## ENGINEERING INVENTIONS

A car truck has been patented by Mr. Jobn R. Fish, of Grand Rapids, Micb. The equalizing bars are so arranged that the frames connecting the journal boxes are entirely relieved of al the weight of the car
and load, tbe bars extending entirely over and resting and load, be bars estending entirel.
An improved means of packing, lubricating, and cooing the pistons of air compressors has
been patented by Mr. Charles $F$. Ruff, of Pbenivville, Seen patented by Mr. Charles F. Ruff, of Pbenixvine, and works in a cylinder with a larger annnlar groove in which water circulares, tbe water in the eeveral grooves
making a close joint, and packing, cooling, and lobrimaking a close jo
cating the piston.
a reversing and cut-off gear for engine bas heen patented by Mr. Andrew F. Johnson, of Still water, Minn. This invention covers a special construc-
tion and arrangement of parts, so that a direct action is tion and arrangement of parts, so that a a iirect action is
establisbed between the load and theengine valve with. establisbed between the locd and theengine valve with
out the intervention of a centrifugal governor operated by the velocity and requiring a certain period of time for its operation.
A feed water heater has been patented by Mesers. Patrick McGivern and William E. Frye, of Crestine, o. A detachably supported water table is
beated in the fire box with feed water and delivery pipe connections, the heater beenn supported by the the
pipe connetions and the side sheets of the urnace, and pipe conneotions and the side sheets of the furnace, and the pipe connections having outside joints back of tbe
fre box, where they can be connected or disconnected fre bos,
at will.

## mechanical inventions.

A waterproof journal bearing has been patented by Mr. Nicbolas W. Godfrey, of Northport, N. Y. Theinvention covers a novel construction of sock-
et bearing, with lining, flexible packing, and washer, et bearing, with lining, flexible packing, and washer to protect the journals of shafting in excavators and
other machinery whicb requires to be immersed in water, from contact with water or sand.
A flier for spinning machines has been patented by Mr. Leedbam Binns, of Paterson, N. J. The
object is to overcome the present difficulty of the eye of the flier becoming notched by the wearing of the tbread, and this invention provides means for causing the thread to have a lateral traverse along the leg or
arm of the flier, so there will not be a single contact point as at present.
A saw mill set works, or improved head block for saw mills, has been patented by Mr. Robert R. Parsons, of Jackson, Miss. The setting shaft is the shaft having its bearings in the block, and there be-
ing a spring applied thereto and to the head block, ing a spring applied thereto and to the head block, with var
parts.
An improved wrench has been patented by Mr. Dwight M. De Silva, of Corning, N. Y. The jaws are pivoted to a head block, whereon a handle is also pivoted between arms of the jaws, extending back of so as to cause the jaws to bite, and to hold with great other object.
A thread separator for ring spinning frames has been patented by Mr. Gilman Jaquith, of Maysville, ion of separator throughout the whole length of tbe ring rail, of specially advantageous form, its small col-
umns or supports being arranged back of the center of umns or supports being arranged back of the center of
the ring rail, leaving the front or working side open or lear, so the travelers on the rings are easily reached by the fingers of the operator

## agricultural inventions.

A thrashing machine has been patented by Mr. Joun A. Beam. of Baden, O:tario, Canada. In
combination wihh specially devised crank sbafts and combination wilh specially devised crank sbafts and
rakes 'are perforated plates, the rakes having greater throw than the plates, so the macbine operates with small power, has
excellent work.
A hay stacker has been patented by Mr. James B. Matlock, of Huntsville, Mo. The lay is col-
lected witb a ralie in the ordinary manner, and the loaded rake is drawn to and upon the bars of a frame, where it may be connected with sliding catches, and elevated by drawing upon ropes, and then automatically releas-
A potato digger has been patented by Mr. Willis Dodge, of Presque Isle, Me. In combination
with a draught beam and scoop is a shaker or screen pivotally suspended, and a specially shaped crank shaf having a lower forward extension engaging a grooved cam disk, the scoop passing tbe potatoes backward over
the screen, which is agitated to separate them from the the scr
earth.

