## ENGINEERING INVENTIONS.

A car signal has been patented by Mr. Florance P. Day, of Omaha, Neb. A vertical shaft is held at each side of the car, the shafts carrying devices for producing flashes of light, one shaift revolving when
the car is running in one direction and the other when the car is running in the opposite direction, the shafts
being revolved from a car axle.
A steam boiler and furnace has been patented by Messrs. James D. Randall and william A
King, of Memphis, Tenn. This invention relates to King, of Memphis, Tenn. This invention relates to
boilers and furnaces designed for burning smoke, atomizing and burning animal and vegetable matters, ons, etc., by commingling steam with hot and cold air and with the oil or gases evolved from the
boiler in the process of generating steam.
A car coupling has been patented by William Jasper Hadden, of Danville, IIl. It 18 designee
to work automatically, and to hold the pin set ready to to work automatically, and to hold the pin set ready to
drop, to guide the link into the drawhead, to drop the drop, to guide the link into the drawhead, to drop the
pin through the link when two drawheads bump to pinthrough the lint when two drawheads bump tosible to set the coupling from either side, so the cars will couple automatically on coming together.
A water tower has been patented by Mr. John B. Logan, of Balutimore, Ma. This invention
provides a special construction and devices for carry ing on a truck a tower which shall support a pipe or
nozzle a t any angle or elevation and of horizontal rotation, to lengthen the pipe and secure it while under water pressure, to fix the truck on the ground when in
use, and to carry the end of the suspended hose while
not in use.
A car coupling has been patented by Mr. John W. Fergusson, of Sardis, Miss. This inven-
tion consists in particular constructions of the drawhead with a coupling stud fixed to the floor of its link socket, and an opposing stud pendent from a hinged
cap plate, with an uncoupling device behind the studs cap plate, with an uncoupling device behind the estuas,
adappted to lift the upper stud from the lower one, and raise the end of the link to allow the cars to be separated, with other novel features.

## mechanical inventions.

A metal shears has been patented by Mr. Gilbert McDonald, of Augusta, Kan. This invention consists in a special construction and combination
of parts to improve that class of hand shears in which of parts to improve that class of hand shears in which
a plain and eccentric lever are combined and connected
with the movable jaw for acting on the latter with great force.
A machine for rolling axles, spindles, Shay, of Foraham, N. $\mathbf{M}$. This invention con
novel method of and means for forging metal $b$ b subjecting them to the action of a rotating die tionary or flat die, one die being adjustable other to give the necessary pressure, and the rotating die preferably having oblique corrugations or grooves
on its acting surface. on its acting surface.

## AGRICULTURAL INVENTIONS.

A plow has been patented by Mr. Thomas A. Blanchard, of Appling, Ga. This invention
covers a peculiar construction and arrangement of covers a peculiar construction and arrangement of
parts of a plow in which various portions are adjustable parts of a plow in which various portions are adjustable
in such a way that the plow can be adapted for in such a way that
variety of work.
A horse hay fork has been patented by Mr. Robert L. Short, of Janesville, Wis. With a slot adapted to enter the hay points downward, and to be reversed by the action of the hay as thefork enters,
and then be extended by the hay as the fork is with. reversed by the action of the hay as thefork enters,
and then be extended by the hay as the fork is with-
A land marker has been patented by Mr. William H. King, of Little Silver, N. J. A hub on the shaft at the inner side of a wheel has an arm with and catch lever, a lug to receive the brace bar, and the adjusting bar connected with the tongue, and a long
bearing to receive the pivot of the marker bar, with bearing to receive the pivot of the marker bar, with
othernovel features.
A band cutter and grain feeder for thrashers has been patented by Messrs. George Ncu-
komm, Louis Neukomm, and David Neukomm, of komm, Louis Neukomm, and David Neukomm, of
Tremont, HI . This invention consists of special coming to provide a mechanism for cutting the bands of grain bundles and feeding the
a regular and uniform manner.

## miscellaneous inventions.

A time register for seats has been patented by Mr. Charles W. Allen, of Valentine, Neb.
This invention consists in a special construction and arrangement of parts, in connection with clockwork, for the purpose of automatically registering the time a seat has been occupied.
A coal chute has been patented by Mr. Moses D. Jones, of Jackson, Ohio. This invention pro-
vides for the use of a swinging chute, to be filled with coal while in a nearly level position, and then lowered for the discharge of its load into the car, so the coal
will not be broken up, as is so frequently now the case will not be broken u
with inclined chutes.

