## 

The Chargefor Insertion under this head is $\$ 1$ a Line.
All Hot Air Furnaces changed to Steam-
Same heaters and registers ; no boiler ; one Furnace, or Same heaters and registers; no boilier; one Fur
whole Patent. $H$. G. Bulkley, Cleveland, onlo.
 Nickel Plating; ; a new and superior mode,
not infring! ing Patents, for sale and references given by A. Scheller, 121 Forsyth street, New York.
Buy Gear's Improved Variety Moulding
 Sperm Oil-No lubricator like it. See Kel-
logg's Patent Steel Measuring Tapese, manufactured
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 Priest \& Co., 3 Tremont Ro v, Boston, Mass.
Iron Roofing. Scott \& Co., Cincinnati, Ohio. Manufacturers of Subuarine Excavators, Wanted-A A. god Scccand lind Portable En-
gine on Wheels, 6 or 8 H.P. Address, with price and full $\underset{\substack{\text { partic } \\ \text { Sh } \\ \text { ders } \\ \text { dit }}}{ }$ Shafting and Pulleys a specialty. Small or-
ders filed on as good terms as large. D. Frisbic \& Co.,
New Haven Conne Steel Castings. to Pattern. Can be forged,
welded, and tempe.ed. Aldress Pittsburgh Steel Casting $\underset{\text { A Superior Printing Te legraph Instrument }}{\text { (the Selden Patent }) \text {,for }}$ the First Premlum (*s Silver Medal) at Cincinnati Expo.
sition, 182 , for Best Telegraph Instrument for privet
 Jos. Minchener, Machininst,of Troy, Alabama,
offers his services as Agent, to represent ainy thing that may be of use to Planters, Bullders, or Manufacturers. Wanted, a Macline to make a flat flour bar.
rel hoop out of wack asn timber ; also, any Machinery that will decrease the cost of making Flour, Fruit, or for the barrel. Address P. O. Box 2333, Buffalo, N.Y. Good
Words for the "Gardner"-From
Powers \& Weightman. Philiadelpha, Jaunary $6,1873$. -. B. Waggener, Secretary, No 1866 chestnut st., Philla delpha. Dear Sir:-At the gas explosion which occur-
red at our store, No. 56 Maideu Lane, New York, on the 31 st of December, the Gardner Fire Extinguishers pro.
eurred from you were used to great advantage. Powers

To Machinists nud Manufacturers in want charge of work, or ac
P. O., Philladelphia, Pa.
Buy Wood Working Machinery of Gear,
Boston, Mass. To G. G. L.- -Having had experience with
some patents for chemically preparing and dyeing moss
 Hydraulic Presses and Jacks, , new and sec
ond hand. E. yon. 770 Grand Street, New Tork. ${ }_{23}$ Pornt Lathe foston, Mass.
Wanted, relialle and responsible parties to
Scll Engines, Saw Mils, and other machinery manufac. tured by the Mansfield Machine Works, Mansfield, Onio. For the Best Circular Saw Mills and, Steam
Engines, stationary and Portable, of all Sizes, apply to

 All, Blacksmith Shops neeed a Holding Vise
to upset bolts by hand. For such, adidres J. V . Abbe, to apset bolts by
Manchester, $N$. II.
Circular Saw Mills, with Lane's Patent Sets;
more than 1200 in more than 1230 in operation. Send for descriptive pam.
phlet and price list. Lane, Pitkin $\&$ Brock, Montpe.
iler Vermont.
lier, vermont.
First Class Bed and Platien Printing Presses,
to order on sliort notitce by Sullivan Machine Company, Machinists, Price List of small 'Tonls free ;
Gear Wheels for Models, Price List free ; Chucks and Drills, Price List free. Goodnow \& Wightman,23 Corn. nill, Boston, Mass. . . . Bailey \& Vail, Lockport,
W.anted, by T. R.
N. Y., Planer, new or secona hand, to plane 5 to 6 ft. ong, 20 to 26 Inches wide.
All Fruit-can Tools,Ferracute, Bridgeton,N.J.

 8thst., New York.
For2, 4,68 iI. P. Engines, address Twiss
Bro., New Hiven, Conn. "Englishl Patent-The Proprietors of the recent Fairs), having ther hands full at home, will sell
heir Patent for Great Britain, just obtained. A great heir Patent for Great Britain, just obtained. A great
chance for business in England. Address Heald, Sisco \& Co., Baldwinsville, N. Y
For the best Presses and Dies and all Fruit
Can Tools, apply to Bliss \& Williams, 118 to 120 Plymouth
American Boiler Powder, for certainty, safe-
At, and cheapness, " The standard antivncrustatt." Am. ty, and cheannees,
B. P. Co., Box 7r 77 , Plttsburgh, Pa.
Scale in Boiliers. I Will Remove and prevent
Scale in any Steam Botler, or make no charge. Send for Scale in any Steam Boiler, or make no
circular. Geo. W. Lord, Philadelphia, Pa.
Gauges, for Locomotives, Steam, Vacuum,
Arr, na teating purposes-Time and Automatic Re cord. Ing Gauges-Engine Counters, Rate Gauges, and Test
Pumps. All kinds fine brass work done by The Recording Pumps. All kinds Ane brases work done by The Recording
Steam Gauge Company, 91 Liberty Street, New York, Steam Gauge Company, 91 Liberty Street, New York,
Dobson's Patent Scroly Saw 1100
strokes per minute. satisfaction Suas makneed. John B. strokes per minute. Satisfaction guar
Schenck's sons, 118 Liberty St., N. $\mathbf{Y}$.
Peck's Patent Drop Press. Milo Peck \& Co., Bownton's Lightning Saws. The genuine
Bochangen will cut Ive times as fast as an ax. A