## MISCELLANEOUS INVENTIONS.

A cover for water closet seats has been patented by Mr. Dale $\mathbf{O}$. Cowen, of Batavia, $\mathbf{O}$. This in
vention provides for seat sheets to fit the apertures in water closet seats, and cover or protect the person from contact with any part thereof.
A spring wagon has been patented by Mr. Thomas P. Yates, of Factoryville, N. Y. This is a novel construction for combining the spring and axt strnction and improve the operation of spring wagons. Percy Cole, of Pipestone, Minn. This invention is an improvement on a former patent issued to the same
patentee, and covers an improved means of holding bag in connection with a hopper while the bag is being
filled.
An improvement in supporting belts forabsorptive pads, or a catamenial sack, has been patented
by Nannette Amia, of Brooklyn, N. Y. The supporting
belt is made of webhing, to which is buckled elastic
webbing and elastic hangers, which have loose sliding webbing and elastic hangers, which have loose
ings to receive the strings of an absorptive pad
A pipe stem has been patented by Mr. Jur. gen P. Lange, of Butler, N. J. The stem has a spiverse passages, a reservoir for nicotine rising with the smoke, and an aperture which provides for
tion,'so as to keep dampness from the bowl.

An improved window and door lock or but on has been patented by Mr. Evander B. Newcomb, of sorydon, Iowa. It is simple in construction and no
spring is needed, but by it the eashes may be spring is needed, but by it the eashes may be locke
when fully closed, or the lower sash supported when raisedto its fullest height or only partially raised.
A washing compound has been patented by Annie $\mathbf{E}$ Rhoads, of Baraboo, Wis. It consists of sal soda, saltpeter, and gum camphor, combined in certain proportions, and used in slightly different ways for the
varied work of cleaning dirt from clotbes, varied work of cleaning dirt from clotbes, and spots
A street cleaning machine has been patent ed by Mr. Beekman Van Gaasbeek, of Mount Vernon, N. Y. A truck carries a water tank, a compressed air chamber, and a water and air distributer, pipes from which may be so set as to sweep the dirt to the curb-
stone or point desired, there being also means for stone or point desired, there being also means for
keeping the water and air hot for melting snow andjice.
A measuring device for surveying and other purposes has been patented by Mr. Alfred Atkins, of Wanganui, New Zealand. There is a wire in a seriesof
sections, swivels uniting the sections, tallies, and a sections, swivels uniting the sections, tallies, and a
chain for connecting the swivel on the inner end witha reel, all furnish ing an improved means of measuring in uneven country
A sugar dumping wagon has been patented by Messrs. James D. Edwards and Leon F. Haubtman, of New Orleans, La. The invention consists in a wagon
box provided at ove end with a means for hinging it, and at the opposite end with means for receiving a rope to lift the latter end of the box and thus dump its conto 1 lft the
A re
A refrigerator for cooling contents of bottles, cans, etc., has been patented by Mr. Bernhard
Moebius, of Cbihuahua, Mexico. Tbe invention consists in a fibrous bag or covering to be passed over a bottle liqnid which is absorbed by the fibers and is es liqnid which is absorbed by the fibers and is
ed, thereby cooling the contents of the vesse..
A creaming can has been patented by Mr. John A. Kendall, of Hamilton, Mo. The can bas at
its lower part a closed annular warm water or air chamber, in combination with a snrrounding cold water vessel, to keep the lower portion of the mill warmer
than that at the to for a period, during which the than that at the top for a period, during which the cream will rise rapidly.
A drum and cymbal clamp has been patented by Mr. Perry W. Fair, of De Kalb, Ind. 'The
clamp device has a seat and stud screw for attachivg the cymbal, and a bottom and flange for seating substantially on the hoop of the drum, forming a simple an quickly adjustable device to make
nection of the cymbal to the drum.

