per cent of the power. This can only be ascertained by for a given strain. There are examples in which no per cent is lost.
(15) B. F. 'T.-High pressure engines exhaust into the air, and realize their power only from
boiler pressure and expansion. Low pressure engines boiler pressure and expansion. Low pressure engines
add to this about 10 pounds per square inch by creating add to this about 10 pounds per square inch by creating
a partial vacuum in front of the piston. This style of engine is not always available, for want of water in
sufficient quantity for condensing the steam. Low pressure adjuncts are not considered economical for
small engines. Many condensing engines, also, use very small engines. Many
high pressure steam.
(16) D. H. V. asks : 1. Can a complete vacuum be formed, and, if so, what would be the ex
ternal pressure on vessel containing same? A. Yes; about $14 \frac{7}{7}$ pounds. 2. Does the external pressure on the vessel denote the exact weight of the atmosphere
A. Yes; per superficial area. 3. To what height can A. Yes; per superficial area. 3. To what height can
water be drawn with sufficient suction power? A. Poswater be drawn with sufficient suction power? A. Pos-
sibly, 33 feet or a little more. Generally, 25 to 26 feet. (17) J. M. S.-The atmospheric pressure only acts upon surfaces freely exposed to the at
mosphere. When other pressures are applied, the at mospheric pressure is not removed, but rather in cluded in the new pressure, so that the atmospheric
pressure, being originally in equilibrium, should not pressure, being originally in equilibrium, should no
be added to the mechanical pressure either within without a cylinder or boiler. The removal of atmospheric pressure in front of a steam-engine piston is actually effected by a condenser and pump. The effect of atmospheric pressure on the steam side of a piston is absorbed in the indicated steam pressure, and should
not be separately expressed. In a vacuum pump there not be separately expressed. In a vacuum pump there
should only be one expression for force caused by the should only be one
removal of the air.
(18) W. C. B. asks a short practical method of calculating, without the aid of the nautical almanac, the time of high water on any given day at a port whose corrected establishment is known. A. The
method for obtaining approximate high water from method for obtaining approximate high water from
the table of the "establishment of a port "requires a new and full moon. Multiply the ayerage daily varia tion of the tides (about 53 minutes) by the number of days following the last new or full moon, which reduce to hours and minutes, and add to the "established
hour "for a given place, for approximate high water
(19) J. G. McK. writes: We have boiler and engine capacity to do our work with 30 pounds pressure, say 80 or 90 pounds? A. On general princi ples, high steam and equivalent expansion is said to be economical, and with the automatic modern engine a
saving of fuel is thus realized. If your engine has a cut-off suited for the change, we recommend it. If of he plain slide valve style, with direct eccentric connec valve, we advise you to let it alone.
(20) R. K.-The solar mean day is 24 hours. The sidereal day is $23 \mathrm{hrs}, 56 \mathrm{~m}$, 4.091 s . in
solar mean time, which is the time of revolution to the ame star.
(21) L. S. D. asks what to use to polish a new mahogany counter. A. Bees' wax $1 / 2$ pound,
alkanetroot $1 / 4$ ounce; melt until well colored. Then add linseed oil and spirits of turpentine, of each $1 / 2$ ill, straining through a piece of coarse muslin.
(22) C. G. desires a remedy to destroy ants. A. Use p
infested places.
(23) J. L.-Stuttering is a purely nervous difficulty. The vocal muscles are able to do perfect work, but, from deficient innervation the mind cannot
command them fully, and the trouble of speech comcommand them fully, and the trouble of speech com-
mences, and soon the habit is formed, and generally grows worse and worse. The mind fears that the words will fail, and as the result they do fail. If the fear could be removed, the trouble would inlarge part cease. A cure can be accomplished in no way but by the per
sistent and determined effort of the sufferer himself. Others can accomplish little for him. If his attention
and his fear can be removed from the muscles of his and his fear can be removed from the muscles of his
throat while speaking, if he can forget that any trouble throat while speaking, if he can forget that any trouble
is there, he will soon improve in his power. This is the is there, he will soon improve in his power. This is the
one line in which his efforts must be made, and with persistent patience it can be successful.