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Steel Castinss "
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upward, can be forged and tempered. Address collıns

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$\underset{\text { Fow Stb,N.J. }}{\text { For }}$ Fire Engines, address R. J. Gould, Brown's Coalyard Quarry \& Contractors' Ap.
paratus for hoisting and conveyingmaterial by iro cable, W.D. Andrews \& Bro.414 Waterst.N.
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Millstone Dressing Diamond Machine-
 Diamonds. John Dickinanon, 64 Nassau St., New York. Belting as is Belting- Best Phililadelphia
Oak Tanue. C. W.Arny, 30 and 303 Cherry Street, Phil.
Minining, Wrecking, Pumping, Drainage, or
rrigating Machinuery, forsale or rent. See ad vertisement,

 be without them. I.L. Davis \& Co
Always right side up-The Olmsted Oiler,
enlargead aind liuproved. Sold every where. Gatling guns, that fire e 400 shots per minute, 12 pounds, are now being made at Colt's Armory, Hart-
of Electro Gold and Silver Plater on all metals, res 9 . 99 Uulo st Hand Brick Macline-Parties building a
machine that will re-compress the brick aftur monlilag and partially dried, will please address the Editor of this
paper, Box 77 , New York City. Send circular.

## (8) 4 (4)

1.- $V$. asks: What is the cause of the scale
which is found on malleable tron castings? 2.- C. asks if there is any thing better than
wax to
 4--H. L. B. asks how to make the carmine
stamp ink used on a ribbon stamp for cancelling pur-5.-C. asks : How can I case-harden part of
an object, such as the face of a hammer head, and leave 6.-J. B. B. asks: What varnish or conpo-
ation will make cloth waterproof witiout causing it to be stiff and sticky, or to lose its color? 7.-C. asks: Can corundum be used for
grinding on a wheel, ike emery, ands it better than em: y for grinding steel and iron
8.-A. M. J. Says: I would like to know of crude petroleum from Iron tanks which are caulked
9.-J. E. F. asks how to preserve and stuff
bids,and how to dress their feathers, which get spolled birdi, and
in killiug.
10--L. L . H . . W. . asks: H . How can I temper

G. G. S. asks: What is the present variation
G. G. S. asks: What is the present variation
of the maignetic merlda trom the true meridian? What
its variation at different times since 1750 ? In it sint Is its variation at different times since 1750? Is it still
moving west ward, and has sit beenso through that entire period, or has any change from the west to east taken
place? If so, when diduit occur? Answer: The in forma.
 Coast Survey Report. The variation 19 statll moving
west wardy and has been continuously since the date given. The exact variation at the given locality can be determinea at any time by yny yurveyor who understan
his business thoroughly. Apply to the nearest one.
A. H. S. says: I intend to build a residence proof, if it can be done with out too much expense. .
proposed to flll every space between the studuing wite brick and mortar, leaning space of of 11 in inches for room rom
for plastering. I amm recommended to nill paces with dry yand or dry ashes sifted fine. If I fill with brick, I must haul them, by team, 8 or 9 miles, while sand may, be
obtanined within half a mile at trilling cost. Which had $I$ better use formy purpose? Will not sand rot wood work,
even if put in dry? Will the small nalls ueed to nail on even if put In dry? Will the samal nalls used to nall on
the lath he suffcient to oustatin the pressure of the sand,
the studding belng 15 or 16 feet the studidig beelng 15 or 16 feet high? l tit it surgested
that sand would stife any fre that might start by clos Ing garoundit, thus secdaring building mach safer. An
swar: There is danger of the outside bourding swer: There is danger of the outside boarding becoming
open by shrinking and warping, in which case the sand will run out through the open jolntst or laps. Dry gend
has been used for deafening between flo ors to the extent of fourinches in thickness, but a psecial lobording 1s put
in to receive it, so as not to bring the weigrt upon the in to receive it, so as not to bring the weight apon the
plaster; the result in this case as to dry rot has not been determined. But timber encasesed in plaster and in iron
has developed very dangerums ort
 plaster one good coat, if you do not wish to incur the
expense of brick fllling. But you had better flli inat the
 S. J. H. asks: Why does not a t top fall when
spinning, the same as when it is not spinning? Answer:
groscope. Consult Pect's' "Mechanics for Schools,",
etc. We will endeavor to tind space and time to trans.
. etc. We will endeavor to tnd space and time to trans-
late tit into less purely mathematical language at some ate it into le.
future time.
E. O. McC. asks : How far can water be
drawn on a perpendicular, with a fre engine?