A gate opening and closing apparatus bas been patented by Mr. Amon W. Chilcott, of Mattoon, Ill. This invention covers a special construction and
combination of parts in mechanism for operating sliding gates, and is an improvement on a former patent issued to the same patentee, whereby the operation is A bosom board has been patented by Mr. Samuel Maxim, of Wayne, Me. The invention covers a special construction and arrangement of the clamping thatclass of ironing boards which have a projection th thatclass of ironing boards which have a projection to
go through the neevk and a clamping part to hold the bottom of the shirt.
An improvement in tombstones has been patented by Mr. Solomon R. Miller, of Mount Union,
Pa. The invention covers a casing for receiving a picPa. The invention covers a casing for receiving a pic-
ture, and adapted to be secured on a tombstone, the casing having a rubber lining whicb bolds the glass a.washer or packer between the cover and the casing.

An air cooling refrigerator has been patented by Mr. David Sanderson, of Ottawa, Ill. The ice rack bas a curved plate or deflector at ine under side of
its central upper portion, in combination with a hopper shaped ice bed with a central oblong air passage in its late well around the ice, and thus cool the air in a roon
A trimmer for sewing machines has been patented by Mr. Daniel Maus, of Utica, N. Y. It is a curve of constantly varying radius, and with saw teeth
serrations in tbe curved cutting edge, so the trimmer is made to cut positively, without causing the wedging action which antagonizes the feed.
An improved hame clip has been patented by Mr. Edward D. Cole, of Macon, III. It is so made that by removing a screw the clip may be detached
from the hame, and also from the hame tug, so that either may be cbanged in the harness if desired without destroying the hame clip, and the clip is cheap, practi-
cal, and durable.
Animproved horse power has been patented by Mr. August Zastrow, of La Harpe, IIl. The invention covers special constructions of belt casing with
guide pulleys or idlers journaled to guide tbe belt clear guide pulleys or idlers journaled to guide tbe beltclear
of frictional contact with the ground, and permit the belt casing to be
it in working the

