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Rowland's Vertical Engine. Wearing parts of steel. Ladies can wear boots one size smaller after using Ladies can wear boots one size smaller afte
German Corn Remover. 25 cents of druggists.
Owners of steam boilers can save fuel, repairs, and
delays by using Hotchkiss' Mechanical Boiler Cleaner delays by using Hotchkiss' Mechanical boiler Cleaner
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weipht, 3.500 lb. price, 8.00 . O. Packard, Mil waukee. Wi is. The , 30 Ib.; phee, 500 . The man who invented the German Corn Remove
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 Improved Skinner Portable Engines. Erie, Pa. "Rival" Steam Pumps for Hot or Cold Water; $\$ 32$ 'The I. B. Davis Patent Feed l'ump. See adv., p. 13. The Eureka Mower cuts a six foot swath easier than a side cut mower cuts four feet, and leaves the cut grass
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appearanceas Whole Pulleys. Yocom \& Son's Shafting Works, Drinker Sc., !'hiladelphia.

## Mallexble anc1 Gray Iron Castings, all descriptions, by Eric Malleable Iron Company, limited. Erie, Pa.

 Eric Malleable Iron Company, limited, Erie, paNational Steel Team Engines. Sec aiv. p. 414
National Stee Thube Cleaner for boilertubes. Adjust
able,durable. Chalmers-Spence Co.,10 Cortlandt St.N. Y . Corrugated Wrougit Iron for Tires on Traction E
gines, etc. Sole mfrs., H. Lloyd, son \& Co., I'ttsb'g. Best Oak Tranned Leather Betring. Wm. F. ForeGardiner's Pat. Belt Clamp. Sce illus. adv., p. 413. Nickel Plating. - Sole manufacturers cast nickel an odes. pure nickel salts. importers Vienna liine, crocus.
etc. Hanson \& Van Winkle, Newark, N. J., and 92 and 94 Liberty st, New York.
Presses, Dies, Tools for working Sheet Metals. etc. The Sweetland Chuck. See illus. adv., p. 396. Machine Knives for Wood-working Machinery, Book Binders, and Paper Mills. Also manufacturers of Solo-
man's l'arallel Vise, Taylor. S'iles\& ©o.,Riegelsville.N.J. Skiuner's Chuck. Universal, and Eccentric. See p. 397
For best Duplex Injector, see Jenks' adv., p. 413. C. B. Rogers \& Co., Norwich, Conn., Wood
Machinery of every kind. See adv., page 414.

Peck's Patent Drop Press. See adv., page
For the best Diamond Drill Machines, address M.
Bullock, 80 to 88 Market St., Chicago. Ill. Brass \& Copper in sheets, wire \& blanks. See ad. p. 13. For best Portable Forges and Blacksmiths' Ha
Blowers, address Buffalo Forge Co., Buffalo, ‥ Y.

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formanship, economy, and durability. Write for
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castings over all others. Circular and price list free.

## Wren's l'atent Grate Bar. See adv. page 13̈.

Diamond Tools. J. Dickinson, 64 Nassau St., N. Y.
The Improved Hydraulic Jacks. Punches, and Tube
Eagle anvils, 10 cents per pound. Fully warranted
Gerser's Patent Grain Thrasher, Peerless, Portable,
and 'iraction Engine. Geiser M'f'g Co.,Waynesboro. Pa.

Baster Wrenches fit peculiar corners. Indispensab.
first-class mechanics. Greene, Tweed \& Co, $\mathbf{N}$. $\mathbf{Y}$. Houston's Four-Sided Moulder. See adv.. page 14. New Economizer Portable Engine. See illus.adv.p. 12 Cutters for Teeth of Gear Wheels formed entirely by Rue's New "Little Giant" Injector is much praised for its capacity, reliability, and long use without repairs Rue Manufacturing Co., Philadelphia, Pa.
For Shafts, Pulleys, or Hangers, call and
kept at 79 Liberty st., N. Y. Wm. Sellers.\& Co
ong \& Allstatter Co.'s Power Punch. See adv., p. 13, Wm. Sellers \& Co., Phila., have introduce
injector, worked ly a single motion of a lever.
For Mill Mach'y \& Mill Furnislung, see illus. adv. p.12. Don't buy a Steam Pump until you have written Val Saw Mive Co.. Easthampton, Mass.
Saw Mill Machinery. Stearns Mfg. Co. See p. 13.
Use the Vacuum Oils. The best car, lubricating, en
gine, and cylinder oils made. Address Vacuum oil Co., gine, and cylinder oils made. Address Vacuum Oil Co,
No. 3 Rochester Savings Bank, Rochester, N. Y. Wiley \& Russell M'f'g Co. See adv., p. 396 For Machinists' Tools, see Whitcomb's adv., p. Fire Brick, Tile, and Clay Retorts, all shapes. Borgne For Miniug Mach'y, see ad. of Noble \& Hall, p.

