## ENGINEERING INVENTIONS.

A balanced slide valve has been patented by Mr. Ashbel Welch, of Lambertville, N.J. This in vention covers a simple, practical, and economical ar-
rangement whereby all sticking of the valve is preventrangement whereby all sticking of the valve is prevent-
edi, the cylinder may be relieved of water of condensaed, the cyinder may be reieved of water of condensea-
tion, and the uniform wear of the valve face and seat
sassured.
A car coupling has been patented by Mr . Edward L. Raynsford, of Susquehanna, Pa. The
coupling hook and drawbar are supported by a bearing plate ketpt in place by a collar and provided with crose
head ends sliding in bearings attached to the car frame head ends sliding in bearings a tached to the car frame
the whole making an improved device to promote conthe whole making an improved device to promote
venience and safety in coupling and uncoupling.
A coal chute has been patented by Mr. Joseph E. Clifton, of Geneseo, III. The invention covers
an improved arrangement of the latch for fastening up the balanced apron of the coal chute, also of a brace at tachment to the door in connection with the bilanced
apron, and an attachment to facilisate and insure the apron, and an attachment to faciiliate and insure tre
latching of the door, etc., the whole making an improved arrangement for coal chutes used for coaling locomotive tenders.
A car brake attachment has been patented by Mesers. Eli M. Holcomb, of Bay Springs, and Fred-
erick E. Miller, of Eveline. Mich. The invention consists in the combination with a ratchet wheel and a beveled pawl pressed against the wheel of a vertically movable plate with a down wardly projecting wedge and a
prong surrounded by a spring, which preses the wedge prong surrounded by a spring, which presses the wedge
plate upward, the parts being protected from rain and snow. and the device enabling the brake to be quickly
A marine engine governor has been patented by Mespre. Alexander H. Bell and Aspinwall Fuller
of New York city. A two part spherical valve seat is placed in the shell, provided with flanges to keep it in place, and with perforations for the paszage of steam and the valve stem, a spherical valve with perforations
 control the valve, with a stufting box and flexible connectiug base to $p$
the valve stem.

## mechanical inventions.

A lifting jack has been patented by Mr. Erick J. Qvarnstrom, of Norway. Mich. The invention consitst of improvements in the construction of screw
jacka arranged toshift the hoistiug screw after the load jacko arranged ooshirt the hoisting screw after the load o simplify the parts, and make jacks that are substantial and reliable.
A vise attachment has been patented by Mr. Charles H. Eddy, of Auburn, N. Y. The under side of the vise has two jaws, one stationary and the other adjustable, both connected by a swiveled adjust-
ing bolt, and with their inner surfaces suitably made to bite or hold on the opposite sides of the rim of the wheel it is desired to attach the vise $t$.
An nil cup feeder has been patented by Mr. James E . Worswick, of Montgomery, Ala. The motion
of the machine where the lubricator is flyed causes a of the machine where the lubricator is ix xed causes a
feeding pin to reciprocate in a tube, where it is loosely arranged, there being a removable collar at the upper end of the tabe, and a removable perforated diek within.
A lumber trimming machine has been patented by Mr. Edward Heyde, of East Saginaw, Mich. It it an improved apparatus for raising and holding in position any one of a series of cutting off saws arranged
in a bench, over which boards are carried to have the ends in a bench,over which boards are carried to have the ends
trimmed square and to specifled lengtha, the saws heing arranged for trimming to several different standard lengths.
A motor has been patented by Mr. Jacob Heckenlively, of Eureka, Kan. A weight is so suspended from a drum that, in descending by gravity,
motion is given to a train of gears, which drive a shaft carrying a cam wheel, with which a machine may be connected by a pitman, a governor device pressing $a$ brake lever against the cam wheel to control the speed of the motor.
A lubricator has been patented by Mr . Henry R. A. Boys, of Barrie, Ontario, Canada. The invention consists of an arrangement of an oil feeding
cylinder and piston ZHa a gauge cylinder and piston, so cylinder and piston and a aange cylinder and piston, so
the outward movement of the piston to feed the oil the outward movement of the piston to feed the oil
from the oil cylinder shall cause a corresponding out from the oil cylinder shall cause a corresponding out
flow of the gauging liquid from the gauge cylinder flow of the gauging liquid from th.
measure the rate of feed of the oil.
A pressure regulator has been patented by Mr. Francis J. Freese, of Manchester, N. H. The ob-
ject of the invention is to make an improved device for automatically regulating the pressure of liquids, gases, steam, etc., a plunger moving in a specially constructed cylindrical casing, so as to enlarge or diminish the
openings by which the flow of gas, steam, etc.., will be openings by whicht the flo
automatically controlled.