 ated in my second story. The manufacturer stated that
I would lose no power by placing it there, provided made a draft tube of the discharge pipe, by inserting its end in a tub of water and making 1 tair tight. I had the
discharge pipe made siphon like at the lowe end. The
dury query is: Do 1 lose power by the siphon arrangement;
and, if it is not perfect, would 1 lose power by the water and tub arrangement, and if so, how much? If I lose
power by elther arrangement, I should like to know for power by elther arrangement, I should like to know , for Any arrangement by whitch you make a complete seal of of the air, and thus retain the tube full of water, will be effective with a properly constructed wheel, rovidied
that tit 1 not placed at a greater hight above the dis. charge opening than that due the pressure of the atmos. phere, and providiad that the errangement does not im-
pede the flow of the water. If the seal is imperfect, head is lost and also a proportionete amount of power,
J. F. asks wheich will be most effective, a
circular saw with 4s, or one with 26teeth, in cuttingpine board. Answer: The size of saw or spead of its periph.
ery should be given. We cannot give a definite answer as the question is agked. At one speed, the teeth might
be set too close if 48 in number, and at otherspeeas, they be set too close if 48 in number, and at other speeds, the
would be too far separated $1 f$, were
O. K. asks if it it in advisable to drive a $4 \frac{1}{2}$
feet burrmillstone with a quarter twist belt from the engine shaft to the spinale, and how wide must the belt
be. Answer: We do not like quarter turn flat belts, but properly arranged, and with plenty of len enth, theys some.
times do well. $T$ ry a 5 inch belt, if you have good dis.解 the stone and the line shafting
J. P. W. Says: I have lately put into my extending from the celling overhead, 7 feet out of the raised any distance, from 2 Inches tor 3 feet: but an will not draw. A current of air sets downwards most of the
time. What is the trouble? Answer: We presume tha in equally large volume of air rises through the chimne
T. I. F. asks: In making the driving or spea, what proportion in lensth ought the levers to be
on to make any gain in favor of the team, if any, as the
larger the circuit the eloweri the the speed? Answer: In. Creasing the size of the band wheel in the horse power
nachine will increase sped of driven pulley at the ex pense of the driving force, which will diminish in simi. lar proportion. No alteration for the purpose of regain.
ing the lost aidvantage will be successful except by sac. he speed galned.
O. N. asks: Which end foremost will a log,
thirty feet long and twenty inches in diameter at on end, tapering to a point at the other, tow easiest in the
water? Answer: The $l_{\text {og }}$ will move more easill with its sharp end foremost. The principal resistance in pro-
pelling properly formed bodies in water comes from the friction bet ween the eurface of the body and the water is increasead by the plling up of the water in front. I the log is mored sharp end frst there is no front plllugg
of the water, but the latter is divided and swings away $\substack{\text { sidew ise } \\ \text { of } \mathrm{a} \\ \text { a clock. }}$
T. R. L. says: Last summer I noticed on
 examination I found that each blade of grass composing
the circle was covered on both sides with a kind of mil ew, which, when undisturbed, was of the bluish color,
but when rubber between the ©ingers, it became black. The grast was about 4 the ches long, and when the mower
was run through it, this substance rose in a cloud and Was run through it, this substance rose in a cloud and
was blown away. On another part of the lawn there
wasanotherport on of never saw one before, can youl let us know what caused
it, and why it assumed the circular form? Answer: It Would be impossible to give a positive answer without some of the substance for microscopical examination.
But it is very probable that a mushroom would have Butit very probabe that a mushroom would have
been foond in the center of the circle, ard that the
"mildew" was caused by a scattering of the myriad

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 to some trouble that $T$ am having with the feed pipe of er last but a very short time, and I I have had to renew the whole pipe from the pump to the check valve (some parts of tit severalt times) in the last twelve months. The and 19 round, and about 8 feet ho diameter at bottom,and just taper enough to hold hoops ; it is between 8 and
 from the tank to the pump is one inch gas. pipe. The
pump has a solld plunger $2 \% / 8$ inches in diameter and the pump has a solld plunger $2 \%$ inches in diameter and the
pipe that troubles is 1 inch gas pipe. The old engineer contends that the pipe is large enough, and that the heated ; i say that the pipe is entirely too small, and I
soggested to him that the pressure of the tank greatly suggested to him that the pressure of the tank greatly
assisted the atmosphere $i n$
prompty fllling the vacuum assisted the atmosphere in promptly y lllilng the vacuum
producee by the pump while the heat communtated to it (the water) would expand it and thus, having the friction. In proof of my position, I called his attention lo the stand pipe (which is $11 /$ in in gas pipe from the
check valve to the boiler) and is seemingly assound now as when put in. Will you give your views on the subject? Answer: We think the pipe too small altogether, unless
the pump runs very slowly indeed. If the trouble arises from oxidation by anything dissolved in the feed water,
D. M. says : I have a brick building covered putting on the tin, it leaks badly, especially during very heavy rains. The mechanic blames the tinner, and the
tinerer the mechanic. I think both are to blame. Please
 the roof from a parapet. Answer: Do not alter the parapet, but insist upon the tinner's making the roof
tight. He thould find the openings in it and solder them ight; and if the parapets are of brick, as we presume