(24) D. E. X. asks a remedy for the "heaves" in a horse. A. Take calcined magnesia, urpentine 2 ounces, with 1 pint best cider vinegar: for a week: then every other day for two or a three for a week; then every other day for with brine. The
months. Wet the hay and other feed horse will
till cured.
(25) J. F. asks how wash bluing, such marine is thoroughly mized with small quantities of an adhesive substance, such as gum arabic, dextrine, or starch, worked into a thick dough, rolled fiat, cut into quare blocks, and rolled by hand into balls.
(26) E. J. K. asks if aluminum is prevented from rusting by the formation of a thin scale of aluminum oxide. A. Aluminum may, like many by the formation of a semi-oxidized film, which may become a hydrate by the moisture of the air. So far as we have observed with a bar as cast, broken, and
cut, also as polished, we have not been able to discover cut, also as polished, we have not been able to discover to the air of a room. We are disposed to rank it as although, like silver, it has its special affinity.
(27) G. E. B.-Hydrogen gas has the lowest conducting power of the gases; lead the low-
est conducting power among the metals; asbestos the lowest conducting power of minerals; and cotton is probably the lowest conductor among vegetables, charcoal
(28) E. H. asks how near to New York sulphur springs have ever been discovered. A. While water containing silight traces of suphar may be found within comparatively few miles of the city, the nearest of sulphur (hydrogen sulphide) to make them of any medicinalimportance are those at Sharon Springs,
(29) F. S. B. asks for the composition of hydraulic mortur.
to two parts of sand.
(30) T. J. G. asks: 1. Explode a charge and strength, lower one on the ground, and both in contact with the charge. Would one suffer more th dinary cirmcumstances that both would be so stroyed that there would be little choice between them. 2. Suspend a stone slab and explode a charge of dynamite in contact with under surface, would effect be the ame as if exploded on top? A. Substantially the same (31) S. V. The
(31) S. V. T. asks for a cement that will mend china, which will not give way under cold
water. A. Mix quickly 50 parts of plaster of Paris, 10 of quicklime, and 20 of white of egg, and use immediately
(32) Sphinx (" L. L. S.," "O. J., Jr.," and "T. L.".). The Grecians usually represented the
sphinx as a winged lion with the head and breast of a woman. The great Sphinx of Egypt, however, is a re cumbent andro-sphinx, or manheaded lion. It symbolized the mysterious nature of the Deity. The
extended fore paws, and the small temple between them, are both constructed of masonry. The main body of the Sphinx is hewn out of a natural eminence in the solid rock. In several places, deficiencies in the natural material have?been supplied by a partial stone
asing. In our illustration (June 5), the ruins of the emple are partially shown. The sketch, however, was evidently made before the excavations had been carried down sufficiently $t$
bable that either the artist or the engraver has repreented the masonry as extending further back than it
does in reality. The head was originally covered with does in reality. The head was originally covered with both of these has now fallen away, and the outlines (33) J E
(33) J. E. C. asks: How much would a composition of cas and air expand in exploding in the
proportion of one of gas to ten of air? A. About $41 / 2$
(34) W. E. W. asks: Why is it that hy rogomic ant? Why is itthat axydrog any oth catomic element? Why is it that a hydrogen molecule
can between the intervening spaces between the molecules of an iron cylinder, in attempts to liquefy it, any more easily than an oxygen molecule? A. The lighter gases are more diffusive because their molecules, being lighter, move in the kinetic motions with
higher velocity, and hence travel faster. As for hydrogen "crawling" through the pores in an iron vessel if it does this any more readily than other gases, it is
on account of its high diffusive power
(35) H. A. M. says : A has an orange tree which gives a sour fiavored orange. To sweeten
the fruit he makes a hole in the tree and fills it with as much sugar as he can stow in. This he asserts has the effect desired. B says it will not sweeten the fruit even
to a small extent. Please say which is correct. to a small extent. Please say which is correct. A.
We side strongly with B. Why do you notry it
(36) G. F. H. asks : Will you please inform me if silkworms in cocoons can be killed by elec-
tricity, and how it is done? A. We know of no way of tricity, and how it is done? A. We know of no way of
killing silkworms in cocoons by electricity. We are informed also by the U. S. Department of Agriculture ey know of no method.