A machine for
machine for leveling boot and shoe soles bas been patented by Mr. Setb $\mathbf{D}$. Tripp, of Lynn, Mass. drive shaft by beveled gear wheels, and with a right and a left worm gearing into worm segments carrying the ade to move in unison.
An earth scraper has been patented by Messrs. John F. O'Connor and Sterling M. Williams, of
Davenport, Iowa. 'This invention covers a special con-
struction and arrangement of parts for effectively ope
rating a scraper, and for readily causing it to dump it rating a scraper, and for readily causing it to dump it
self by the preponderance of weight in a certain por ion thereof, or for carrying the load if desired.
An elevator bucket has beeu patented by Mr. Joseph A. Holmes, of Greenland, N. H. This is
an improvement on an invention formerly patented by the same inventor, and provides that the bucket shal be attached to the endless band at or near tbe center of its length, so that when the buckets are large or
laden they will not pull away from the band.
A time lock has been patented by Mr. Moses . Hawkins, of Edinborough, Pa. The invention consists mainly in what is called an "accident lever" with
wo pawls, one engaging a ratchet on the going barrel two pawls, one engaging a ratchet on the going barre
and the otber a stationary ratchet the lever having an inclined surface for engaging tbe time catch when the going barrel on the breaking of a spring.
A driving mechanism for sewing and othe machines has been patented by Mr. Samnel Maxim, of
Wayne, Me. There is a driving ring with a face groove in which the heads of studs held in pivoted plates fitted in recesses of pivoted drive links bite alternately a opposite sides of the drive ring groove on reverse
movements of the treadle, to impart continuons rotary motion.
A cheese press or mould has been patented A. Mr. Lewis A. Rites, of Chester, N. Y. The invention
covers two correspondingly recessed compressing rollre arranged diagonally to each ol her in the frame, to acilitate the feeding of the curd and the dropping ou of the compressed rolls, there being also a hopper of ing rollers.
An improved bell has been patented by Mr. Marcus M. Bowers, of Baltimore, Md. The flare of the bell is mare with a series of interrupted straigh
ines, there is a concave form for the bead, and a ham mer swell within the inside of the shell, whereby the strength of tone is increased and the bell is less liable
o break from strinkage, tension, or strain of the metal to break from sbrinkage, tension, or strain of the metal
An apparatus for painting bobbins bas been patented by Mr. Lnther C. Baldwin, of Manchester, N.
H. This invention is in part the same as tbat covered by a former patent of the same inventor, where the bobbins have a prolonged travel on an endless moving belt, and there is a nod arrangement or belts whereby the bobbins are carried in a small space, so they are A safety catch for elevators has been patented by Messrs. August J. Becker and Joseph B Young, of Mount Carmel, Pa. Combined with an ele
vator car is a frame held on tbe same and supported by springs; the snspension rod of the cage is connected by
chains with the frame, so tbat wben tbe hoisting cable chains with the frame, so that wben the hoisting cable the guide posts and lock the cage or car in place.
An ash sifter has been patented by Mr. Henry C. Pigueron, of Spring Lake, N. J. On oppo site sides of the sieve are lugs with apertures through
whicb a square rod is passed the rods not turning in whicb a square rod is passed, the rods not turning in
the lugs, so tbe sieve cannot tilt; the coals and cinder the lugs, so tbe sieve cannot tilt; the coals and cinders
cannot pack between the rod and the screen, and the cannot pack between the rod and the screen, and the
sieve can be emptied more readily than those in which he rod is passed through the sides.
A stencil plate has been patented by Mr. Romeo E. Ghezzi, of New York city. The invention covers a stencil plate provided upon its face with raised brush guides on each side of the perforations to restrict
the color during each application to a single perforated character or device, the plate having also blank spaces to afford facility, when shifting the plate, to space cilings.
A firemen's tower bas been patented by Mr. Eugene B. Magnus, of South Norwalk, Conn. This and
and means of connecting tbem, the whole forming scaling tower for firemen, which may be set on tbe
ground at a distancefrom a burning building, wherel) convenience is afforded for firemen to stand in differen positions, th
taken apart.
A machine for pulverizing clay has been patented by Mr. Marshall $\mathbf{F}$. Phillips, of Lakeland, La. per with an intermediate partition having pins, and a cross partition arranged above the saws, tbe fineness of he product being regulated by the set and shape of the saw teetb, the distance between the saws, the position
of the partilions, and the speed at which the saws are
A mail bag has been patented by Messrs. Frederick Michael and Robert Williams, Jr., of Eaton,
o. In the edge of each side, at the opening, is a longio. In the edge of each side, at the opening, is a longi-
tndinal pocket, for receiving welts on a sliding cover piece, so the sides of the pouch are drawn together and the pouch closed by passing the cover and welts intothe
pockets, there being a hasp on the sliding cover adapted to be locked in place by a combined lock and tag

A photographic plate holder and case has been patented by Messrs. Sebastian S. Peckinpugh and
George J. White, of Big Rapids, Mich. In combina tion witb a plate holder is a plate or strip with an adjusting screw, so the plate can be adjusted to exert a
greater or less pressure against tbe pbotographic plate, to press the latter firmly against the front of the plate holder, to facilitate their carrying and transference into the plat.
A gate hanging and operating apparatus has been patented by Mr. John $\mathbf{H}$. Brafford, of Red gate, has upper and lower hinging brackets and an intermediate arm, the rod passing through brackets and arm, and the arm carrying a pulley or roll, a latch rod and operating cords, the wbole making a simple and
substantial gate. easily adjustable wben it sags, and
readily opened and closed without dismounting from a

