recipe for making parafin paint? A. Mix together good
asphalt and parafin in equal parts, melt, and stir well asphalt and parafin in equal parts, melt, and stir well
together. Add to this a small quantity of finely ground together. Add to this a small quantity of finely ground
caustic lime with constant stirring and apply to the surfaces of the tank with a large brush. When this has cooled, put on another coating of pure molten parafin, pplied quickly and evenly.
(67) W. J. P. asks: I have an emery wheel etc. I I broke it while driving the spindle in. The frac ture has the appearance of good cast iron. It broke im to nearly equal halves. How can I unite them? A. The tone may be cemented by means of a paste of oxy fracture surfaces with a thin coating of the paste, place the pieces accurately together, and press strongly in a
vise. To insure a strong joint, it shouid be left undis-
(68) F. H. asks: Is it easier for an engine to drive a certain amount of machinery when placed miternediate? A. Yes.
Is there a saving of fuel in having a large boiler and alarge engine; I mean large for the amount of work to be done? A. In general, it is more economical to have the buired with very slow combustion, or, in other words, to have a boiler that is considerably larger than is abso lutely necessary. The engine, however, will generally be most economical when workin
at which it was designed to run.
(69) J. C. M. asks: Which are more easily drawn, high wheels or low ones, provided they are load-
ed alike? A. We presume you intend a comparison be tween wheels of large and small diameter. A load on the large wheels can be drawn more easily than when on small wheels, on account of the greaterle other than the inertia of the body to be moved, the large
(70) McC. Bros. ask: 1. Will injectors head of water? A. They are made both lifting and non lifting. 2. Will they work water as hot as $150^{\circ}$ or $200^{\circ}$ Fan. A. It is best not to heat the water more than
$120^{\circ}$. 3. Will muddy water wear them out very rapidly? A. They will probably not work satisfactorily unless the water is passed through a strainer or filter. 4. Whatare the comparative merits of injectors and good
pumps? A. There is not very much difference
(71) A. D. asks: 1. An upright tubular abes, 2 inches in diameter and 6 feet long with 3 feet heatimg surface in grate and firebox. Firebox is 32 inches in diameter. How many cubic feet of water would a boiler of this size evaporate in one hour, press-
ure being 100 lbs. to inch? A. Between 7 and 8 , with a ure being 100 lbs to inch? A. Between 7 and 8 , with a
strong draught and good coal. The evaporation of a strong draught and good coal. The evaporation of a
boiler dependslargely, of course, on the rate of combuson, and the above forcurse, on the rate of combuson, and the above figures are for a high rate. 2. One inch, is converted to steam. Would it expand to 1,600 times its volume, pressure remaining the same, orwould it be less or more? A. One cubic inch of water would
(72) W. S. asks: If a cylinder, filled with angerfrom air, be brought to a red heat, would there be would the expanse of air be gradual up to that temperature? A. There would be no danger. Oxygen is not ombustible.
What is electricity as produced by friction? Can it be substance eliminated from the air, or produced by a
iner division of its particles as the air is ground up in its iner division of its particles as the air is ground up in its
passage between the cushion and cylinder. A. Probsblyno one can tell you exactly what electricity is; but your definition would be generally regarded as a statement of what it is not.
(73) J. C. D. asks: What is the best mateiation covering a cylinder of an engine, to preventraiation? The cylinder is steam.jacketed with steam from boiler at 70 lbs. pressure. The outside of cylinder novered with wooden lagging with space left for the
non-conducting filling. A. Use felt for the filling, and with wood as you suggest.