Where the tin enters the brick work. Most ilikely the
fault lies here.
fault lies here
O. H. asks: What power for each square
inch of water passing through oo feet a distance of five miles could be obtainea? I am desirous of this information, as my farm is about the pipes to supply the city are more wan half the distance lown in the streets; and if $I$ could convey the water the
distance named, it seems to me I should have, with a flue or six inch pipe, a power to cost less than to build a steam engine of ten horse power. Answer: Every ten gallons of water, under the head indicated, is capable of
developing about a half horse power, if used in an ordideveloping about a half horse power, if used in an ordilikely to varyimmenselyf rom that due the head with the greater or less amount of water used in the city, and the
riction of the pipes will cause considerable loss. The friction of the pipes will cause considerable loss. The
power sctually derived from the source referred to will power sctually derived from the source referred to
be eprobably but a small proportion of that due the head, but we cancot undertake to say how small that friction may be. We should anticipate that steam power would
be cheaper than water power, and also more reliable, cheaper than water po
I. P. H. asks: When was the game of chess
invented, and by whom, and in what country? Who is the standard authority on such games? Are there any ners in that art? Can you inform me where Baiernisiocated, as I cannot find it on any of the maps? I Thinkit
is in the Austrian emptre or near it. Answer: Thegame go. Staunton and Hoyle are tie standard authorities Professor S. F. Baird has peblished directions for taxiermists in the Report of the Smithsonian Institute for 556. Baiern is the German
J. asks for a simple method of detecting
explosive ofls, and states that his neighbors use a burning fluid of which the vapor cscapes through a burner. thisfluld, whatever the latter may be. Answer: $\Lambda$ yerfect test for mincral oill was described on page e 411 of our
last volume, under date November 30,1872 . J.s letter is ne of niany asking for instruction on practical matters already published in our journal. Better evidence of
the continued usefulness of the SIIENTIFIC AIERICAN ould not be adduced.
C. H. says: On December 13, about sunset, common barrel, at a considerable hight in the air. It raveled westward, and would not have been noticed by
many but for the tremendous noise, which jarred the arth and made the windows ratle. It continued roar ing all over the sky for several minutes. What was it?
Answer: If the blue light had been invested with a tail, it would be easy to account for the phenomenon; but wanting that ap
ory, solution.
W. H. C. says: I have had an argument ship, being the flrst part seen as she approaches, is not a ship, being the ilst part seen as she approaches, is not a
proof of the rotundity of the earth. He argues that the
circle of the earth's circumference is too great, and ap. circle of the earth's circumference is too great, and ap-
proaches too near a straight line to produce this result proaches too near a straight line to produce this result
within the distance that a sinip can be seen with the unaided eye. How is this? What is the rotundity of the earth per mile? Answer: Eight inches.-How far can a
large ship be seen on a smooth sea? Answer: About 17 miles, if the masts are 200 feet high.-Suppose a straigh ine, 50 miles long, to touch the circle of the earth at the
center of the line, how far would each end of that line be from the circle? Answer: About 417 feet.
R. H. M. says: We have two flue boilers, each of the following dimensions: 16 feet long, 4 feet dl
ameter, with 48 three inch tubes; the grate surface is 5 feet by 4 feet. They are said to be of fifty horse power
each. We have also two other boilers 4 feet 6 inches diamoter ; one has 64 three inch tubes, the other, 62 . The grate surface is 5 feet by 4 feet 6 inches;
said to be of 70 horse power each. On the last named boilers our working pressure is 80 pounds; we very fre-
quently find great diffeulty in kecping up this pressure, wine. The length of steam pipe is barcly 50 feet, con sumptionof fuel, 6 tuns best soft coal, in twenty hour What I desire to knowis this: Is the estimated power
correct according to dimensions given, allowing the conde condensation, etc.? Is the consumption of fuel out of grate or flre surface sufficient? Answer: Good builders
of steam bollers usually allow twelvc fect of heating surface per horse power, and, with good engines and of coal per hour, with a good engine angl boilers, should give at least 120 indicated horse power; and with the best engines and boilers in the market, 100 horse power shoul be obtained with a consumption of one half the amoun
of coal given by our correspondent. The proportion of of coal given bescribed seem to us good. Examine the en
the boind
gine and the setting of the boilers. There is a seriou defec
C. F. W. Says: In estimating the power of
antifiction cams, , take it for grauted the law is the antifiction cams, Itake it for graited the law is the
same as for an inclined plane, namely, as often as the hight is contained in the length the power is but in my case the length of the plane is 6 inches, the
hight 3 inches, and when used, both planes work at the same time, but the hight is double, making 6 inches. Is
there, or is there not, any power gained besides what is gained by the lever to work the same? Answer: The relation of force exerted to resistance overcome, in the whole
combination, can be determined by multiplying the force exerted by the distance over which it moves in its own d rection and dividing by the distance traverssed by the
table of the press. The result gives the resistance which and provided there is no friction.
M. D. K. asks: 1 . What is the highest speed
attained in printing cards, circulars, etc., and what is the name of the press? 2. How can I ascertain the power of a toy steam engine? 8. Is there an illustrated
dictionary of mechanical terms published? 4. How are colored lithographs made, and are all the colors printed at one impression? Answers: 1. About 1,000 per hour, Toy steam engines are generally too small for the ordito work raising a weight, and remember that force suf ificlent to raise 33,000 pounds a foot high in a minute o a horse power. 8. Consulta bookseller. 4. Each color
A. A. D. asks whether the power of a hy-
draulic press is doubled or quadrupled by the use of two or four small pumps, which inject the water into the
large cylinder, instead of one; or, if not, whether the effect of two or four of suchsmall pumps would stmpa
rather the area, of the piston of which is equal to the
sum of the others. Answer: To determine the power of the hydraulic press, measure the diameters of the pump
plunger and the eam of the press. The square of the di ameter of the ram is divided by the quantity obtained by multiplying the square of the diameter of the plunger
by the distancefrom the center of the plunger to the by the distance from the center of tid ping the whole
fulcrum of the pumn handle and diling by
length of handle. The result will be the number of times nat the pump handle. Friction is not constdered on the pump handle. Friction is not considered. The
action of four small pumps worked by the same handle action of four smale pumps worked by the same handle
would be equivalent to that of a single pump of double diameter, that is, of area equal to the four combined.
J. K. asks: Is it safe to use any remedy
when chemlcals are used, to removescalesfrombonlers? Answer: Mechanical means are always to be preferred, where their action can be carefully watched, is proper If they contatn any acil, howcyer, they will injure the
exposed metalic surfaces wherever they may come in exposed metalitic surfaces wherever they may come in
contact with them. Some apparently harmless remedies is thus semetimes caused
To E. E.-To form a perfect cube in per connect cach alternate angle with thecenterby a radius