## \$pecial.

MRS. MARY A. LIVERMORE'S TRIP TO EUROPE. As one of the clearest thinkers on the various social
problems of the day, and as a lecturer of rare attract-
veness and ability, Mrs. Mary A. Livermore has long veness and ability, Mrs. Mary A. Livermore has long
been widely known both in this country and in England. Among women who have taken the platform for the dis-
cussion of questions particularly affecting their sex. cussion of questions particularly affecting their sex, Mrs. Livermore is without donbt the ablest representa
tive, and the most convincing in her arguments and Instrations. A few yearsago in her arguwents and ilimpaired that she was forced to retire from the lecture field. But the interregnum in her work was not of long duration, and her wide circle of friends and admirers soon welcomed her back again. How and by what
means she was restored to health is related in the following deeply interesting letter:
Melrose, Mass., Feb. 1, 1884.
"drs. Starkey \& Palen, 109 and 1111 firard St., Philadelphia.-Dear Sirs: I am entirely willing tomake a statement of the benefit 1 have received from the
Compound Oxygen Treatment. and that you should make such use of it as you please.
"Four years ago thisspring, at the end of a very severe and exhausting winter's work, I found myself ntterly oroken down in health. My superb constitution had hith-
erto carried me triumphantly through every task I had tro carried me triumphantly through every takin had of protracted labor that had fallen to my lot. But I was now completely prostrated, with no power of recupera-ty-1. I conld sleep but two or three hours of the twen-ty-1'our, and then only in a semi-sitting position, be-
cause of a difficulty of breathing; suffered excruciatingly from sciatica and neuralgia of the stomach; experienced the torment of indigestion and the train of ills that follow, and was harassed by optical illusions that were a source of great discomport, although I knew them to be illusions. My mental depression was as
severe as my physical prostration. I believed the hopeless invalidism which I had most dreaded had come to
me, and my chief aim was to hide myself from the me, and my chief aim was to hide myself from the friends
count.
"Myp

My physician recommended a trip to Europe, and my husband accompanied me thither. The change bronght only paliation of my troubles, bnt no radical improve--
ment. While in England some American acquaintances told us of the Compound Oxygen Treatment, and they dial agent in cases like mine. They emphasized their statements by narrations of complete cures whicb had been wronght by it of which they were personally cog${ }_{\text {nizant. }}^{\text {my hu }}$
"My husband immediately ordered from London the
materials for a home treatment of two months. I used it for a month, punctiliously obeying the directions sent for its use, before I began to rally. Then my return to good health was rapid, and since then I have enjoyed
almostuninterrupted perfect health and almost $y$ jonthalmostuninterrupted perfect health and almost yonth-
fnl vigor. I resnmed work immediately, and have asfnl vigor. I resnmed work immediately, and have as-
siduonsly followed the most laborions vocation ever since, altbough long past the time of life when it is considered safe to toilseverely and unremittingly. "I have never discontinued the use of the Treatment
since I began it. Tbere have been few days in the last since I began it. Tbere have been few days in the last
three and a balf years when I have omitted it. I understand and accept tbe rationate of the Treatment, and depend on it for vigor and strength, as I do on tood. I have recommended it to scores of people suffering from
nervous prostration and chronic ailments, some of acking persistence in the use of the Compound Oxygen. bave not been been benefited; for patience and persistence in its use are essential, if one would be cured of
chronic ilnnesses or lifted from a depth of physical dechronic il
pression.

## Yours truly,

In another letter to Drs. Starkey and Palen, Mrs. Livrmore says: "I have always and everywhere prolaimed the excellence of the Compound Oxygen Treatment, and have persuaded a great many people to use
it. I could not live vithout $t \mathrm{t}$, unless $I$ abandoned all $m y$ iork, and simplyexisted, and I would rather die than do Any information in regard to this remarkable treatment will be promptly furnished by Drs. starkey and
Palen, 1109 and 1111 Girard Street, Philadelphia. If you rite for their Treatise on Compound Oxygen, th ey will mail it to your address.