An oil cup has been patented by Mr. Perry Small, of Guaymas, Mexico. It is an improved oil cup
wilh, llass drip chamber, the latter being made by with glass drip chamber, the later being made by a
partition plate, which is integral with the glass cup, partition plate, which is integral with the glass cup,
the frame surrounding the cup having openings above the frame surrounding the cup having openings above
and below the partition plate, and having at its upper and below the partition plate, and having at its upper
end a suitable cap, the whole being simple, cheap, and end a a suitable cap, the whole
not liable to get out of order.

## agricultural inventions.

A potato digger has been patented by Mr. Hans Nelson, of Waupaca, Wis. A scoop is connected
with the rear end of a downwardly and inwardly curvwith the rear end of a downwardly and inwardly curv-
od beam, with which is combined a clearer, and clearer vibrating cams or wing on the axle of eupporting
wheets, the scoop being readily ad apted to work deeper or shallower in the ground, as may be desired.
A grain header and harvester bas been patented by Mr. Peter E. Drouet. of New Orleans,
La. The front board of the cart is made in adjustable Larts, the side bars are pivoted at their rear ends on a
ar to which are secured the scraper roller, comb, ree and driving mechanism, and as the machine is drawn talks and received in the cart body.
A tongue rest, for supporting the tongue of a harvester and self-binder, has been patented by Mr.
John Fisher, of Riley, Ind. In combination with the tongue is an npright frame in which is a slide with an inwardly projecting rod, around which a spiral spring
is coiled, the whole making a device to relieve the is coiled, the whole making a device or relieve the
horses from holding up the tongue ard the weight horses from
thereon.

## miscellaneous inventions.

A catamenial sack of improved form and conetruction has been patented by Mr. Charles $\mathbf{H}$.
Levy, of New York city. The frame can be made of netal, rubber, or bone, covered, and the pocket and
A telephone call and switch box has been patented by Mr. Edwin H. McFall, of Memphis, Tenn. Cuis is a novel arrangement of switch and circuit in circuit at all times on lines connecting three or more circuit at all t.
instruments.
A hoisting device for vessels has been paented by Mr. Richard H. Purnell, of Rosedale, Miss, form of brake for use in combination with hoisting devices used on steamboats
gangway or stage planks.
A velocipede has been patented by Mr harles M. Schaffer, of Louisville, Ky. The wheel a frame are madewith one open side, to facilitate ingress
nd egress and pive better views of surroundings, and egress and give better views of surroundings, to
facilitate mounting and starting and to improve th facilitate mounting and sla
appearance of the machine.
A leather and cloth varnish has been paented by Mr. Walter C. Gifford, of Brooks, Mich. 1 swaterproof and gives a polish, the composition con-
disting of alcohol, gum shellac, white reesin, oil of turpentine, kerosene oil, oil of cinnamon, and lamp black in certain specifled proportions.
A mucilage cup or holder has been patented by Mr. Stephen S. Harman, of New York city. The nvention connibts H at its ope in the cover, provided at its lower or in ner end with a
sponge fltted in a socket, or otherwise attached to the stick or handle.
A reflector holder for lamps has heen patented by Mr. Daniel R. Williams, of Dallas, Texas. Different forms of clamp and clasp are oo made
that the reflector may be held in any desired position, that the reffector may be held in any desired position, and may be turned around
yet it will be frmly held.
A device for attaching and detaching horses has been patented by Mr. Cicero C. Ferrill, of Shubuta,
Texas. It is intended to make it possible to diepense Texas. It is intended to make it possible to dispense
with the ordinary harness except a collar and with the ordinary harness escept a collar and a pair of
hames, and for this purpose the thills have ferrules and spring actuated pins, and the hameshave specially con rived loops and guards.
A watch protector attachment has been patented by Mr.Julius C. Grimmell, of Brooklyn, N. Y. The invention consists in a casing with two swing from the free euds of which a hooked fork is sus-
pended, the stirups preventing the withdrawal of the pended, the stirrups pre
watch from the casing
Ar extensible clasp for books has been pa ented by Mr. Jacob Monch, of Offenbach-on-the-MaiL Germany. The clasp is formed of two plates. one
adapted to slide under the other, the lower one having a diazonal slot, into wbich a stud of a nut or block pases, so the clasp can be easily lengthened
ened according to the thickness of the book
A fountain pen has been patented by Messrs. Albert J. Eletzker, of New York city, and Charles H . Court, of Jersey City, N. J. The pen has a point secclosed by a loosely filting plng with a tongue, and
con adapted to be vibrated by the pen during writing, and hus cause a fow of ink.