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ose inquiries do not appear after a reasonable time should repeat them. If not then published, they may concl
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(1; S. L. R. writes: 1. We have a boiler 15 feet long, shell $41 / 2$ feet in diameter, having eighty 3 inch flues. We wish to burn shavings and sawdust. How
much grate surface should we have? A. About 36 much grate surface should we have © A. About 36
square feet. 2. What kind of grate? A. A thin, plain square feet. 2. What kind of grate? A. A thin, plain
grate with narrow openings. 3. Hiow high should the grate with narrow openings. 3 . How high should ane
chimney be and what size the flue? A. 6 feet, and 30 chimey square. 4. The engine is 14 s 30 . What should
inches be the size of the steam pipe leading to the engine, and what size the exhaust ? A. Steam $31 / 2$ inches diameter,
exhaust $51 / 2$ inches diameter. The furnace should be exhaust $51 / 2$ inches diameter. The fur
at least twice the usual depth for coal
(2) E. J. C. writes: A well known writer on stationary engmes says of the curved or coiled pipe
that connects the boiler and steam gange: "- The cock which is placet at the lowest part of the inverted siphon
pipe is designed to draw off any water wh ich may have sollected in it: if the water was not drawn off it would rise into the gauge and the steam pressure would be
incorrectly indicated." Please explain. At would act incorrectly indicated." Please explain. A. It would a
like a siphon gauge, by the difference of height of column of the liquid in the two legs of the siphon; but
as these siphous arc usually made, the inaccuracy vuld be inappreciable.
(3) L. G. G. asks: What is the best and most economical way of producing a bright sturface upon several iron pius, $\frac{1}{4} \times 1 \times 2 \times 3$, having the fire scale
still on? A. Use emery wheels. (4) A. D. W. writes: If your correspond. ent, J. A. D., will put a cock into the top of the air chamber of his Niagara pump and fill it with water it will be them. I take it the steam takess the place of the air,
and then a current of air causes condensation, which produces a vacuum which tends to hold tlie valves.
(5) G. G. M. asks if there is not some misake in reference to $\$ 500,000,000$ gold weighing 4,500 tons, as stated in No. 24 , late volume, under heari
"The sub_treasury gold wagon." A. Yes; it should be 1,000 tons.
(6) W. W. asks: Will the boilers used in ranges, some of which are warranted to stand 200 ib. pressure per square inch, answer for an engine $1 \not / 8 \times 8$ ? How would you arrange it to obtain the best results ?
A Yes; for moderate pressures, say, not over 40 lb ; whe A Yes; for moderate pressures, say, not over 40 lb .; we
have seen them setin masonry; they may be set eithen vertically or lhorizontally
(7) E. L. B. asks: Can you inform me how the hydrostatic press and jacks came to be com-
monly called hydraulic press and jacks? A. We canmonly called hydraulic press and jacks? A We can-
not; eithe: term is correct. When thepressure is being exerted, the fluid is in motion: it is then hydraulic. When the pressure is obtaned, and the water is at rest, it is then properly hydrostatic.
(8) D. R. asks how to feed turtles and fishes? How often should iresh water be supplied
How long will a turtie live with nothing to eat? Feed the turtles and fish on earth wormsafter they have been placed in grass or moss over niglit to scour them
of all earthy matter, then cut them up to one quarter of an inch and feed to the animals. Look out that none are left after the animals have had all that they require.
Remove from the aquarium what are left, or decomposition will take place, wallch will spoil the water and turtles. Raw beef answers well as a food for fish. In a true self-supporting fresh water aquarium the water
needs never to be removed if the proper kinds of plants
are used for oxygenation. A good sized turtle will live
three monthswithout food, a young turtle one month. (9) A. W. asks: How much steam press re will a boiler stand, 15 inches diameter by 30 inche gauge ? A. Not over 16 lb . per square inch. The heads should be braced with care and it should be tested with water pressure to at least 80 lb . before using
(10) E. F. J. asks if any benefit is derived rom combining magnesium with steel. A. A half pe grained steel and greatly improves the quality. The maznesinm is introduced through an opening in the
cover of the crucible, after muserting some small bits of charcoal, in order to remove the free oxygen Without this precaution there would be danger of an exploston.
(11) C. wants to know how to make shoe blacking. A. Mix intimately 1 pound of molasses, pound of best bone black, in very fine powder, and 3
pound olive oll; then add $1 / 4$ pound sulphuric acid, pre pound olive oll; then add $1 / 4$ pound sulphuric acid, pre
viously diluted with $3 / 4$ pound water. The whole allowed to stand for three hours or longer, and afte ward as much water is added as is necessary to give it the proper consistence.
(12) G. I. J. asks: Is there any device by which I may regulate the strength of the current from coils will not do. I wish to change the strength