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Correspondents sending samples of minerals, etc.,
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(1) A. V. P. asks the style and size of lens and focus, etc., suitable for a camera obscura for out-
side sketching. A. A plano convex lens of 2 inches side sketching. A. A plano conver iens of 2 inches
diameter, and 2 feet focus, makes a very convenCiameter, and
ient proporion of pictnre for erenecthing. A Asharper de-
fned picture may be made by using two 30 -inch focus lenses, 2 inches diameter, in a tube flat sides outward or back to back, 4 inches between the lenses.
(2) P. G. asks: 1. Will a windmill lift surface water throngh a $111 /$ inch pipe to a tank 40 feet
higher than water level, distant 400 feer. mill will forces water the distance and height named, the quantity depending upon the power of the mill
Would it do to carry water for drinking purpose
through galvanized pipe9 A. Galvanized iron pipe is
largely used for conveyiug water, and is not considered very unhealthy if the water is cold and not ailowed to (3) B. K. F. asks what the mode of print Ing from engraved or stamped music plates is like. A. Music printing is done in the same way as copper plate
printing. The plate is covered with ordinary printing ink by a dapper (plate warm enough to handle easily without bistering the hands); rub off the excess of ink with a rag, then rub the palm - of the hand withsome whiting and lightly rub over the face of the plate. This requires a little dexterity to wipe in different directions, so as to leave the platesurface bright and
hei ink in the lines. Then place the dampened paper upon the plate and pass under the roller, which should be blanketed. The press is a rolling platen, witt a roller 6 or 8 i.
der it.
(4) G. L. G. asks: What is the pressure er square inch on a steam cylinder 1 foot in heiyht, 8 nctues in diamettr, when Falrenheit thermomete a quarter of anjinch thick, stand the pressure If not, how thick necessary? A. 296 pounds above atmo-
sphere. Yes, if perfecily sound, but we would recom. mend that it be not less than three-eighths of an inch thick, and tested to 450 pounds by hydraulic pressure
before submitting it to that pressure of steam, viz., 296 ounds.
(5) O. H. T. asks (1) how to prepare green oint which will stand the heat of steam and not scale
of and change color, for painting a steam engine. A. Use a chrome green ground in Jopan, and put on in wearing varnish. 2. Please give the dimensions for making a water tank which will hold four barrels of water. A. Make the tank to hold $16 \%$ cubic feet, or if
round, 2lf feet diameter, 4 feet 2 inches high, or 3 feet diameter, 2 feet 10 inches high. If square, $21 / 2$ feet square by 2 feet 8 inches high.
(6) S. S. G. writes: 1 Length and size of bore, weight and shape of ball, weight of powder, and
other conditions being the same, which will throw Ither conditions being the same, which will throw
ball the greater distance-a smooth bore or rifled guns Does not rifing impede the discharge of the ball, and does it do any orher good than to insure greater ac-
curacy to the direction of the shot? A. Smooth bore curaccs to the direction of the shoty? A. Smooth bore
is best for round bullest. The rifinig is necessary for long bullets. 2. What horse power is required to sus ain 33,000 pounds immovably without other support? . Horse power is supposed to be a moving
(7) L. W. McC. writes: We are running an fashioned pair of silae vaive engines, cylinders 11 sure. We have some controversy on several poiuts We want not so much a maximum of power (that being ample) asto get say 40 to 70 horse power with a mini-
mum of coal. What size steam and exhaust poris ought they to have? What size steam and exhaus pipes?
steam twhat point of stroke ought engine to receive steam to insure economical or harmonious working to-
gether? Would we get any very perceptible reduction of fuel, by reducing the driving pulley (which is $93 / 2$ feet),
(now 64 )? If so, at what speed and pressure of steam would we get the highest economy? Would the saving, and pressure? Or, would the reduction of driver of itself contribute tothe result? One engineer says the
economy would be the result only of increased piston speed and pressure, while another says the change in pulleys would also help. Is there any efticiency in am
monia fortior in dissolving or loosening scale on quantitities? and tubes? If so, how used and in wha scale? If so, how used, and in what quantities, by 16 feet, with 90 three inch tubes, fed from spring water strongly impregnated with lime and (supposed) magnesia, which forms scale rapidly and gives
us trouble. The water passes through an old boiler, us trouble. The water passes through an old boiler,
and is heated with exhaust before beiug pumped into boiler. Can you tell us how to get rid of this scale and prevent tine we have nesed various compounds, also results. How many feet of grate surface ought the from grate bar to bitsonce from grate bars tizt popen ing or throat at bridge wall and at back end of the
boiler? A. You would not materially economize in boiler? A. You would not materially economize in
fuelby altering the ports or changing the steam or extuel by altering the ports or changing the steam or ex