To W. G. B.-This communication was re earlifer note. The desire of our correspondent is, how ever, fully complied with in our last remarks upon the
subject of the balance wheel. The only real gain in attempting to balance a reciprocating plece by a rotating one is that derived from changing the direction of the
disturbing action of the momentum. For example, the
reciprocating parts of a horizontal stationary engine, if runuing at high speed, produce horizontal strains which Its foundation and holding down bolts are less well fitted
to ressist than to meet the vertical strains which are produced by the momentum of the rotating plece, whic
may be used to neutralize those horizontal strains. J. H. D. Says: A friend claims that, if
wetght of 40 ibs. be put on a wagon axle (which is 20 wbigh each whecl), the pressure is the same on the
lop on ene wheel as on the bottom; while I assert that,
top of the If there are 14 spokes in the wheel, there is just one
fourteenth of the weight on the top. Which is right fourteenth of the weight on the top. Which is right?
Answer: The problem proposed involves the higher
mathematics. If the rim is absolutely rigid, and if the joints are unyielding, the strains on the several spoke will vary in proportion to the squares of the cosines of
the angles which they mike with the vertical. In this the angles which they make with the vertical. In thi
case, the force resisted by the vertical spoke, elther at top or bottom, is about two fourteenths of the total
weight on the wheel, where all the spokes take their pro-
X. Y. Z. says: Will some one inform me me
what causes sinks, hollow, or low places in brass cast Ings? Answer: The defects you speak of are due to va
rious causes, such as uneven shrinkage, molds not thor oughly dried, etc.; but principally uneven pouring and too little pressure in the metal from the pot.
J. G. W. Sends a mineral specimen and
says: The piece Iscnd you is broken off from a large says: The piece Iscnd you is broken of from a large
plece weighing $7 /$ of a pound. It was found while excabelow the surface, in a soil composed of sand and clay When found, it was covered with an oxide fully 14 of a inch thick. Many who have examined it think it is of
meteoric origin. But I have always supposed that meteors contained a considerable percentage of iron; this
does not appear to, for the minutest particles are not the least affected by a powerful magnet. Answer: It is is
not of meteoric origin, but is iron pyrites (sulphuret of iron) which is not attracted by the magnet.
S. S. W. C. says: I am using a plain slide
valve engine, 10 by 24 inches. Thevalve cuts of atabout two thirds of the stroke. Is it possible to set the eccen-
tric so as to cut off sooner and stlll give sutflent withoutchanging the length of the valve? Answer: Th engine referred to is probably as well arrangedas willbe
found possible. To cut off shorter with a single slid valve would probably cause excessive cushioning. To
make a change would require, also, a change in the length of valve face.
C. asks how to make a machine to sand pogether at the ends. The threads maybe so tied togeth r as to leave the face on emery side of belt perfectly
smooth and level. Size the belt with a coating of thin smooth and level. Size the belt with a coating of thy
glue and then let it dry. Hand the belt overtwo pulleys,
so that it can be easily turned about the consistency for glueing wood; put it on ho witha brush, sifting the sand or emery on at once. Go
round the belt as quickly 95 possible, then lay it on a as hard as possible (an iron pulley, loose on a mandrel, best) ; then hang up the belt to dry.
M. H. B. asks: How can I work a blue color
into soap? Answer? Ultramarine and smalts or zaffre are the materials used; the pigment ought to be stirred
Into the soap when the latter is in the mold. The fear unfounded.
S. L. A. says that a steel square which he the temper. Answer: The simple covering with oll can-
not effect the hardness and elasticty of steel. It is a fact that oll and fats are used to anneal steel, eapectially
thin articles, ilike springs, butin this case they are dipped into $a$ bath, heated to the point of ignitlion. Sometimes the tools are covered with the fat or oll, whereupon the B. St. J. says: I am running a steam saw
there is a thumping or pounding, like striking with a
heavy hammer, from the time we get 5 lbs. of stcam till we have 40 lbs ., when it ceases. What is the cause of said pounding? The boller is a large fiue boiler, four feet in diameter and elghteen feet long. The connectio pipe from the pump is exposed three fect to the fire, an
is a four inch pipe. When in front of boller the thump ing sounds at back, and at back, sounds in front, and is
so heavy as to jar the whole mill and to be heard four or so heavy as to jar the whole mill and to be heard four or
five rods outside. Answer: We presume that the five rods outside. Answer: We pressume that the action
described is due to the presence of cold water in the in the cylinder, or in some other way drain the steam
pipe and allow steam to blow through until the pipe is thoroughly warmed.
D. M. O. asks: Is there any process by which grained sugar can be made from sorghum? An
swer: The attemptsto make granulated sugar out of sor swer: The attempts to make granulated sugar out of sor-
ghum have not proved economical. Several pamphlets
have been printed by have been printed by agricultural publishers on this J. K. M. asks: What is the most powerful
bleaching process, and how can I apply it for bleaching an animal substance? Answer: The best bleaching
agent for ordinary purposes is chloride of lime. Per manganate of potash is also much employed. For housegists, can be used to bleach linen and remove wine stains J. P. C. says : I wish to illuminate a magic
lantern with an electric light; what is the best battery to use, and what is the number of cups? Are there any
magnetic or other machines that would answer the purmagnetic or other machines that would answer the pur-
pose? Answer: It is difficult to manage the electric pose? Answer: It is diffcult to wanage the electric
light without employing Foucault's lamp, and this ex ex-
pensive. Professor Tyndall made use of three of these lamps at his recent lectures in New York, and ran them with a bichromate battery of 50 cells. It is more con-
venient to illuminate a magic lantern with the e.alcium