graduallybymeans of a resistance placed at some point graduallybymeans of a resistance placed at some point
in the circuit. A. You can make resistance coils that will answer your purpose, by making a wooden reel in
the shape of a cross, aud winding uninsulated wire it so as to have an air space all around cach convoln tion. If the current heats the wire so that it will bur wood, you may pla
edges of your recl.
(13) M. E. W. asks how to find the point team will blow off at the required pressure A Multiply the pressure per square inch by the area of
the valve; the product s the total weight required upon the valve; the product s the total weight required upon
the valve. 2. Divide this total pressure by the weight the valve 2. Divide this total pressure by the weight
to ke hung on the valve lever; the quotient is the num ber of "I leverages" which yon nust give the weight
from the fulcrum. Suppose 100 lb . steam and 12 inches area of valve; then total pressure on the valve is 1,200 Ib.; and if the weight be 80 lb .. then $1,200 \div 80=15$
" ${ }^{\text {leverages." Now, if the distance from fulcrum to }}$ center of valve be 3 inches, then the welght must be se at $3 \times 15=45$ inches from fulcrum, or 42 inches from cer: the effect of the lever or weight of the valve.
(14) O. R. M. asks for a simpie method of testing or assaying specimens of rock. A. Charge int
a 6 -ounce crucible, 1 ounce each of the ore and dry bi a 6 -ounce crucible, 1 ounce each of the ore and dre sod $1 /$ ounce of argol, and cover with $1 / 4 \mathrm{inch}$ of dry sait
Heat the crucible until the contents are in a cuiet state of fusion, remove from the fire, cool, break, and clean the lead button by pounding on an anvil. If the button weighs more than, say, half an ounce, scorify it down in a scorifying dish in an open muffle. Heat 114 inch keep up the temperature of the muffle to button, and heat until all the lead has been scorified off and absorbed oy the cupel, and the small bead of gold orsilver (if the ore contains ary. becomes well rounded and
clear. The ore must be finely powdered, and the whole f it passed through an eighty-mesh sleve
(15) A. S. asks for information as to the direct determination of silver in galena on Volhard's according to its supposed tichness in silver, are very finely ground and intimately mixed in a porcelain mor-
tar with from three to four times its weight of a flux tar with from three to four times its weight of a flux
composed of equal parts of soda and saltpeter, placed composed of equal parts of soda and saltpeter, placed
in a porcelain crucible, covered, and heated over a buruer to thorough fusion, when the misture is well stirred with a glass rod. It is then let cool and placec
in an evaporating dish partily filled with water, in which the melted matter is softened, dissolved out of
the crucible into the dish, which is then heated, and the watery solution is fitered into a flask. The residue on the filter, after being well washed, is rinsed back into the dish. very dilute nitric acid is adden, and the
whole evaporated to dryness. The dry residue is taten up it water acidulated with nitric acid, heated, and tion. The residue is washed with hot water, the filtrate is allowed to cool in the fiask, ferric sulphate or iron
(16) HI J asks how to make a good quality pickel, and well selected grapes into a stone jar, and pour on them six quarts of boiling water. When the
water has cooled enougi, squeeze the grapes well with the hand; cover the jar with a cloth, and let it
stand for three days; then press out the juice and tand for three days; then press out the juice, and add ten pounds of crnshed sugar After it has stood for a
week, scum, strain, and bottie it, corking loosely. When it, corking tightly. Lay the bottles on their side in a cool place.
(17) A. W. asks: By what means can an enameled surface be gilt with a name, same as on a
ead pencil? A polished pencil, having a coating of shellac, can be stamped with gold by aid of a heated dye; not so an enameled surface-the gold will rub
entirely. A. Use thingold size and a hot brand.
(18) A. B. asks how to case-harden small of prussiate of potash and loam. and coat the iron of prussiate of potash and loam. and coat the iron
therewith; then expose it to a strongred heat, and when
it water.
(19) R. W. inquires how to prepare emery for optical purposes. A. Mix four pounds of the flour
emery of commerce with one ounoe of powdered gum arabic, and then throw the powder into $t$ wogallons of
clean water. Collect the deposits at the end of ten
sixty minutes, and that which is not depcsited by on ing lenses. The use of the gum arabic renders the (20) J. N. L. asks: 1 . Is there any liquid nel, sootless and smokeless, that could be used in bed ary fire? A. We know of no cheap fluid that we ca ecommend for such purposes. Fres without flues to arry off the products of combustion should never b If gaselining apartments under any circumstances. If gasoline or other liquid will answer for such pur 1,000 square feet $100^{\circ}$ Fah.? A. Gasoline cannot bo used in this way.