haust pipes. 3 inch steam and $31 /$ inch exhaust pipes are ample foreach engine-4 inches main steam. Know ing the point of cut.of of the valve would enable you
to decide the best running adjustment of the valve. Cutting off at one-third to one-haf the stroke for engines matic cut-off engines are made to vary from one-tent to one-half, according to the work. There are other
points that are of great importance in the condition of points that are of great importance in the condition of faces uponthe slide valves, loose piston from wear the sustaining springs giving out and allowing the pis-
ton rings to run loose. The leak of steam at these points is very much overloked in old engines. Cylin-
ders should be rebored when chey are found to be out of shape. An engine that has run ten to fifteen years especially if of the horizontal kind. needs rehoring and new rings. Much of your loss in economy is derived
nom the use of two cylinders instead of one of equal poower. We do not recommend change in the relativ size of pulleys or speed. The steam pipe should be
well feited, and the top of the boiler covered 2 or 3 inches deep with fine light ashes if now exposed. As you say nothing about the kind of fnel used, we are to
suposese that you are using bitnminous coal, which re quires a peculiar method of fring. For this coal the boilier should be 3 feet above the grate. Grate 5 feet by
5 feet, or 25 spuare feet, if you are oniy nsing about 50 horse power. Your boiler is rated 60 effective horse power. Ash pit shonld be two feet deep from top of
grate ; area over bridge wall equal to area of tubes. Alwayskeep a good flue brush on hand, and see that it
twice a week. In feeding the coal never cover the
whole grate at once with fresh coal, but feed at the front and gradually push tbe coal back, always keepin the bright fire at the back of the grate. This tends to
consume the smoke. As you have tried nearly all o consume the smoke. As you have tried nearly all o mend you to try some of the mechanical boiler cleaner (8) W. T.-The vernal colure for 1884 is $288^{\circ} 15^{\prime} 26^{\prime \prime}$ West from the point of correspondence of the
signs of the zodiac and the signs of the constellations the time of which is supposed to have been fixed as a the above position for th year-280 $15^{\prime} 26^{\prime \prime}$. You will find Norton's Astronomy a sufficient guide in any mathematical calculation that will give you the exact data
(9) J. H. D. writes: I have been told that the sunhar receded in the equinoctial point of the eclip. Aries (that is, the sign), it really bappens in the ooth degree of the constellation Aquarius. Is it so? A The zodiac is divided into 12 equal parts of $30^{\circ}$ each,
the division commencing at the vernal equinox, which correspondswith thefirstpointof Aries, following from west to east in the order of the signs. The first poin right uscension and longitude. The signs of the zodia corresponded with the constellations of the 8ame name
about 140 years B C., at which time the arrangement of he zodiac and the naming of the constellations was supposed to have been established. Since then be oquinoctial and soistitial points have retrogradel. neariy of the sign Aries, is near the beginning of the constel ation Pisces. In consequence of the precession or the quinox the star maps have to be corrected from time ot time, the older maps not representing the true reck oniug in right ascension. Thus from precession alone
the equinox has receded in 2,024 years $28^{\circ} 15^{\prime} 26^{\prime \prime}$, or
$50 \cdot 26^{\prime \prime}$ per year.
(10) $\mathrm{H} . \mathrm{B}$.
(10) H. B. G. writes: The distance from the mouth of the Cumberland River to Nashville, Tenn. is200 miles, with a fall of fift feet, or 3 inches to
mile: Wiath of the Cumberland River is about 176 yards. Now, in case of tie Ohio River being very high, River at Nashville? A. A large rise in the Ohio at the mouth of the Cumberland wonid very sensibly affect the flow at Nashville. We do not know the topography of the stream, and cannot be expectec to give an intel igent answer upon the mere data of 200 miles with 5 feet fall, or 3 inchesto the mile. The depth and volume of water flowing in the Cumberland has much to do It is also necessary to know the amount of fise in th Ohio in order to estimate the rise at Nashville.
(11) T. L. asks: What is zylonite?
(11) T. L. asks: What is zylonite? Wha is vulcanized fiber? What is the correct name of the
flaceous plant known commonly as "corn geranium" A. Zylonite is fiber of cotton or linen and sometimes wood pnlp combined with camphor by the alcoholic process, and pressed intoa homogeneous mass, or only
nother name for celluloid. Vulcanized fiber is fibe hanged by a chemical combination through th aid of heat. The word vulcanized was coined in the
rubber trade. Ask your floristabout " corn geranium." rubber trade. Ask your forist about "corn geranium."
(12) C. A. C. asks: Who established the arst locomotive works for building railwas engines, and probably Ross Winans estabiished first works in this ountry
(13) W. W. E. asks (1) the rule to find what quantity of water will fow through a pipe when A. The resalt is affected by the character of the pipe (material) and bends. Ruie given in Hasweil's ocket Book, page 385:
$39: 27 \sqrt{\frac{h d^{3}}{l}}=$ volume of discharge in cubic feet per
second, in which $h=$ head in reet,