## (74) H. M. says: In a recent issue, you give

 an answer on the subject of crocus. I wish to say that then roast it with a strong fire until acid vapors cease to ise; cool, wher with water until the latter ceases to afect litmus, and then dry.(75) E. C. asks: We are at work out of doors, and our tools on cold mornings are all right; but
if held to the fire, the frost comes out, although it was not seen before. I claim that the frost is in the steel, all hrough it, becaue the break much more easily. AnThe appearance is caused by the condensation of the oisture in the atmosphere, due to the sudden variation of temperature. The same effect is caused by ice water
(76) F. H. T. asks: I am building a small ngine, $11 / 2 \times 3$ inches, and I hardly know how to proceed. Is it necessary to have packing rings on piston, he cylindernicely? A A solidon so that it will fit in say síinch thick would do; but a ring would improve
(77) R. D. H. says: 1. By diminishing the speed of the governor, can I increase the speed of the
engine? A. Yes. 2. What will be the safe working pressure in pounds of steam of a boiler 48 inches long, of 14 inch thick iros, ameter and 48 inches long, of 14 inch thick iron, single
(78) H. Isenbeck, St. Petersburgh, Russia: For grain elevators, address Gill \& Mansfield, New York Central Railway, 60 th
Milson, Buffalo, N. Y.
(79) T. H. S. asks: 1. How many quart cells of the gravity battery will be necessary to work a
telegraph in my house, and should they be connected for telegraph in my house, and should they be connected for quantity or intensity? A. Three or four cells should be sumcient, connect in series. 2 . How can I arrange a 2 or 3 minutes after the current is connected? A. Join one end of the magnet wire to the armature lever, use a spring for the back contact, and connect this to the rest of the circuit as the magnet wire would be if the instrument was used in closed circuit.
(80) C. S. asks: Would a die made of an alloy of copper and tin in equal parts do to stamp on
copper, or would it be too brittle? A. We know of no copper, or would it be too brittle? A.
alloy that would answer this purpose.
Minerals, etc.-Specimens have been reeivedfrom the following correspondents, and examined, with the result stated:
H. H. T.-We should be happy to see the specimen of the tin ore mentioned. The specimen you send is a piece of cast iron containing much carbon. The matrix is slag from a blast furnace. You did not pay sumcient
postage on your letter; 12 cents due. -H . V. H. - No. 1 lime) defined crystals of carbonate of lime, and garnet. No. 5 appearsto be slag from an iron furnace. No. 6 is clay containing a small percentage of sulphur and crystals of carbonate of lime.-No. $\mathbf{7}$ is colamine.-G. O. P.We did not find gold in the sample sent us.-W. B.-
No. 1 containszincand lead. No. 2 consists principally No. 1 containszincand lead. No. 2 consists principally
of zinc.-G. S. Y.-It is what is known as spiegeleisen, of zinc.--G. S. Y.-It is what is known as spiegeleisen, carburet of iron usually containing a small percentage In the manufacture of Bessemer steel.-S. M. W.-Your bituminous mattery which it contains. It contains a considerable percentage of paraffin oil. Send us a larger sample of it.-A. V. S. -Your stone has been pronounced by dealers to be very good, as far as may be judged from so small a fragment, for polishing purposes and hones. If it can be quarried in large pieces, sufficiently homogeneous and without fiaws, it may prove marketable.
We have seen similar stones from Arkansas.-G. S. B.It is geocronite, a double sulphide of antimony and lead.
E. D. L. asks: Can any one give me the dimensions of the old English standard andthe American wire gauges? Does Stubs' steel wire gauge corre-
spond to either of the above?-L. W. F. asks: What is the method pursued by hub cutters for transferring a new design upon steel in the manufacture of Jewelry and

## ghar



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Ventilating halls, etc., P. Miha Ventilating halls, etc., P. Mihan and warming cars. J. S. ..... ..... Ventilators, P. Mihan
Ventilator, J. Sandall, Jr

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Wall protector and towel ra
``` Washing machine, J. O. Beauperland Washing machine, M. C. Longacre. Wash stand and bureau, H. Mar. Water, raising, M. L. Fisher.
Waterproof hose, D. C. Gately Watering stock, device for, I. Alle Weather strip, J. Chandler. Weather strip, D. O. Hink............... Wooden shoe machine, D. P. Ramsdel Wrenches, L. Coes......
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