(97) J. B. asks : Is the stroke of an engine the length of cylinder? If not, how is the stroke
measured? What is relative horse power of two engines: 1st cylinder 10 inches, 3 feet stroke, $2 d$ cylinde 12 inches, 2 feet stroke. A. The stroke of the engine is twice the length of the crank, center of pin to center of shaft, or the distance of the crosshead movement on the slides multiplied by two. The 10 inches by 3 feet
cylinder in power has the relation to the other cylinder cylinder in power has the relation to the other cylinder
mentioned as $235 \cdot 62$ to $226 \cdot 18$. These numbers are ob tained by multiplying the areas of each cylinder by its
(38) Dr. H. S.-Warts may be burned off by application of nitrate of silver or other caustic, but we know of no special treatment to prevent their re-
currence. We have printed numerous remedies for the removal of corns, but as they will go away of themselves if one wears only shoes that do not press on them, so they will constantly return, no mat
many times removed, if one wears tight shoes.
(39) H. J. P.-Vacuum gauges do not indicate pounds, but correspond with the barometer, and
indicate inches of mercury. Dividing the indication in nches by two will give you nearly the vacuum in
(40) E. S. asks directions by which considerable adulterations of white lead and linseed oin
may be detected by one not a chemist. A. To detect barytes in white lead, dissolve the latter in dilute ni tric acid. Any undissolved
terial, and probably barytes.
(41) A. B. asks why infusorial earth is called electro-silicon. Is it a non-conductor of elec of? A. It is diatomaceous silica, from which the trade particular electrical qualities.
(42) Mrs. J. B. F.-The insects which you send are a species of plant louse of the genus
Lachnus. They prove injurious to evergreens when they occur in large numbers. To completely destroy them, it is only necessary to drench them well with a
solution of whale oil soap or
remedy is hot water a few degrees below the boiling
point, which will not injure the tree, but will effectupoint, which will not in
ally destroy the pest.
(43) O. W. M. desires a recipe for mak ing a stain to imitate cherry or cherry stain. A. A cherry stain may be made by boiling in a copper ket
tle 3 quarts of rain water, and 4 ounces of annatto Boil till the annotto is dissolved, then put in a piec of potash the size of a walnut; keep it on the fire about half an hour longer, and it is ready to bottle
(44) G. A. G. asks how to destroy ants
that infest his lawn. A. If the nests of the ants can hat infest his lawn. A. If the nests of the ants can be readily found, there is no better remeds than topour This sub
care.
(45) W. A. writes : I have noticed in your issue of the Scientific American, at various called the hektogre for making a printing machin ing a black ink to be used with the same. I have tried both, but I find a great difficulty in gaining a success. I have tried the process for the ink in the manner yon describe, but I fail to produce any copies
Ink is prepared with nigrosine. It will not create a bronze. Would you therefore kindly direct me in the right direction, that is to say, to get a black ink, that can be used by the hektograph? A. The ink you desire is made by dissolving soluble nigrosine (aniline black)
in 5 to 7 parts of water. It should be a saturated so lution and rather thick. For use on the hektograph it
is best to use a purple ink. Sec "The Copying Pad is best to use a purple ink. Sec "The Copying Pad o. 438.
(46) W. C. B.-To make stereotypers paste: Take 5 ounces of fiour, 7 ounces of white starch,
a large tablespoonful of powdered alum, and four garts of water. Put the fiour, starch, and alum into antil the whole becomes of the consigtency of thick cream. Then gradually add the remainder of the water which must boiling, stirring well meanwhile to prevent umps. Put the mixture over the fire and stir until it boils; then let it stand until quite cold, when it should look like jelly. When you are ready for work,
add Spanish whiting, the mixture not to be too stiff to spread readily with the paste brush. Put through fine wire sieve with a stiff brush, and it is ready for
(47) W. F. C.-Black, glossy leather belts, made of japanned leather, can be improved in
appearance by rubbing withlinseed oil, but there is no suitable permanent blacking for them that also keeps their polish. There is no cure for their cracking (48) G. H. L.-The fluid
aparilla is with alcohol. Sarsaparilla sirup used in soda fountains is made of oil of wintergreen 10 drops, oil of anise
10 drops, oil of sassafras 10 drops, fiuid extract of sarsaparilla 2 ounces, simple sirup 5 parts, powdered ex parilla ounces, simple sirup 5 parts, powdered ex
tract of licorice $\mathbf{1}$ ounce. Sarsaparilla beer is made by dissolving $11 / 2$ ounces compound extract of sarsaparilla with 1 pint of hot water, when cold, add of good pale or East India ale, 7 pints.