## $39 \cdot 27 \times \sqrt{ } \frac{50 \times 0^{1-166^{6}}}{200}$

I would like the rule for finding the pressure, fricion, velocity, and quantity of water delivered, wben you have all the above points to compute by. A. The pressure is, 04335 pound per square inch for each foot
of head. In Haswell's Pocket Book you find the rules of hydraulics fully treated, also in Trautwine's Engiof hydraulics nuly
(14) F. W. R. asks how to calculate the ressure of water through an iron stand pipe 20 feet nd discharging at the bottom through an orifice of a quarter of an inch in diameter. Should the pressure be increased or diministed if the stand pipe were reA. The presure is and diameter increseitht or head mainained in the stand pipe; the diameter, or flow into or out of, does not affect the pressure. The pres-
sure is 04335 pound per square inch for each foot of sure is 04335 pound per square inch for each foot of
height or head of water.
(17) V. B. asks: What is used in graining nachines to stain poppar lu mber in imitation of spanish sed we cannot say, but quite likely a solution such as an be made by boiling 1/2 pound madder and 2 ounces while hot ; when dry go over the whole with pearlash olution, 2 drs. to the quart. If not exactly the shade, it can be modified by altering the proportions of the grediens.
(21) S. G. J. asks: For what is tale used? is there more than one grade or quality of its Abnut
what price will it bring in markect A. Taic is used extensively in soap making, and also for dressing sheep sking. leather gloves, etc. The domestic talc is used in
 position of some lubricating compounds. The talc imported is considered to be of a superior quality as com. about $\$ 12.00$ per ton.

INDEX OF INVENTIONS For which Letters Patent of the United April 8, 1884,
and mach bearing that date.