A saddle seat has patented by Mr. Peter B. Hirsch, of Denver, Colo. This invention consists in
dispensing with the bridge plate and the layers of leather, and emploging in lien thereof a single plate o metal shaped in dies to the desired form, and thu swished.
A thill coupling has been patented by Messrs. Lorenzo D. Rundell and Perry Van Valken
burgh, of South Westerlo, N. X. The invention conourgh, of South Westerlo, N. . . The invention con-
sists of an axle clip with two projecting jaws or lugs, sists of an axie cliv with two projecting jaws or luge
each having inwardly projecting flanges on the ends eaco having inwarraly projecting flanges on the ends,
a fork being secured on the inner end of the thill, and having a recess in each side edge of the front prong. A pocket knife has been patented by Mr . George Freund, of Durango, Colo. It is designed fo miners use, to facilitate the cuttung and capping of
fuse; the knife has a notch in the handle case and one in the blade, the latter having a screw thread formedon
its bottom to press a screwthread in the end of a fuse its bottom to press a screw threadi
placed in the notch in the handle.
A clothes lianger has been patented by Mr. Lonis Barkany, of Baltimore, Md. The hanger consists of a notched arm with a cross bar hinger at it its free
end, and a prop supporting the end, and a prop supporting the arm, the arm and prop being pivoted to a supwort, the contrivance being espe
cially adapted to hold clothes open, while it can be cially adapted to hold clothes of
folded compactly when not in use
An umbrella and parasol rib has been patented by Mr. Asher T. Meyer, of New York city. The bar, with a head and flatened portion, and having an
eve passing through both the rib and dar, the object being to simplifythe construction of the lower or oute end of the paragon rib.
A pendulum scale has been patented by Mr. Henry C. Keeler, of Ogden, Utah Ter. This is an im-
proved form of weighing ecales in which pendulums proved form of weighing scales in which pendulums
with removable weights may be substituted for the bal-
ancing ball and weight, 'or the construction may be such that one of the beams and dianstruction may be gradnated be
for the scoop and the ther sor the,
form.
A flying target has been patented by Mr. Charles F. Stnck, of Peoria, Ill. Combined with a
ragile ring, having a flange on its lower inner edge, fragie ring, having a flange on its lower inner edge, is ragilering a carrier ring, to be inserted within the portion will break more easily than solid targets, an there
shot.
An automatic winding signal for spring clocks has heen patented by Mr. Edward Jungerman,
of Gettysburg, Pa, The invention consists in combing with the main spring of a clock a shoe or yield ing bar which, when the spring expands from uncoiling, is struck by the sping and made to bring a sigualinto
view, on the face of the clock or elsewhere, to giv new, on the face of the clock or eleg
notice that the clock should be wound.
A hame clip has been patented by Mr. harles W. Massenheimer, of Allentown, Pa. The invention consists principally in making the clip with a
hook and hinged tongue or section, the hook being hook and hinged tongue or section, the hook being
made interral with the side plates of the clip, the side plates being joined with a solid shoulder or bridge a heir forward ends, so the traces may be easily attached detached without ripping the tag.
A lumber rack bas been patented by Mr. Joseph A. Aycock, of Whitesburg, Ga. The rack is
formed of a series of vertical sticks, beld movals tween top, botom, and intermediate pieces of a frame between which vertical sticks the planks or pieces of lumber are held $a$ distance apart equal to the thicknese
of the stick, thus permittiug the air such access as wil of the stick, thus permittivg the air euch access as wil
A churn has been patented by Mr. Anson M. Otis. of York, Neb. The churn body has a project-
ing screw at the center of its bot:om, and a stationary shaft with a radially expanding and contracting dasher connected by hinged bars, a sliding tune, and a pitman the dasher is expanded and contracted radially by the
evolution of a crank staat.
A wiping and polishing apparatus for plate printing machines has been patented by Mr. Alexanter cating bed of the press is a roller having slots, webs paying off spools, receiving spools, and means for rotating the spools and vertically reciprocating the roller, the whole being an improved device for wiping off sur-
plus ink and polishing the plate before taking an implus ink a
pression.
A mercury vacuum pump hasbeen patented by Mr. Cuarles G. E. Neveux, of New York city. bulo is maden ar the cop of this bulb having valyes ar ranged to connect it with the vessel to be exhausted; then by a special construction the mercury can be made to anve all the air ont of the bulb, when the valves will so nd this openation with the air vessel to be exhansted, ittle trouble, there being no loss of mercury, and the whole construction being simple and rapialy worked.