## light.

J. F. asks for directions for testing bleach-
ing powder (chloride of lime)? Answer: It is not casy for any one but a professional chemist to test bleaching
powders. The directions for accomplishing an accurate analysis are given in Fresenius' work on quantitativ
IV
W. E. G., of Ky., sends a mineral specimen,
asking what it is, and of what use. Answer:
J. M. W. asks for a demonstration of the manner in whicha pirt aises through the arr without ex
ertion on it own part, and states that thifs will open erto field for perpetaual motionists. Answer: If you
new
have read the ScIENTIFIC AMERICAN carefuly, you will have read the SCIENTIFIC AMERICAN carefully, you will
know that a bird does not rise without exertion on its
own part, and you will have a wholesome dread of anyhing further on the subject of perpetual motion.
F. A. K. says: A lever $L$ has its fulcrum at sure is exerted perpendicularly at the right hand extremIty of the lower part. Another lever, of similar dimen-
ions and with its fulcrum similarly placed at the left ons and with its fulcrum similarly placed at the left
hand extremity of its lower part, is of shape 1 . Which hand extremity of its lower part, is of shape. L. Which
will exert the greatest pressure? Answer: The latter,
or $\perp$ form. If the two arms of $L$ are equal in length, here will be merely a transmission of power, less the riction, and no leverage at all. But in the latter form, the
leverage andincreased power will yary as the point where the power is applied is moved further from thefulcrum;
nd the leverage will be as this distance is to the leugti and the leverage will be as this distance is to the length
E. M. asks: What cheap preparation can I
use to make a box water tight against either hot or cold water? Answer: Dip the box in hot paraflin.
J. B. W. asks for information with reference next year. Who has It tn charge, and what has been pub-
lished with reference thereto? He suggests that a table of contents for each number would be a valuable ad dition to our paper: Answer : Write to Professor New-
come, Washington, D. C., for information relating to the commission for observing the transit of Venus. We
publish a table of contents for each number on our edit orial page.
C. M. asks if anthracite coal is injured by
xposure to the weathes, or by i:amersion in water?
iI have soaked it in water for some days without any in-
reasein weight." Is carbon soluble in any liquil with out chemical change? Answer: Anthracite coal is considerably deteriorated by exposure to the air, a fact that
is too much overlooked by dealers. There is no solvent
it A. G. T. Says: I read the article on the use
of arsenic in paper hangings, etc., and its' effect ou the ealth. I havea large case of stuffed birds in my sitting
oom, which are, of course, prepared in arsenic. Do you consider them injurious to the health of the occupants
of the house; and is the profession of taxidermist an of the house; and is the profession of taxidermist an
unhealthy one? Is Ure's Dictionary of Arts and Manudescriptions of the manufacture of trams and organ-
 be kept in close cases, and the room be well ventilated,
as molsture and changes of temperature will liberate some of the poisonous arsentc. Taxidermists are liable
o all the symptoms of poisoning unless they are very cautious. The article on sing mainufaeture, in Ure's
ond Dictionary, is fully illustrated.
D. W. P. says that he and another person Increased by passing through plain glass of uniform
thickness. "I hold that it is not ; he saysthat it is." Ann its passage through glass, but not nearly so much as the artificial heat from other sources.
W. S. B. asks: Am I right in supposing one pound to the square inch, would, at a pressure of
two pounds to the square inch occupy a space of two two pounds to the square inch occupy a space of two
cubic feet and so on, and is it the same with all other rases? Whatis the best rule for determining the pres-
ure of water at different hights? Answer: The volume of gases is governed by Mariotte's law, which is that, at
the same temperature, the volume occupled by the same bulk of air is in inverse ratio to the pressure which it
supports. If the pressure of the column of mercury in a tube is equivalent to one a tmosphere, addingthispres sure to that whichthe atmosphere exerts on the mercury
we have the air subjected to double its usual pressure and it is, consequently, reduced in volume one half. If
we subject it to a pressure of three atnospheres it. win be reduced to one third, of four atmospheres, to one fourth,of its original bulk. The only variations in the
law are near the point of liquefaction of gases. For thepressure of water, see hydrostatics in any book of physics.
H. C
H. C. S. asks if frost will follow down an
empty pipa, covered atthe top 20 as to freeze at six or
welve inches below the frost level. Or, willa hydrant
reeze, if the pipe is empty and the cut off valve is from six to eighteen Inches below where the ground is frozen?
Answer: If both the pipe and the hydrant are empty, Answer: If both the pipe
what is there to freeze?
J. L. asks: Is the air which is injected into he receiver or heater of the caloric engine warmed br
he exhaust before it is injected or not? Also, is the rigidity of a frozen road bed the only cause of the rails
hreaking? It is denied by some sclentifc authorities hat fron lis less tenacious when it is frosty, but experi nce seems to contradict such a theory. Answers: The heated. Ralls have slightly greater strength, probably when cold, but they have less elasticity and consequent-
ly are less well fitted to resist concussion. We presume y are less well fitted to resist concussion. We presume
that the last fact may fully reconcile experimental deductions with our experience.
E. H. B. says: The water in Lake Michigan, une, 1871. Some persons have an idea that the wearing away of Niagara Falls and the changing of the current In
Chicago River is the cause; but $I$ am of the opinion that It is caused by the action of the elements or by evapora-
tion. Will you please inform us what is the cause of the great depression of the waters of this great inland sea?
also where is the wash or caving in Also where is the wash or caving in of the bluffs and
great clay banks along this shore deposited? The wash is fimmense every year. Answer: The light of water in
the great lakes is greatly infuenced by the velence irection of the winds prevalling during the season, as well as the greater or less amount of rain which has fallen within the drainage area from which the water fiows.
We do not suppose that the wearing away of Niagara Falls has had the effect the wearing away of Niagara require a geological survey to deternine the real cause precisely. We presume that the soll washed from the
banks Is widely distributed over the lake.bottom, and me of it is probabler caried diver. C. A. M. says, in answer to A. .J. query 3
page 10 , that horn is clarified by first puting int boillng water, and, when thoroughly licated, itis placee