A wire basket has been patented by Mr. William H. Elliott, of Texarkana, Tex. It has a
circular bottom and $a$ wire frame bent to form a cylincircular bottom and $a$ wire frame bent to form a cylin-
der, the circular bottom being held in the lower part of the cylinder, so the basket can be taken apart and folded compactly, but is light, strong, and durable, and es-
pecially adapted for collecting cotton. pecially adapted for collecting cotton
A safety belt has beèn
A safety belt has been patented by Mr. Edward J. Claghorn, of New York city. It consists
of an outer and inner belt, with various attachments for ropes, straps. suspension hook, etc., to be applied to the person for securing one to a fixed object, orto assis for flremen, tourists, telegraph men, etc.

A nut lock has been patented by Mr William H. Dinsmore, of Connellsville, Pa. This in.
vention relates to gang nut locks for railways, where plate or bar is adapted to be fitted over the nuts afte inclose each of the nuts snugly, and can be easily plac ed on them.
A gate latch has been patented by Mr Robert Magruder, of Liberty Hill, Texas. This inven parts for the purpose of compensating for shrinkage of he gate in dry weather and its swelling in wet weather ot that the bolt or latch may at all times extend the ight distance to properly engage the gate post.
A measuring jacket has been patented by Mr. Hermann Lingen, of Wheeling, west Va. This invention covers an improvement on a former patented
invention of the same inventor, there being an extensible and adjustable frame eneld on and between the edges
of one of the seams, so enlarging or decreasing the size of one of the seams, so enlarging
f the jacket as may be necessary
A watchmaker's tool has been patented by Mr. Hiram P. Pruim, of Grand Haven, Mich. It is combination tool, with a screw driver and tweezers at
tached to a ring at a little distance from and nearly at right angles with each other, so that both implement placed on the forefinger of the operator's hand.
A thill coupling has been patented by Messrs. Erwin A. Gallatian and John R. Taets, of Sout Westerlo, N. Y. This invention consists principally of
jaws having upon their inner sides circular or annula jaws having upon their inner sides circular or annular
projections, combined with a hook eye having a groove or recess in each end, so the shafts can be coupl
uncoupled rapidly, and to prevent their rattling.
A monocycle has been patented by Mr. Francis E. Mills, of Pittsburg, Pa. It is a vehicle de
signed to be driven by a person standing erect withi tigned to be driven by a person standing erect within
the wheel, which should have an outside diameter about eighteen inches greater than the height of the one who is to operate it, the invention also covering n
of construction and arrangement of parts.
A scarf, necktie, or cuff holder has been patented by Mr. Lewis F. Ward, of Marathon, N. Y. The invention consists in an open slotted elastic holder or device for use as a detachable appendage to collar
and cuff buttons for holding scarfs, cuffs, or ties in proper position, the same device being applicable to
each of the articles.
A bridle bit has been patented by Messrs. John R. Brott, of East Medway, and Martin L.
Andrews, of Melrose, Mass. It is so made that a connecting bar passing through the mouth is dispensed with, side hooks being used instead, inserted between
the teeth and cheeks, and connected and formed intethe teeth and cheeks, and connected and formed inte-
gral with a curved bar that passes around the under

A jute machine has been patented by Mr. John C. Delavigne, of New Orleans, La. Accord-
ing to this invention, the green stalks are subjected to a heating and fermenting process, and then after drying are run through a specially devised machine, to separate
the woody fibers from dry jute and ramie without wet. the woody fibers from dry jute and ramie withou wee-
ting or soaking the stalks as usual, and thus avoid the
An animal trap has been patented by Mr. Robert Jessee, of Locust Lane, Va. It consists of
an upper chamber, with rotary partition and pivoted an upper chamber, win rotary partition and pivoted
fioor or treade for controlling it, a cover hinged to the
to top of the chamber, and a lower chamber hinged to the lower part of the upper chamber, with other novel fea-
tures, to prevent the escape of animals back to the open-