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Greenwood \& Co., Rochester, N. Y. See illus. adv. p. 286. Walrus Leather, very thick, for polishe

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lished, they may conclude that, for good reasons, the ished, they may conclude that, for good reasons, the Per declines them.
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fice. Price 10 cents each.
Correspondents sending samples of minerals, etc.,
for examination, should be careful to distinctly mark or label their specimens so as to avoid error in their identication.
(1) T. M.-It is almost impossible to identify a flber botanically without specimens of its leaves variety of nettle called ramie (Urtica neva).
(2) W. A. C. asks for a correct aualysis of sint. 'This is a fat, greasy, substance which is washed
off of sheep's wool while getting it ready for manufac off of sheep's wool while getting it ready for manuf
turing. A. Suint, according to Fuchs, consists of:

| Potassiun | sulphate.. | $2 \cdot 5$ per ceut. |  |
| :---: | :---: | :---: | :---: |
| ${ }^{*}$ | carbonate. | 44.5 | * |
| $*$ | chloride.. | 30 | " |
| Organic | matter.... .. | 50.0 | " |

$\overline{100}$
The amount of potash salts depends upon the soil on which the food of the sheep grows. Other things being
equal, it has been found that the merino wool contains the greatest amount of potassium salts, ranging as high as 30 per cent.
(3) F. S. S. asks: What is the difference between common bone black (animal charcoal) and
ivory black? A. Properly speaking, ivory black should be derived from burning ivory chips ordust, in distinction from bone black, which is obtained from
bones; but we believe the commercial article in most instances is simply a better quality of bone black.
(4) A. O. writes: I bad the bandles of a flease inform me of a cement or glue that will nnite please inform me of a cement or
the piects? A. Use the following: Add half a pint
vinegar to half a pint skimmed milk. Mix the curd vinegar to half a pint skimmed milk. Mix the curd
with the whites of flve eggs well beaten, and sufficient with the whites of flve eggs well beaten, and sufficient
powdered quicklime sifted in with constaut stirring,
(5) Mrs. L. F. D.-Brass work can be polishedhy rnbbing the metal with flnely powdered tripoli
mixed with linseed oil and applied with a rubber made from a piece of an old hat or felt. Or else a mixture of glycerine, stearine, naphthaline, or creosote mixed acid can be used
(6) L. M. W. writes: I have a very expensive linoleum carpet on my office,which is mopped every day, but soon becomes dingy. What can I varnish or look bright all the time? A. Rnb the oil cloth every two or three months with boiled linseed oil: rub it well in with a rag, and polish it with a piece of silk. Or else as it becomes hard rub it well with a small portion of a mixture of beeswax soften ed with a minute quantity of turpentine, using for this purpose a soft furniture polisbing brush. In cleansing the oil cloth do not
use soap or hot water.
(7) T. F. asks the difference between quicklime and common building lime. A. Lime or quick
lime is obtained by burning calcareous stones in or furnaces. It is the anhydrous calcium oxide, oxide oflime. This when exposed to the air absorbs water, and crumbles into a powder, which is commonly
known as slaked lime, or hydrate of lime. The latter is chiefly employed in the preparation of mortar for
building purposes.
(8) H. D. P. asks for receipt for lacquer ing tin different colors. A. The following will proba
bly meet your desires: Put 4 ounces best gum gamboge bly meet your desires: Put 4 ounces best gum gamboge
into 32 ounces spirits of turpentine; 4 ounces dragon' blood into the same quantity of turpentine as the gamloge, and 1 ounce annatto into 8 ounces of the same
spirit. These three mistures should be made in differspirit. These three mixtures should be made in differ
ent vessels. They should then be kept for about two weeks in a warm place, and as much exposed to the fit for use, and any desired tints may be obtained by making a composition from them with such proportion of eact liquor as the nature of the color desired will point out. Or the coloring matter may be produced by
dissolving any suitable aniline color in alcohol, and dissolving any suitable aniline color in
adding it to the conventional tin lacquer.
(9) C. A. N. asks the best method of remethods that he is familiar with fail to give good re sults. A. The silver is reauced by either evaporating the bath to dryness and then treating the residue, or by precipitating the silver by means of dilute hydro-
chloric acid or salt solution; in either case the residue is poured in a crucible with equal parts of borax and carbonate of soda. The metallic button whic
form at the bottom of the crucible will be silver.