upon a wooden pin of a convenient length, and scraped length of the horn at each stroke of the shave. It now has a clean surface, and is sawn into one or more cylin drical pleces of convenient size, each of whilch is splif lengthwise by passing it over a circular saw projecting
through a tqble. These pieces are now placed again in bolling water, and, when hot, transferred to bolling whale oll, from which, while still hot, they are taken and
rolled or fattened and placed between sheets of Russian rolled or flattened and placed between sheets of Russian
iron in a powerful screw hot press. The press is made ot everal adjacent cast fron boxes containing squart open The pieces remain in about five minutes according to the temperature of the press, and when removed are
the form of fiat, a mber colored, transparent plates. the form of fat, amber colored, transparent plates. Th
R. B. M. says, in answer to E. S. S., query 3, page 59 : Jacket your pipes with aebestos paste, onc
half inch thick, and then protect the paste by a cover o hin boards or tin; charcoal pulverized, or any other
hon-conducting material will answer for the jacket. have jacketed my plpes with fine hay, and have had no $\underset{\text { taps in the following manner: }}{\text { A. © }}$ (ter hardening, polish the bottom of one of the cutting grooves until it is
bright (au old fine cut file will answer); then place the shank of the tap in th
you and the polished point a little elevated; if a taper tap, the large part of the tap should come nearest the fire. Then move it back and forth over a slow fire, that has the coal charred so
that it will not smoke. Heat evenly andslowly until the bright groove assumes a deep red color.-Z.D.
C. M. says, in answer to W. L. L., who asked on windows: The crystalline forms which the vap ors of a room assume, while being condensed on the cold panes
of a window, depend mostly on the surface condit:on of the glass. A glass plate, absolutely clean and fi at, woul show no forms, the frost being equally distributed. The
wiping or cleaning of the window inside the room usually done in a roundish, spiral, or scroll like manner hence the first adhesion of vapor, and the subsequent
crystallization (if we can call it so) follows these lines and produces the well known fern-like or leaf like forms. and produces the well known fern-like or leaf-like forms.
But wipe one pane before a frost carefully by horizonta streaks only, and the next to it by vertical streaks; an
the frost crystals will beformed in the same directions respectively, much more resembling those of some chemical salts than vegetable shapes. Snow crystals,
forming in the air without any chemical or mechanical obstacles, are always hexagonal, with secondary forma-
H. M. W. says: C. A. de S. wants to be think I have a right to speak about it. In the firs place, I got hold of a somewhat stifflsh paper (old ledge paper is excehent); then I cut it into slips of conven down on each slip one word or sentence (depending o down on each slip one word or sentence (depending on is necessary. When every word or sentence which
wanted in the index was noted down, I got hold of 2 cigar boxes, which I lettered from a to 2 . I now distrib uted those slips into the boxes. This done, I put the
contents of each box in a separate paper bag, put the now empty boxes again before me, got hold, of a, and
distributed all slips bearing words beginning with a bedistributed all siligs bearing words beginning with a a be
tween these boxes, thus, aa, ab, ac, ad, etc., to the end tween these boxes, thus, aa, ab, ac,ad, etc., to the end of
the chapter. This done, I got hold of aa, and successive. the chapter. Ins ace etc., and distrituted those slips further. Whe
ly
arrangedalphabetically I pasted those slips belonging to a in proper order on brown wrapping paper. Having treated a in this way, I took hold of b, and soo on to the
end of the alphabet. It took me a fortnight ( 6 hours a day) to get through with the distribution, and after that the copying took me several months.
A. G. C., on page 59, asks how to temper
taps. He must first of all bear in mind that a tap is sim ply a series of cutters on a bari hence the cutting part as possible to as possible to insure durabilty. This can be best accomIng the outside hard, while the inside will be compara a heavy ring (a brokenpulley hub is asgoodas anything) which have on side of your fire for use while hardening
taps, and also a heavy pair of tongs, made hot in the same way. Take the lever end of the tap with the ho
tongs, and insert the tap in the center of the hot ring tongs, and insert the tap in the center of the hot ring,
butdonot let it touch the sides. It is better to keep
turningit round. If the temper turning it round. If the temper draws too fast, wher
held by the tongs, cool it off; mope backward
ward untll the right color is attained. This, too, de
pends on quality of steel and the size and make of the tap, and lastly the purpose for which it is intended.-
McC. McC .
W. A. W. says, in answer to J. E. S. S. (query steam engine, to be heated by a common stove: Anything that you can make tight, with heating surface enough purpose. I saw a boiler and furnace in Grand Rapids Mich., that was made something like a box stove with;
boller set in the top, about one half the diameter of the boiler being in the frebox; there was no grate in fireboller being in the frebox; there was no grate in fre-
box or fue in boller. It was cast Iron and evidently all
cast whole, except the botom of the furnace and front cast whole, except the bottom of the furnace and front
end of boller. The cylinder of engine was 3 by 5 inches: end of boller. The cylinder of engine was 3 by 5 inches
A safety valve one inch in diameter will lee plenty large A safety valve one inch in dameter will
enough. Ten pounds pressure will be all you will need Why not gear up higher and run your
olutions per minute instead of 150 ?
J. W. says, in answer to J. E. S., page 378 volume XXVII., and W. G. B., page 27 , volume XXVIII.,
on transmiselon or motion : I would say that it is simply absurd to refute a thing we have not scen practically
tested. W. G. B. seems to be a true disciple of doubting Thomas, and much like the man who, when he heard of
the first iron ship being built, swore it would sink. simply assert that I have seen belts as wide as four inch-
es workadmirably on the plan described by me. And es workadmirably on the plan described by me. And
further, it has come under my notice, since I wrote my this plan at the planiug mill (recentiy destroyed by ire)
on President street, Baltimore, and will be used againin on President street, Baltimore, and will be used againin the reconstructed building. I have only to add that, in
constructing the slifter, it should only allow the edse of constructing the shifter, it should only allow the edge of so that the pressure of the shifter with the pliability of
the belt brings it in contact with the revolving iast pul.

