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Articles in Light Metal Work, Fine Castings in Brass Welles'Specialty Works, Chicago, Inl
Qun and Sewing Machine Tools. Pratt\& Whitney, Hartfora, Conn.
ion given on all subjects relating to Boilers, by A. F. Nagle, M.E., Providence. R. I.
(1) J. H. P. asks how to get a good and urable dark blue on a gun barrel with acids, and with out heat? A. Apply nitric acid and let it eat into the ilm of oxide. Clean the barrel, oil, and burnish.
(2) W. H. L. S. asks: What is the mechan ical effect used on the stage in making one scene dis pear gradually, and another appear as gradually in in place? A. One way is to arrange a mirror in rear of th lights so thatit will reflect a person angle to the side of the stage, but concealed from the view of the oudience. The person stands in a dark comp faint. A strong calcium light is then thrown direc on the person so that a vivid reflection appears in the lass. When the light is gradually diminished the re fection appears to fade, and when gradually strength comes into prominence. Similar effects are produce by the magic lantern.
(3) R. H. W. asks how to soften a lump of old that is too hard. It has a little copper and silver in f tin will sometimes harden alloys of gold and silve (4) N. G. P. ask: Will you please give me recipe for putting a black polish on white wood? A which add powdered nutall. Stain your wood with this solution, dry, rub down well, oil, then use French polish made tolerably dark with indigo or finely powdered stone blue. mucilage? A. Macerate 5 parts of good glue in 20 part
of water for 24 hours, adding 20 parts of rock cand nd 3 parts of gum arabic.
Will cream turn yellow, when used as a secret writing (5) postuls, when exposed to heat? A. Yes. (5) J. H. P. says: I have just tried an experiment on making vinegar from the wild crab apple. It has from two nights' and one day's standing got quite
sour, but too bitter to use. How can I get the bitter taste from it without doing it an injury 9 A. Warm sample of the vinegar and agitate it with a little egg al
bumen. If after setting 2 hours it is not improved, stillation must be resorted to.
(6) L. P. M. asks for (1) a lacquer to gild burnished iron and zinç A. A good lacquer consista of alcohol, 8 ozs.; gamboge, 1 oz.; shellac, 3 ozs., an-
natto, 1 oz ; solution of 3 ozs. of seed lac in 1 pint alcohol. When dissolved add $1 / 4 \mathrm{oz}$. Venice turpentine nd $1 / 4$ oz. dragon's blood to make it dark. Keep in emovilace for 4 or 5 days. 2. Alver plating? merse for some time in a solution of $1 / 2 \mathrm{oz}$. cyanide o potassium to 1 pint rain water, and brush off with pre(7) A. A. R. asks the length of time incu ation takes for hen's eggs, turkey's, duck's and geese',
and the degree of heat during the time from first to 00 day tre manageme 28 tequr A. Gees ure $140^{\circ}$. The eggs should be turned every 6 or 7 days and the chicks, when hatched, keptuntil strong under n artificial mother made of sheepskin.
(8) R. A. McC. asks for a preparation that will erase lead pencil writing from printed pasteboard of cards? ${ }^{\text {a }}$. that will not injure the printing or color of cards?
(9) C. M. C. asks: If the requisite length a pendulum rod to vibrate seconds is 39 s inch, how can the number of vibrations be found from any given ength of rod, or vice versa, the length of rod from the number of vibrations? A. The time of oscillation inceases in the same ratio as the square root of the dulum be increased $4,9,16$, times, the time of its oscilla ion will be increased only $2,3,4$, times.
(10) J. C, W. asks: 1. What was the cost of the Suez Canal9 A. $\$ 80,893,665$, or about $\$ 808,936$ per mile. 2. What was the greatest engineering work of modern times, and what was its cost? A. The MisDover, both unfinished.
(11) D. U. G. says: I have had several ar guments with parties in our town about making rust done. I claim that it can be done: but how I cannot tell If you can give meany information upon the sub-
ject it will be thankfully received. A. Rust joints are made by mixing the following ingredients in the given quantities, and driving the mixture with a caulking
tool into the joint: Cast iron turnings or borings, 100 ool into the joint: Cast iron turnings or borings, 100
bs. powdered sal ammoniac, 1 lb .; flowers of sulphur /a lb . The latter ingredient is sometimes omitted.