## they have once entered

A car window shade has been patent ed by Mr. Gideon B. Massey, of Mount Vernon, N. Y Combined with the shade roller and shade is a vertically
slotted guide standard, into the slots of which the ends of a strip secured on the free end of the curtain pass, Cords or wires from the corresponding ends of the strip nd roller passing over suitable pulless, so the shades
can easily be held in any desired position.
A filter has been patented by Mr . Alonso Cardoso de los Rios, of New Orleans, La. A A
large open tank has layers of charcoal, fine and large large open tank has layers of charcoal, ine and large
sand, and stones resting upon a false iron gruting bottom, under which is a chamber, and up through which and through the filtering material the water passes, be-
ng partially freed from sediment by an agitatingwheel in the chamber beneath the false bottom.
A hand propeller for boats has been patented by Mr. Michael Batz, of Brooklyn, N. Y. The
propeller shaft carries a pinion or cog wheel, and a slidpropeller sharcarres a pinion or cog wheel, and a sila-
ing transerse shaft carries ear wheels alterately
moved into and out of gear with the propeller shaft pinion; J there are spring actuated pulleys supported Pinon fixed guageons, and hand levers with strap con
uection with the pullesg, with other novel features.
An elevator has been patented by Mr. groove in its fioor and there is a corresponding groove in the fioor of the building to receive the arms of a bar
attached to the well door, so the carriage will be lock ed when the door is opened and released when closed, making it impossible for the door to be left open when
the elevator carriage moves away from it, and thus the elevator carriage move
guarding against accident.
A door knob attachment has been patented by Mr. Nathan Hzwkes, of Appleton, Me. This
invention relates to inside fastenings for knob spindles in which a fliding plate, having a keghole slot therein, is adapted to be moved in and out of position, for hold ing the spinde from turning, and adapts such locking
plate to be operated by a slight movement of the hand, plate to be operated by a slight movement of the hand,
and to be held in both locking and unlocking positions by either friction or gravity.
A window screen has been patented by Mr. Jay R. Graver, of Lincoln, Neb. The side pieces of
the frame are collapsible inward toward the center of the screen, the top bar or piece being rigidly secured
to the window frame, while the bottom har is lose the screen may hang like a curtain, and be collapsed
wIndow when the stde pleces are disengaged from
hooks.
A paint distributer has been patented sy Mr. Wilbur I. Armstrong, of Belvidere, Ill. It has distributeded, into which a feeder projects formed of two spring strips, between which the liquid is drawn by ofillary attraction, and then distributed by a curren of air, there being ase air receiver through which the
compressed air passes, so the air will be moistened to eep the parts of the distributer clean.
A gas machine has been patented by Mr. William C. Strong, of Readfield, Me. This invention reates an machines in which gas is made by car
bureting air with a volatile liquid, such as gasoline, the bureting air with a volatile liquid, such as gasoline, the
ir beng driven through the carburetor by the descent of a bell into a water tank, the gasoline receptacle, car-
buretor, and other parts being jacketed within the bell, buretor, and other parts being jacketed within the bell,
and provides a simple, portable machine, to vary in size nd provides a simple, portable machine, oted
or capacity as required.
A watch balance has been patented by
A watch balance has been patented by Mr. Johann E. A. Uhrig, of London, Midadeses County tinuous secondary or auxiliary compensation for the balances of chronometers, watches, etc, to eliminate the errors which occur ad the extremes of temperature
when the balance is adjusted for medium temperatures, so combining curved springs with the rim of the bal so combining curved springs with the rim of the bal
ance as to cause the segments of the compound rim to move in an accelerating ratio towara the center of the balance as the temperatur
ing capable of regulation.
A fire escape has been patented by Mr. Robert H. Nichols, of Aylesford, Nova Scotia, Canada The sides of the ladder support are of light but strong framework, and a drum is journaled at each end of the frame, with grooved notched whel, over which an endless chain ladder passes; if the bottom drum is turned
in one direction or the other, the upper part of the ladin one direction or the other, the upper part of the lad-
der will be moved upward or downward, and the lower part in the inverse direction, there being also levers brake shoes, and other novel combinations of parts, for
the purpose of lowering persons, etc., from burning the parpose
building.