(10) R. P. B. writes: I have two boilers 15 inches in diameter, 8 feet long, three 3 inch flews in
each. Fire box 3 feet by 2 feet, return fue: each. Fire box 3 feet by 2 feet, return flue; i
won't draw the flames in the flues, and not the lengt of the boiler somelimes. The stack is 8 inches in diameter, 20 feet high above boilers; the ash pit door is $18 \times 6$ inches, close to the ground. What is the best to
top a leak in a boiler ? A. If the fire box you give distop a leak in a boiler? A. If the fire box you give di-
mensions of is for each boiler, you have not more
thau one-fith the area of return tubes you should have, thau one-fith the area of return tubes you should have,
and of the smoke chimney ( 8 inches diameter) is for and of the smoke chimney ( 8 inches diameter) is for
both boilers, it should be 1\% 'inches or 18 inches both boilers, it should be
dlameter instead of 8 inches.
(11) E. E. P. asks: 1. What is the combination or commercial name. if any, of the metal which
ex $\rho$ ands in cooling? A. Bismuth, cast iron, and antimony expand in cooling. The first mentioned expands one thirty-second in solidifying. 2. Is it chemi ing pot? A. Reference is made to the pure metal. 3 , Does it lose this property of expunsion by repeated beating and cooling if not melted? A. The property is not altogether constant; the molecular change brough
about by repeated heating and cooling will, we think, in terfere somewhat with its expansion. 4. Can you give its
ratio of variation as compared with iron or steel? A. Its ratio of variation is greater than that of iron and ateel,
(12) C. C. M. writes: I saw an instrument maker use a yellow sukstance put in a cotton cloth and
dipped in water, for blacking banjo handles. Can you dipped in water, for blacking banjo handles. Can you
name it or something that will dye light wood black name it or something that will dye light wood black
instantly? Would you give a receipt for a cheap and
quick polish to be rubbed on with a pad? A. We infer from your description that you have reference to the from your description that you have reference to the
following: Pour two quarts boiling water over one following: Pour two quarts boiling water over one
ounce of powdered extract of logwood, and, when the
solution is effected, one drachm of yellow chromate of potassium is added and the whole well stirred. When rubbed on wood, it produces a pure black. Repeat
with two, three, or four applications, till a deep black with two, three, or four applications, till a deep black
is produced. See also page 1994 of ScIENTIFIC AMERIoan Suprlement, No. 125. Ground pumice
mixed with linseed oil makes au excellent polish.
(13) F. De W. P.-Fluorine has never b isolated. The compound obtained was hydrofluoric acid. We would recommend you to avoid experiment-
ing with fluorine, as the burns obtained with the coming with fluorine, as the burns obtained with the comful, but also very dangerous.
(14) N. F. of Australia wishes to know the best dye for the hair. A. The least objectionable article is probably made from green walnut shells. Only and macerated for three or four weeks, then pressed
(15) M. B. C. asks: How many borse power does it require to manufact ure one barrel of
flour in one hour? A. It is usual to allow one horse power per bushel of grain per hour, for the power required to grind the grain, and an additional horse
power for driving the balance of the machinery of a flour mill. To simply reduce the grain required for a barrel of flonr, to chop, in one hour, say five bushels,
would therefore require five horse power. The con would therefore require five horse power. The con-
ditions vary so much, that no exact rule can be laid ditions
(16) J. E. B. writes: We cannot find an article tbat will thicken oils withont destroying the lu-
bricating qualities. A. We would suggest powdered bricating qualities. A. We would suggest powdered
graphite.
(17) A. S. asks at what rate light travels. (17) A. S. asks at what
A. About 185,000 miles a second.
A. About 185,000 miles a second.
(18) R. M. C. asks: Is the gas made from gasoline and generated by the Springfield gas machine
as strong, when used for producing power in a gas motrong, as the ordinary coal gas or that made from pe-
troleum? A. It is used in some of the gas motors, and troleum? A. It is used in some of the gas.
appears to be as "strong" as other gas.
(19) R. H. J. asks how the wires on the armature of the Brush machine are connected to the
commutator. Are both terminals of each bobbin con
nected to the commutator, or only one? A. One tercommutator. Are both terminals of each bobbin con
nected to the commutator, or only one? A. One ter-
minal of each bobbin is connected with the commuiator the other terminal being connected with that of the bobbiu loca
armatare.