(12) W. G. M. says: 1. The Nautical Alnanac gives the polar distance of Polaris for January zimuth of Polaris for the same date and for latitude $42^{\circ}$ gives azimuth of Polaris $1^{\circ} 51^{\prime} 45^{\prime \prime}$. Will you please explain why the azimuth is greater than the polar distance? A. Azimuth is the distance between the meridian of any place and a vertical circle starcing from the enith or that place, measured on the horizon-the verwhose azimuth it is designed to measure It follows that, as the pole must be in the exact meridian, and an object either east or west of the pole is on a vertical divergent from the meridian of the pl.ce, of course will be further from the meridian at the horizon than at the polar altitude. It must be understood that twice this, of course, is when it is upimuth of Polaris is 0 , bove or below the true pole. 2. Also why the azimuth increase, and decrease, with the latitude, as the azimuth for the same date for latitude $30^{\circ}$ is $1^{\circ} 36^{\prime}$, but for latitude $50^{\circ}$ is $2^{\circ} 9^{\prime} 15^{\prime \prime}$. A. As the zenilh approaches the pole, the meridian and vertical circle, passing through
an object of a given distance from the pole, will be more divergent, and of course make a wider
the horizon, where the azimuth is computed.
(13) J. W. asks: What if the best system of artificial ice making? Is not chymogene dangerous to use? A. You will find that the special merits and cived ample comment in these columns. That system of course the best by which the maximum quantity nd labor. Liquefled gases-as sulphurous acid and mmonia-although incombustible, are not less danger ous than ether or chymogene. Other thinrs being equal, the process supplying the more volatile reagent is usually the most effectiv
(14) B. D. N. asks: What will remove How can I makerubber cement? A. Fill a bottle ull of native indiarubber cut in shreds. Pour in ben zole until the bottle is $3 / 4$ full. Shake every few days ntil the mick.
dries quickly. dries quickly
What caus
Whery
Is gas escaping in a room where a lamp is burning
liable to set a hourse on fires A. Yes, if a sufficien quantity enters to produce an explosive mixture with Is the

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tis dextrin? A. A gum-like product of the of dilute acid upon starch at $200^{\circ}$ to $212^{\circ}$
(15) J. W. W. asks how to make a black nkin a cold orlump form, so that by adding water
can make ink as wanted? A. A good ink powder, which might with a little mucilaginous material be made into blocks by pressure, consists of Aleppo galls, 3 lbs.; copperas, 1 lb. ; gum arabic, $1 / 21 \mathrm{lb}$.; white sugar, $1 / 4 \mathrm{lb}$; powder and mix; 2 ozs. of this powder dis
pint of boiling water gives a very good ink.
(16) J. R. asks: How can I make a fine uality of ink to stencil boxes, with stencil plates, and also not very expensive? Also the mode and preparation of making and drying it? A. Sulphate of manga-
nese, 2 parts, lampblack, 1 part; sugar, 4 parts; all in ne powder and triturated to a paste with a little water.
(17) E. H. says: 1. If I sink a cylinder weighing 10 lbs at a depth of 20 feet in water, what
ressure on the square inch would I obtain on its piston, the latter being 3 inches in diameter? A. The pressur of the water on the piston, at the commencementor its little with the temperature of the water, varying weight would bring the cylinder up at the surface of the water after the piston has made its full stroke and bears against the bottom of the cylinder? A. The
weight of the submerged cylinder would be 10 lbs. diminished by the weight of the volume of water which it displaces, which volume cannot be calculated from
(18) E. L. W. asks for a recipe to make
 niter, 16; red lead, 3 ; strong lead, 6 . 2 Ordinary phosphorus, 9 parts; niter, 14; binoxide of manganes ally add the phosphorus, which must be well stirr into the liquid; then add the niter and coloring matter Keep the paste at a regular temperature of about $97^{\circ}$
Fah. by means of hot water under the iron or marble lab on which it is spread.
(19) I. L. S. says: Can you give me a pro ess for purifying rancid butter, also best coloring in previously A. Use 1 pint of water to each 1 b. of butter, pint of water; wash well the butter in this mixture, a terward rewash in cold water and salt; or melt the butdered and previously well sifted to free it from dust skim, remove and strain through flannel, then salt. For coloring, a solution of annatto is commonly used.
(20) J. H. P. asks; 1. What is the meaning the term "pitch," when applied to propellers or medium, after the manner of a screw in a nut. 2 . In describing steamship engines, why is it said that the nominal horse power is, say, 500 , but will work up to, power is merely a commercial unit, and the expression said that the vessel has a No. 8 engine, which is capable of developing 2,500 indicated horse power.