## NEW BOOKS AND PUBLICATIONS

Les Torpilles. Par Lt.-Colonel Hennebert.
This work of 279 pages on the subject of torpedoes is quite profusely illustrated with 82 wood engravings. treats at the opening of the experiments of Bushnel lution, andalso of Fulton's and Colt's early experiments in the eame line. The gradual evolution of the torpedo from the small anchored fioating buoy to the automatic
cigar-hhaped submarine propeller is then described, and cigar-shaped submarine propeller is then described, an
the subject is eluciaated by clear descriptions and artistic drawings. Several chapters at the end of the book are devoted to the service that has been done in
recent wars by the use of the torpedo, and considerable recent wars by the use of the torpedo, and considerable
prominence is given to the impulse which was given to Hachette et Cie., 79 Boulevard Saint Germain, Paris,
F'ANN
Annee
haye. Plectrique. Par Ph. Dela
o great and wonderful are the discoveries and in ventions which have been made in electricity within
the past few cears that the public have had some difitthe past few years that the public have had some difil-
culty in keeping pace with the progress made, and as a natural consequence the demand for literature upon this almost inexhaustible theme has been very considerable This work, the title of which is given above, is designeed
to supply this demand annually by giving a review of the development in the various branches during the preceding year. The work is written in a pleasant, de scriptive style, and is comparatively free from techni-
calities. Besides dwelling at length upon the industrial progress of electric lighting, the telephone, the elelegraph,
and the application of electricity as a motive power, in and the application of electricity as a motive power, in
connection with railroading and ballooning, a section connection with railroading and ballooning, a section
of the work is given up to experiments made in France in resuscitating dead bodies, in suppressing cholera germs, in employment of electricity as a bait in sea fish. ing, in its use in mining, astronomy, etc. It is a work
of 312 pages, and may be had of Messrs. Baudry et Cie., of 312 pages, and may be had of Messrs.
15 Rue des Saints-Peres, Paris, France.
Architectural Perspective for Be-
GINNERS. By F. A. Wright, architect.
GINNER, By F. A. Wright, archite
William T. Comstock, Sew York.
This book is intended mainly for draughtsmen who are obiged to educate themselves. It has eleven plates
of practical examples, to make clear the application of theoretical principles. How to shade a perspective is
also touched upon, and all the minutest details of the also touched upon, and all the minutest
arehitect's work are shown and explained.
Spons' Mechanic's Own Boo
 is volume of 700 pige, tions, aims to cover a wide fiela, the index of subjects referred to covering more than twelve pages of small
type. First the raw material is treated of, its charactype. First the raw material is. treated of, its charac-
ters and variations, and then the tools used in working ters and variations, and then the tools used in working
up such material, the book being intended to form a complete guide to all the ordinary mechanical opera-
tions.
The Photographic Tines, published by the Scovill Manufacturing Company, has now
reached its fourteenth volume. The bound copies of the numbers issued in 1884 make a volume of large pro-
portions, giving a general view of the twelve months as well as from the commercial point of observation.
The Year Book of Photography, edited by Thomas Bolas, F.C.S.s. and published by Piper
$\&$ Carter, London, England, is not only valuable as a $\infty$ Carter, London, Engrand, is not only valuable as a
guide for the beginner, but has much that is most connumerous hints, jottings, and recipes are obviously the