(21) R. W. S. writes: I have a telegraph ine af ew rods over one mile in length. Wire is No he line and six cups, gravity battery all at one end When battery sets one way I get no current at all. Re verse it, and the sounders work faintly. What is the trouble? Is main line of too great resistance for bat tery, or are the grounds weak ? Have had some experi
ence in making grounds, and never before had anything ence in making grounds, and never before had anything
which would not work well. I thought four cups which would not work well. I thought four cups
wouldrun the line. A. If your line wire is iron, the resistance is too great; you must use a larger wire or
more battery. If your wire is copper, your grounds or connections must be at fault.
(22) C. W. R. asks how the magic solder wire is made, such as pedlars sell for mending tinware copper, etc. It is some kind of conposition of chemicals without the acid, simply by holding the light or heat underneath the place to be mended, then simply let the
 muth, 1 part: tin, 3 parts; lead, 2 parts, and cast in slen equal parts of tin and lead and pour it through a vesse having a very smail opening in it, into a tub of water
If the metal is the right temperature, and if the aperIf the metal is the right temperature, and if the aper-
tured vessel is supported the proper distance above the tured vessel is supported the proper distance above the
water, the stream of melted metal will be cooled, form g a more or less perfect wire.
(23) N. E. writes: 1. I am running a band saw, and have a great deal of trouhle with the lap. W
use common solder, but it will not hold the ends togethe but a short time. The saw is two inches wide by one sixteenth thick. How long should I make the lap one what is the best solder, or how can I braze it ? Can you give me a receipl to make a solder better than the
common solder that tinsmiths use? A. Make your common solder that tinsmiths use? A. Make your
lap about an moh long. Coai the adjacent surfaces lap about an inch long. Coai the adjacent surfaces
well with borax paste, and wire the two ends together well with borax paste, and wire the two ends together
with irou binding wire. Support the joint over a large piece of charcoal, and apply pieces of silver solder to the edges of the joint, having previously coated the solder with borax. Now with a strong blow pipe flame hea the saw at the joint until the solder flows. 2. I have about 100 of the Scientific American I wish to bind.
What is the cheapest and the best binding that I can What is the cheapest and the best binding that I can
get ? A. We know of no cheaper way than to employ a bookbinder.
(24) W. W. C. asks: 1. How can I preserve some manuscript written on common paper and
with an ordinary lead pencil so that it will not rub off, or in other words, how can I make the writing indeli-
ble? A. Lead pencil marks carnot be rendered indelible, but if the lines are washed over with a clear solu tion of $1 / 40 \%$. of gum arabic in $6.0 z$. of water they will not rub off readily. 2. Two bodies of exact size and shape, but of unequal weight, and each presenting an entirely smooth and non-compressible surface to the atmosphere, are dropped from a given height at the
same time: will they reach the ground phillosophers say they will,others say they will not unime they bedropped in a vacuum. A. In a vacuum, yes; in the air, no; the heavier body is capable of overcoming the resistance of the air more easily
(25) J. J. S. writes: I wish to know something of the nature of nitro-glycerine. Please answer 1: After being prepared, and coming suddenly or otherwise in contaet with air, does it (the air) have any effect on its explosive properties? A. The air has little or no effect upon it. 2. In its liquid form for what purposes
is it generally used and when so used? How is it exploded? A. Chiefly in blasting, in tunneling, and mining. It is used extensively for cracking the rock in the bottom of "dry" petroleum wells. It is spark or fuse. 3. Where is it made, and what size cans is it generally put up in? Also the difference in explosive power while in liquid form, and such prepara-
tions as "giant powder," "dynamite," and other bigh explosives having nitro-glycerine as a basis. A. See article on nitro-glycerine, pages 344,345 , current volume vary from firic american. The cartridges usually gard tothe relative effictency of dynamite, giant powder and nitro-glycerine, consult Mowbray's " Trinitroglycetine." 4. I read of two empty glycerine cans being
fond in the woods somewhere in Pennsyl small boys. A man to whom they were bho attempted to open them, causing an explosion, thereby losing his whole arm, tearing it from his body. Now, esplosion? What are the most serious objections to its being handled in liquid form? A. Such packages sides after their contents have been poured out to their (26) W. C. R. says, in answer to N. J. A "My experience is to bore a large hole in the end of he post that is to be put in the ground, fill it with salt, then:plug the hole tight with a wood plug.
(27) C. M. K. asks: Can you inform me of any means by which the flesh can be taken from the
bones of smail birds, leaving a perfect skeleton? A. The following method will answer in some cases: Put
the bonesin a strong, warm alcoholic solution of caustic potash for a short time, then immerse them in running
water until clean. water until clean.