(20) H. K. G. asks: 1. The main school buildinglhere is 18 rodsifrom the primary, and is heated
by a 14 horse power boiler which will heat it well with 20 pounds steam. Is it practicable to heat the primary also, and in what manner? A. If your boiler is below
the are steam to the primary and return the drip water in well protected pipes. If the boiler is above any of the rooms to be heated, a steam trap must be employed to let off the water orreturn it to the boiler. 2. What is a cheap mode of making a cylindrical or plate electrical ma-
chine? A. Consult the back numbers of the SUPPLEchine? A. Consult the back numbers of the SUpple-
ment. You will find in them descriptions of ber of machines.
(21) H. H. W. writes: I have a thermostat placed over a gas burver. The electrodes are of steel and brass, brazed. I want some metals which will heat act more quickly, If youl caunot suggest better metals for the purpose, can you suggest a simple method of cooling these more quickly? A. You can embloy a very thin strip or wire of brass and multiply its expansion by levers, such a strip may be made to heat and cool very rapidly.
(22) C. G. asks for a non-poisonous liquid that will not thicken in bottles arabic muc glass jar with broken up glue of best quality, then fill hours until the glue is all melted, and you will have an excellent glue always ready.
(23) J. E., Jr.-The answer was intended for you. You must adapt your battery to the purpose
for which you use it. If you want to run single incandescent lamp, you must use a large number of cells connected in series. If you take the current through a
small resistance, the battery will run down very quickly.
(24) M. I. - You can deaden the noise between rooms by nailing wall strips on the side of the
beams and filling in with boards, and plastering with common mortar about two inches thick on top of the board flling. You will have to take up the
floor to do this. You may accomplish the same thing fioor to do this. You may accomplish the same thing
by lathing between the beams from below, and plastering. Then lath and plaster upon the face of the beams, making two thicknesses of plaster. A secoud ceiling will anower the same purpose if you do not wish to
disturb the ceiling or floor. This can be put on by nailing wall strips to the ceiling, and lath and plaster. A nother way is to lay an entirely new floor with a
second set of beams above the original floor, beams ot touching the old floor
(25) J. J. L. asks for information concern ing the manufacture of milk sugar from the whey
which is produced in cheese factories. A. Milk sugar or lactine, is largely manufactured in Switzerland. It is also made in the United States to a limited extent. The process is, to strain or filter the fresh whey to remove
all traces of curd. Then evaporate in pans at a all traces of curd. Then evaporate in pans at a moder
ate temperature, $150^{\circ}$ to $175^{\circ}$ Fab.,until crystals begin to form,;place in the pans small clean sticks for facilitating the process while the liquor is cooling. Let the cool-
ing be carried as far as possible without freezing. Then draw off the liquor, and wash the crystallate with clear cold water by placing in a fllter cloth and sprinkling the water over the crystals just enough to wash off the whey. Spread the crystallized crude sugar upon cloths
to dry. For purifcation and bleaching, dissolve the crude sugar in boiling wo ansiderably cissolve the tion, and filter, through animal charcoal (bone coal) and also throuph a cloth filter, to remove all traces of bone black. Evaporatethe flltrate at $150^{\circ}$ to $170^{\circ} \mathrm{Fah}$. to saturation, continuing the evaporation under a lower-
ing temperature until the entire crystallate is deposited. ing temperature until the entire crystallate is deposited.
Use small sticks of wood, preferably willow, to facilitate crystallization. Draw off the liquor, and dry on
(26) T. D. writes: I have a rubber thrashing belt 6 inches wide and 125 feet long, 4 ply. Will a 5 or 6 ply 5 inches wide, same length, give as much power as
the 6 inch? I would like to use as narrow bell as possible on account of the wind affecting it. A. The heavy 5 inch belt will transmit as much power as the light 6
inch belt. It must be also ruu proportionally tighter inch belt. It must be also ruu proportionally tighter
than the wide belt. The thick belt under the greater straiu will not wear as well as the thin one. You may strain will not wear as well as the thin one. You may
also find trouble with the lacing if a quick speed is
used. The journals also suffer with very tight belts Better make all the pulleys larger by 20 per cent and use 4 ply 5 inch belt.
(27) C. P. asks what ingredients to use for stamping on dark and light goods, from paper patterns,
that will not rnb off. A. Raw starch with a very small portion of gum sugar or even cooked starch mixed with it, with enough water to make it pasty, will make it stick; for dark goods. The same mixed with indigo
blue will make a good stamping mixture for white (28)
(28) P. J. F. asks: Can you inform me how to construct a small battery sufficient to use for plating tery was best for this purpose. that is, for plating small articles, such as buttons, knife blades, etc. A. Use a not adapted to electroplating.