## Special.

## .SLEEP FOR THE SLEEPLESS

It was Coleridge who put in the mouth of that quaint

## O sleep, it is a blessea thing, Belovead from pole to pole."

The man who regularly enjoys sound a leep has no adequate conception of all theses worrass in-
ply. It is to the sufferer who in sleepless wearines. Dy. In is to the sufferer who in sleepless wearines
osses on his bed half the night; and toward daylight
 neaning is apparent. The man who dipests well and
lieeps well can stand almost any amount of hard work sleeps well can stand almost any amount of hard work.
It is not work that kills people; it is worry. The work good health an rength; for the daily waste of the body is repaired
during the night. But the worry that oppresses the vic m of insomnia during a sleepless night is what rack he system, wears out the muscles, torments the nerves, iving.
Insomnia" is a growing evil. In this busy age, when
ctive men are all the time overworking themselves, there are five times as many people tormented with in-
ability to sleep as there were a generation ago. We are living under higher pressure. "Insomnia" is of differ ical causes. But most of it may be summed up as to character in the words "can't sleep," and as
indigestion or overworked brain and nerves.
indigestion or overworked brain and nerves.
A most marked case of insomnia and recovery from it
is that of Arthur tobacconist, of Philadelphia. Mr. Hagan is one of the
largest dealers in tobacoo, and is the Philadelphia repre-
sentative of the great Baltimore house of $G$. W. Gail \& Ax. In the ine great Baltimore house of $G$. W. Gail \&
sentative those who are inquiring the best Ax. In the interest of those who are inquiring the best
way to secure sound sleep, and to triumph over the tor way to secure sound sleep, and to triumph over the tor
ments of insomnia, one, of our editors called on Mr.
Hagan at his store, on North Front Street. If he had Hagan at his store, on North Front Street. If he ha
een lookingamong a party of gentlemen for one wh had been badly run down by dyspepsia and insomnia,
Mr. Hagan would not have been the one selected. That entleman now looks in such excellent physical con fered from a day's illness or a night's loss of rest. Inre-
sponse to questions as to his past and present experince, Mr. Hagan said to our editor:
"My case was one of severe and long continued in
somnia, proceeding largely from dyspepsia, the result of too great application to business. My system was very
badly run down. Sleep became almost an impossibility My physical distress during the night from being unable so secure refreshing slumber was dreadful. It weakene and distracted me during the day, and made attention to
business a slow martyrdom. For five or six years I was from time to time under the care of different physicians, receiving occasionally some measure of benefit, yet on
the whole gaining no material advantage. I was put on the whole gaining no material advantage. I was put on
very low and simple diet, consisting principally of kimmed milk.
to physic and ariet I a long variety of experience as to physic and diet, I one day happened to pass the
office of Drs. Starkey \& Palen, and I noticed the sign of
. 'Compound Oxygen.' As other modes of treatment
had failed, I thought this one could do no worse, and it had failed, I thought this one could do no worse, and it
might do better. So $\mathbf{I}$ went in at a venture, and made agony of. For some time I had been enduring the agony of dyspepsia, and for weeks I had not been able to
sleep without the aid of chloral or other drugs. The Oxygen did not work an immediate miracle in me. But
I soon saw that it was doing me good, and so I resolved I soon saw that it was doing me good, and so I resolved
to persist in its use and to give it a thorough trial. Be-
fore long I began to know the pleasure of real sleep. It was by degrees that my dyspepsia left me, and the power to sleep returned. I was greatly encouraged by
my partial improvement, and this stimulated me to go my partial improvement, and this stimulated me to go
on with great regularity and persistence. If my recovery
was slow it was real. I had the best of home nursing as slow, it was real. I had the best of home nursing me. For several months I regularly took the Compound
Oxygen Treatment, carefully obeying the directions, und xyyen Treatment, carefully obeying the directions, and constantly gaining strength and freedom from disease.
My system received the vitalizing which it so badly eeded.
A bout two years ago this took place, and I have en-
oyed a prime condition of health since. I have been able to attend with pleasure and satisfaction to my busi-
ness. I Ihave no need now to resort to the Compound some other temporary disorder. I take an abundince of
"I have recommended Compound Oxygen to a number My friend, Mr. E. W. Edwards, of this city, is notably one of these. He was badly run down by Bright's Dis-
ease and other infirmities, but was brought into good shape by the Compound Oxygen, and is now attending to business with ease and comfort. As a complete vital-
izer of the system, the Oxygen is all that can be desired.
It drives out disease by restoring vitalaction and putting the system in such a state of strength that disease has The reader will naturally seek more information on this interestingsubject. It can be had in a pamphlet
which is published by Doctors Starkey \& Palen, 1109 and 1111 Girard Street, Philadelphia, and which will be mailed to any address on application.
$\mathfrak{B u}$ ßiness and æersonal.
The chargefor Inserrion under this head is one Dollar
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hine. Lamb Knitting Machine Co., Chicopee Falls, hine.

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Womon .