(21) F. C. S. says: A master mechanic here claims that the proper manner to get the length of an
 one, is to get the length from center of driving shaft to nd from this lenoth tolke the dietance from center of ecenutric to end of lugs on eccentric straps where the od is bolted; theremaining length, he claims, equals the ength of eccentric rod. Please give the correct way or ascertaining the length under the stated circumstances? A. As you state the rule, it is incorrect. A
good way to find the length, is to place the crank on the wo centers alternately, and find the length that will divide the lead, or nearly so. This supposes that the ecfirst to be adjusted.
(22) Constant reader inquires the amount of upward pressure exerted on the sides of a coffer dam ut to bottom; not taking into account the laying of the timbers composing the dam? A. It is equal to the weight of a volume of water equal to the volume of tie abmerged part of the coffer dam, or, more simply, the
(23) A. B. C. asks: 1. Why is it claimed or compound engines, that the strains are more reguas in the simple engine. If the initial pressure in the before the cylinder is expanded into a large cylinder, is not the steam expanded, the pressure reduced, and as consequence the strains as irrogular as beforer If you compare a simple engine with a compound, both working at a kigh rate of expansion, you will see that he range of expansion in the single cylinder is much greater than in each of the two or three cylinders of the compound engines. The equalization of strains on the
crank pin is effected by special arrangement of the clinders, and this can be done either with compound cylinders or several simple ones. 2. Again, in regard to high pressure boilers, the strength of a cylinder is inversely as its diameter and inversely as its length. Please state where the limit is. I read in the Engineer that the tubulous boiler was the only style now known where the pressure could be safely carried at 150 to 10 , carry 175 to 200 lbs. pressure per square inch; why could not they be used on marine vessels? A. This reers to cylinders exposed to external pressure. In practice the limit of length is a few feet, the internal flues being divided in effect into a series of short cylinders by attaching rings or bands. The tubular boiler is used in marine practice instead of the style with flues comnonly iound in western steamers, for the reason that
(24) F. M. D. says: I am going to use a nd teep the boilerclean. It is composed of 10 lbs of soda ash, 1 lb . of muriatic acid, $1 / 2 \mathrm{lb}$. of acetic acid, and 2 lbs. of chestnut oak bark. Will this be injurious to the iron if used regularly, and if so, state which of
these articles cause injury? ar .

## (25) W. P. says: I am working at an alti-

 ade of 10,500 feet, where it is impossible for a pump to ly losing 5 lbs. per square inch of pressure on the valves owing to the rarefied condition of the factured in Chicaso or Boston, or any other city of the same altitude, mark 5 lbs. light when on a boiler up in this altitude, or say 55 lbs . when there are actually 60 in boiler? By figuring out the safety valve I find such to be the case, or the steam gauge is incorrect. A. The ordinary gauge, when correctly adjusted, shows the pressure in the boiler above the atmosphere. To getthe ab-olute pressure, the pressure of the atmosphere, as obtained from a barometric observation, must be added. We would be glad to have complete dimensions of your safety valve, with weights of the varions parts,
and the conditions under which the discrepancy beeen the gauge and valve was noted.
(26) H. C. inquires whether the whole ength of the tube, or only that part surrounded by watight boiler? A. In a boiler, all surface that has fre or hot gas on one sideand water on the other, is reckoned as water-heating surface. Surface with hot gas on one face.
(27) A. E. R. asks: 1. Is a hot water boider保 so, why A. A hot water test is generally less injuri-
ous to a boiler than a test with cold water, for the reason that the boiler if tested cold is subjected to strains that do not occur in its practical use. 2. Is there an inspec tor of boilers in New York State now, and how often
does the law require a boiler to be inspected? A. We hink no
(28) C. T. asks: Can an engine run as fast on the level with 100 lbs . steam, as it can with 150 lbs .,
no load attached to take the steam? A. If the question no load attached to take the steam? A. If the question
refers to a locomotive running light, as seems probable, the speed will be greater with the higher pressure if the pipes and ports are sufficiently large.
(29) F. C. S. asks how in drawing an engine with inclined cylinder is the end of the end of the view projected from side view. Four A. You can find additional points in a similar manner to the first four, by noting where perpendiculars from certain elements or lines parallel to the axis in the side view cut the corresponding elements in the top view. How many feet a minute can a plunger pump be run
to work well? A. The speed of pump is governed by the size of plunger or suction pipe, noting that for ordinary lengths of suction pipe, the velocity of the water should not exceed 600 feet per minute, which figure can be used for a first class pump.
(30) P. B. asks: What does the Post Office age stamps? A. A canceller is desired which shall be