(29) A. H. D.asks: Have you any knowledge of a preparation, which if applied to paper will render
an electrical current visible on the paper? I have 'tried the following: in nitrate of ammonia, ferricyanide, glyceriue, gum tragacanth, and water, but it does not give not produce a color. A. We know of nothing for this purpose that can be used dry.
(30) J. D. R. asks about the largest locove in the New World-its weight, dimensions, when made, its running time, number of cars it draws, and
where it runs. A. We beliteve the largest engines in
the country are on the Central Pacific Railroad. Cylininder 19 inches diameter by 30 inches stroke, 8 driving wheels 54 inches diameter, weight in working order
123,000 pounds; built at railroad shops. Engines now i building at the shops of same company: Cylinder 21
inches diameter by 36 inches stroke, 10 driving wheel
57 inches diameter, weight in working order 146,000 pounds.
(31) J. E. J. writes: I have been grinding enses according to directions given in one of your SupPLEMENTs, but find trouble in polishing. Is the rouge stance to use? (It is all I could get.) How long should he last emery used in grinding be suspended in water ? How long should the operation of polishing a lens one Would the lenses known in ordinary circumstances Would the lenses known in optical catalogues as cos-
morama lenses if silvered one side be of any service as a reflector for a telescope? If so, would a 4 inch lens of being doubly convex? Would a focus of 36 inch lens, it be conveniently silvered by the processgiven in ScIentific American of July 31, 1880? A. Face rouge is adulterated. Use the finest jeweler's rouge, which yon may obtain from any jeweler or watch maker. The
washing of the emery for fine grinding is very diffleult washing of the emery for fine grinding is very difficult.
It should be washed from the flnest flour emery. Place t should be washed from the flnest flour emery. Place
a pound in a glass jar (preserve jar), fill it with water stir gentlywith a small stick made like a paddle, allow away, water to trickle into the jar, let the top.scum run water is running into dish, and slowly stir while thom the pound o flour emery, wash over about one ounce for the finest.
Then in another dish about two ounces for the next flnest. The balance will be useful for a third quality.
The time required for polishing a lens of 1 inch diameter depends entirely upot the fineness of the last emery finish. Hali an hour to two and a half hours
may be required. A cosmorama lens is unfit for an may be required. A cosmorama lens is unfit for an
object glass or a reflec:or, and will not be achromatic in either case. It can be
Scientific American.
(32) W. McC. asks if there is anything betterthan a boom derrick for hoisting a weight, say two
tons. I want to swing it in a radius of twenty-four fee from the corner of a wooden bullding that is not over twelvefeet high. We have plenty of steam power to work with, and would like to get something cheap. A Wedoubt if you can do better than to use boom der-
ick. It is made with a mast and a braced boom former lightness, using two sets of tackle for swiuging in out from the center. Drawings of a 30 foot haud der
rick, which we think would answer your purpose, were rick, which we think would answer your purpose, wer
published in Scientific American Supplement, No
(33) T. G. asks (1) how to make those wax
crayons which are used to work one on top of the other crayons which are used to work one on top of the other without disturbing the under color. A. The wax
crayons or pencils ares made with paraffn or spermaceti, pipe clay, and the various colors. The clay mus used to hold the clay and colors, to be decided by experiment; we cannot give the exact details. They are manufactured and imported from France and Germany. 2. Also what is the composition used in mak-
ng tiles or plates for inings are fire brick or tiles made of fire clay.
(34) P. C. A. asks: 50 horse power Westnghouse engine using steam at 70 pounds pressure
rom 60 horse power, 12 flue boiler. Cylinder exhausts nto a 36 inch by 8 foot boiler having twenty-four nch flues 34 inch thick, and a rotary exhaust fan in chimney opening. Would the air drawn through the flues by the fan be sufficiently heated for economical use in a lumber dry house? A. According to your state-
ment, we doubt the economy of your proposed arment, we doubt the economy of your proposed ar-
rangement. The temperature of the air delivered by the fan would be too low for rapid drying., If you can give ample time for drying, the arrangement will rying very rapidly
(35) F. A. W. asks the date and most important facts of the trial of horse power vs. locomotive
that took place in Baltimore, Md., nearly fifty year ago, with assistance of Mr. Peter Cooper. I lost the illustrated sheet he gave me. A. The trial took place
on 28 th of August, 1830 , in a ruu from Baltimore to Ellicott Mills, distance of 13 miles, time one hour and 15 minutes; shortest time for any one mile, $43 /$ minutes.
On the return trip, time was 61 minutes for whole disOn the return trip, time was 61 minutes for whole dis 50 seconds; one engine, 314 inch cylinder and 1414 inch stroke. You will find full account in Brown's comotive in America.