(49) N. P.-Ox gall is an excellent and delicate cleansing agent. It is a liquid soda soap. Bu
a receipt said to be excellent for rem oving all such substances as tar, axle grease, etc., from colored cottons : First, smear with lard, rub with soap and water, and let it stand for a short time; then wash with oil of
turpentine and water, alternately.
(50) R. I. M.-For a good paste that will neither decay nor become mouldy, mix clean flour
with cold water into a paste well blended, then add boiling whier, stirring well up until it is of a consistency that can te easily and smoothly spread with a
brush; add to this a spoonful or two of brown sugar, brush; add to this a spoonful or two of brown sugar, a little corrosive sublimate, and about half a dozen
drops of oil of lavender or other suitable perfume.
(51) A. W. L. writes : 1. A gentleman ho has been lecturing here says that but very little (within 5 or $\mathbf{c}$ yn Palestine for 1,200 years, and that now becoming fruitful. Is this a fact and if so, what is the cause? A. By consulting the Encyclopedia Bri tannica, you will find fult information in regard to the rainfall of Palestine. The average rainfall is 60 inches which exceeds that of many portions of this country 2. What is the receipt for a so-called white house paint
made of skimmed milk and lime or whiting? A. Take made of skimmed milk and lime or whiting? A. Take
of whiting 5 pounds, skimmed milk 2 quarts, fresh
(52) E. A. M. D. asks the greatest height known of a wave of water in inid-ocean and near land, during a storm. A. According to Scoresby, the greatest
height of waves from storms observed by him was 43 feet from top to bottom of trough. Captain Wilkes, ne measurement and obtained only 32 feet
(53) J. T. McC. asks how oil can be taken out of a marble tombstone: has been in it now
about four years. A. Such stains can be removed by applying common clay saturated with benzine. If the acidulated and may injure the polish, but the stain will
(54) J. N. W. asks how the composition (54) J. N. W. asks how the composition Best boiled linseed oil.
Precipitated oxide of zin
And dry over a stove at a heat not over $160^{\circ}$ Fah When thoroughly dry, roughen by means of pumice (55) wh amber or copal varnish.
(55) E. D. asks how to gild the edges of cards in gold and silver. A. Obtain an extremely
hin leaf of gold. Put your cards together so that
the edges are perfectly even. Then place in a press,
with the exposed edge uppermost. Coat the edge with
a mixture of red chalk aud water. The gold is blown a mixture of red chalk and water. The gold is blown
out from small books, and spread on a leather cushion, where it is cut to the proper size by a smooth edged knife. A camel's hair pencil is dipped into white of eggmixed with water, and with this the partially dry edge is moistened; the gold is then taken up on a tip brush and applied to the moistened edge, to which it intantly adheres. When all the four edges have been gilt in this way, and allowed to remain a very few minutes, the a burnisher form of a very smooth piece of forcibly, which gives the goid a high degree of polish. To silver edges take a brush, dip it in a saturated solution of gallic acid, and wash the edges; then dip the brush intoa solution composed of 20 parts nitrate of silver to 1,000 parts distilled water. Keep on alter-
nating these solutions until the edges assume a brilnating these solutions until the edges assume a bril-
liant tint. Then wash with distilled water, and dry by rir.
(56) G. Z. asks : 1. Would you kindly give me a good and simple method for purifying the gas called carbonic anhydride ( $\mathrm{CO}_{2}$ ), chemically exressed? A. Wash it with a little water already saturated with gas. 2. Also a formula for making fireproof ireproof by trement with various metallic salts, fireproof by treatment with various metallic salts, as
tungstate of soda or silicate of soda. It is blackened by treatment first with nitrate of iron in solution, followed by solution of logwood.

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