The Best Upright Hammers run by belt are made by To Manufacturers.-I wish nut lock patent, No.
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another page. J. A. Campbell, care " Banner," Brenanother page.
ham, Texas.
Experimental Tools and Machinery Perfected; all kinds. Interchangeable Tool Co., 313 North 2 St. Iron Planer, Lathe, Drill, and other machine tools of The leading Non- Covering for Boilers, Pipes, etc., is Wm. Berkefeld's Fossil Meal Composition; ering does with two inches. Sold in dry state by the
pound. Fossil Meal Co., 48 Cedar St., N. Y.

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Try our Corundum and Emery Wheels for rapid cut
ting. Vitrifed Wheel Co., 38 Elm St., Westfeld, Mass. The Providence Steam Engine Co, of Providence, R . I., are the sole builders of "The Improved Greene En

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Y. Whistles, Injectors, Damper Regulators; guaranteed pecial C. O. D. prices. A. G. Brooks, 201 N. Sa St., Phila Brush Electric Arc Lights and Storage Batteries machine gives 65 Arc Lights with 45 horse power. Our Storage Battery is the only practical one in the market Brush Electric Co., Cleveland

The Cyclone Steam Flue Cleaner on 30 days' trial to
liable parties. Crescent Mfg. Co. Cleveland, 0 .
For Steam and Power Pumping Machinery of Single and Duplex Pattern, embracing boiler feed, fire and low uum, hydraulic, artesian, and deep well pumps, air com-
pressers, address Geo. F. Blake Mfg. Co., 44 Washington, pressers, address Geo. F. Blake Mfg. Co., 44 Washington,
St., Boston; 97 Liberty St., N. Y. Send for catalogue.

Stationary, Marine, Portable, and Locomotive Boiler specialty. Lake Erie Boiler Works, Buffalo, N. Y. Wanted.-Patented articles or machinery to manufac
"How to Keep Boilers Clean." Booksent free by
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Presses de piêe. Ferracute Mach. Co., Bridgeton, N.J. ForPower \& Economy, Alcott's Turbine, Mt. Holly, N.J Steam Boilers, Rotary Bleachers, Wrought Iron Turn Tables, Pate Ino Whe Tippett Woal Send for Monthly Machinery List
21 Chambers and 103 Reachinery Company,
f an invention has not been patented in the United States for more than one year, it may still be patented in Canada. Cost for Canadian patent, \$40. Various other address Munn \& Co., Scientific American patent agency, 361 Broadway, New York.
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Send for catalogue.

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Newark, N. J., and 92 and 94 Liberty, St., New York.
Supplement Catalogue.-Persons in pursuit of inforiffc subject, can have catalogue of contents of the Screntific american Supplement sent to them free TheSupplement contains lengthyarticles embracing the whole range of engineering, mechanics, and physical
Machinery for Light Manufacturing, on hand and Curtis Pressure Regulator and Steam Trap. See p. 93 Woodwork'g Mach'y, Rollstone Mach. Co. Adv., p. 94 Drop Forgings. Billings \& Spencer Co., Hartford, Conn Munson's Improved Portable Mills, Utica, N. Y. Anti-Friction Bearings for Shafting, Cars, Wagons, Price list free. John G. Avery Speeer, Mes. Brass \& Copper in sheets, wire \& blanks. See ad. p. 92. The Chester Steel Castings Co., office 407 Library St. Philadelphia, Pa., can prove by 20,000 Crank Shafts and
5,000 GearWheels now in use, the superiority of their The Improved Hydraulic Jacks, Punches, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York. Friction Clutch Pulleys. D. Frisbie \& Co., Phila. Tight and Slack Barrel Machinery a specialty. John Lane's Patent Self-measuring Faucets for molasses
, varnish, etc. Lane Bros., Box276. Poughkeepsie, N. Y Stay bolt taps, true in pitch
Whitney Co., Hartford, Conn.
Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 423, Pottsville, Pa. See p. 62. Catalogue of Books, 128 pages, for Engineers and Electricians,
Street, N. Y.
The best Steam Pumps for Boiler Feeding. Valley

## 

HINTS TO CORRESPONDENTS.