## COMMUNICATIONS RECEIVED.

The Editor of the Scientific Materican acknowledges, with much pleasure, the re ceipt of original papers and contributions upon the following subjects:
On the Equatorial Protuberance of the Earth. By J. H.
On Aero Steam Engines. By D. B. 'T
On Flux and Reflux. By R. W.
On the Action of Water on the Turbine. By J. B. R.

On a Unity of Action by Inventors, concerning Foreign Patents. By J. A. B.
On the Wheel Question. By II. E. M
On Protection from Fire. By HI. \& B
On Financial Science. By N. L.
On Tidal Water Power. By W. B. S.
On the Astronomy of the Ancients. By L.

On the Motions of the Sun. By A. D.
On the Mineral Wealth of Virginia. By W. De H.

On Marine Camels. By E. S. F
On the Servant Question. By L. C. G
On the Use of River Water for Extinguishing Fires in New York. By W. B. D. On the Detection of Explosive Oils. By J. [OFFICIAL.]

## Index of Inventions

Letters Patent of the United States were granted for tile weige ending January ${ }^{7}, 1872$,
and EACH BEAKING THAT DATE.
[Those marked (r) are reissued patents.]

## SCHEDULE OF PATENT FEES:

On each Caveat...
on filing each application fora Patent (17 ycars) On Issuing each original Patent. Oa appeal to Commissicner of Patents. On application for Recissue.
u application for Extension of Patent.
On grinting the Extensi
On an application for Design (31/2years) $\$ 10$
$\$ 25$
$\$ 1.5$
$\$ 20$
$\$ 10$
$\$ 20$
$\$ 30$
859
$\$ 50$
$\$ 10$
$\$ 10$
$\$ 15$
.830

## Bag holder, J. B. Brown........... <br> 

Bed bottom, spring, J. L. Secomb Bee hive, D. Loofbourrow
Bee hives, honcy box for, Johnson and Barke Bell ringer, steam, West and Parke
Blowerfor grates, F. McCartly Boller steam, F A Woodson
Boller, sectional stcam, Babcock and Wilcox. Bone black, revivifying, A. Lonsky.
Book, memorandum, II. M. Hinadill Bool hecls, C.W. Glidden.
Boots, machine for, C. H ., Boring machine, N. R. \&. A.P. D., and F. M. Bial Bottle stopper, A. Hebbard...
Bracelet fastening, F. Kursh. Brick machine, E. R. Hubbar Burial casket, s . Stetn. Canal boats, propelling, A. Ames cane juice with sulp phurozes acid, J. Dymond Car coupling, J. L. De Good Car coupling, C. H. Kendal Car coupling, B. Moore Car frame, R. M. C. Parker
Car spring, J. W.Culmer
Car spring, raillroad, J. W. Culmer
Car axie bet, H. G. Down...... Caraxıe, lubricating, J. R.. Morri
Car seat, rallrad, A. Barney.....

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134,614 1344,614
$13+687$