(1) J. H. C.-The developer which has been found to work well on plates coated with Mr enderson's emulsion is as follows:

| Sal soda. | 4 oz . |
| :---: | :---: |
| Sulphite soda | z. |
| Water. | .... 32 oz . |
|  | No. 2. |
| Pyrogallol. | .1/2 oz., 218 grs . |
| Oxalic acid. | ........ 35 grs. |

Water.....
35 grs .
Dissolve the oxalic acid in water, then add the pyro o develop a large plate, take $21 / 6$ oz. of No. 1, add $33 /$
(2) J. D.-The anthracite coals vary from 39 to 42 cubic feet to the ton. The
coals vary from 41 to 49 cubic feet to the ton
(3) J. C. C. writes: Suppose a cannon e mile long is put on car wheels and placed on a rail road track, the cannon being loaded with powder suf-
ficient to drive a ball one mile a mirrute; attached to the car wheels at the breech of the cannon is an engine with power sufficient to draw the load one mile a min ate. Supposing it possible to start them both at th same instant, the powder driving the ball one way, and the engine drawing thecannonin the opposite direction. How far will the ball be at the end of the first minut from where it started-one mile or two miles-with rela tion to the cannon? A. If the gun backs down a mile in one minute, and the ball moves along the gun at the rate of one mile in one minute, the ball will remain sta tionary in regara to the earth; in fact, the gun runs away at the end of a minute
(4) E. S. N.-Steam follows the same law as the atmosphere and gases relative to sudden
(5) W. G. W. asks: 1. How to grind out the mouths of vials and bottles, so that the corks will fit tightly for holding alcohol and other volatile hings? A. Glass stoppers can be made to fit tightly by grinding with emery. This operation can be per formed either by hand or on the wheel. 2. Is there any known solvent for charcoal? A. Charcoal is de scribed by Storer as "insoluble in water
or in dilute acids or alkaline solutions."
(6) "Steam Fitter" writes: A few days back I had a controversy with an engineer in charge of a steam heating plant. A No. 3 Blake pump is used to
return water from hot well to boilers; hot well about six feet above pump; pump would jerk a little as it started back on its stroke; to remedy this, engineer puts on what he calls an "air chamber" on suction pipe, and coll it-will be full of air, and that as the water fioods the pump it will cushion on the air and stop the jerk in the stroke. I contend that the air will be exhausted from the chamber, and as the cylinder fills with water a partial vacuum is formed in the chamber, provided the pump is runnmg fast, and that the shock is relieved by the water filling the vacuum. The jerk in the stroke I think is caused by the water being very hot Which, if either of us, is rights A "Steam Fitter" is correct, and engineer may also be said to be correct, is air chamber is a common designation for these appli
(7) S. B. G. writes: It is said the Old Liberty Bell was cast in London about the year 1751; but when it reached Philadelphia it was found to con tain too much copper, and a second casting was neces
sary; after which, in the first week of June, 1753, it was hung in the belfry. Please inform me whether it was cast the second time in Philadelphia or in Lon don; and was the same metal used? Also, what was the cause of it being cracked? A. The now famous "Liberty Bell " was imported from England in 1752; it was cracked on trial by a stroke of the clapper, and recayt in Philadelphia under the direction of Isaac Norris, to
whom is attributed the putting on of the inscription from Leviticus $x \times v$., 10: "Proclaim liberty through out all the land, unto all the inhabitants through Immediately beneath this is added: "By order of the assembly of the province of Penna. for the state House in Phila." Under this again, "Pass \& Stow, Phila., MDCCLIII." In 1777, during the occupation of Philadelphia by the British, the bell was removed to Lancaster. After its return it was used as a State House bell,
but was finally removed to Independence Hall. Its last ringing, when it was cracked, was in honor of a visit of Henry Clay to Philadelphia.
(8) J. H. D. asks how the periods of maturity of people inhabiting the different tropical,
temperate, and arctic zones compare. In which sectemperate, and arctic zones compare. In which sec-
tion is average longevity the greatest? A. Temperate
(9) C. A. S., Jr., asks how to make a dip for brass buttons to darken them, say shade nearly
same as dark bronze or Florentine bronze? A. One part oxide of iron one prat white areenic, twelve parts
hydrochloric acid. Clean the brass well to get rid of lacquer or grease, and apply with a brush until the de-
sired color is obtained. Stop the process by oiling well, when it may be varnished or clear lacquered.
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