(36) A. F. writes: I have a small vertical engine, 3x3; is it large enough to run a small boat? 1
How large a boat will it drive? A. With plenty o oiler, a boat 16 or 18 feet in length and $42 / 4$ feet beam.
Can I drive direct on shaft, or will h have to gear off? A. Drive direct. 3. How fast would the engine have to run? A. 350 to 380 revolutions per minute. 4. What would the dimessions of boiler have to be? A. Boiler
with not less than 58 square feet of heating surface.
(37) J. T. writes: A propeller engine cut-off cam is generally opposite the crank when on dead cen-
ter. Now, what is the object in having it set behind the crank instead of the front? A. Probably to cut off laterin the cylinder. We could not say positively
withoat knowing the arrangement of your cut-off gearng.
(38) E. E. R. writes: If one has an engine (slide valve) larger than he needs for his work, which boiler, or to keep the pressure as usual and slack the between these two ways? A. Keep up the pressure between these two ways? A. Keep up the pressure,
and arrange your valves to work more expansively, will be most economical. 2. And, taking any com-
mon slide valve enginerun to its rated power and using a certain amount of fuel per horse power, what part more fuel (approximately) would it take per horse
power when running the same engine to one-half its capacity? A. When running at one-half capacity, it will take a trifle more fuel per horse power, butthe ings, radiation of cylinder, pipes, etc.
(39) W: F. asks: 1. About how many and

We cannot say, as it is entiraly with the examiners. 2.
How many kinds of boiler iron are there, and what How many kinds of boiler iron are there, and what There are various qualities of boiler iron made. Their ensional strength will run from 40,000 to 60,000 pounds per square inch. 3. How can a very small leak in a boiler, in the seams. be calked best without going to a
boller maker? A. By careful use of the calking tool. ooler maker? A. By careful use of the calking tool. lowing size to contain: Six feet high, single flue, and about 3 feet in diameter? $A$. We do not understand our question about square inches in a boiler. 5. I have pull an average load of 500 pounds a trip. To do this must carry between 70 and 90 pounds of steam. The engines are very powerful, though small, being $4 \times 8$. want to make the engines do the same work with
ixty pounds. A. You can only make the engines do ixty pounds. A. You can only make the engines do (if you have gearing) soas to increase thanging gearing f you have gearing) soas to increase the speed of the
ngines without increasing speed of dram. 6. What ngines without increasing speed of drum. 6. What
kind of oil is best? I use black oil. A. There are so mand of oil is best? I use black oil. A. There are so
many kinds of oil in market, that we cannot say which many kinds of oil in market, that we cannot say which
is'best. 7 . What is best to do, and how can a slipped ccentric be remedied immediately without losing time A. Set your eccentric right and mark eccentric and
shaft, so that if it slips you can set it in place by the marks.
(40) W. M. S. asks: Can an engine, having odraw its water, and thereby expending some of its Wn power, throw a more effective stream than when . No; whatever pressure pumps by outside forces? n outside force is so much relief to the power required o work the engine under similar conditions.
(41) Azof, of Russia, writes: 1. a. I am putting down a cupola, using an old boiler shell, 3 feet inchesdiameter; inside measure after lining will be feet. Thave two rows of tuyeres, 15 in each row, 43/2 nches oy 3 inches, made by leaving out third brick in vantageously? $b$. How much iron ought I to melt per our? What should be the charges? Fuel onthrecit . I have an English fan 25 inches diameter with 12 nchesround discharge, calculated by the maker to run down 3 tons per hour at 2,500 revolutions. With this an I wish to blow cupola and three smiths' fir es. What gether, and what speed for smithy alone, and what ar gether, and what speed for smithy alone, and what ar-
rangements of tubing would suit? A. a. A preseure ongements of tabing would suit A. a. A pressure
7 or 8 ounces per square inch of coke is used, and with coal 12 to 16 ounces. $b$. A verage not over $11 / 3$ ns per hour with your dimensio ons. Your blower is sufflcient for three tons if the cupola were largeenough. c. Your fan is ample for both cupola and three forge fires; 2,500 revolutions will be ast enough for all vour work, and might be reduced ne-quarter or one-third when forge fres only are in se, but the blast to fires should be regulated by a valve at or near the forge. 2. In using emery wheels,
should the upper side of the wheel run to or from the workman? A. Run top of emery wheel from the workworkman? A. Run top of emery wheel from the work-
man. 3. What will be the horse power of a horizontal engine whose cylinder is $91 / 2$ inches by 16 inches, revoutions 95 per minute, and will a boiler with one flue ooly 14 feet 6 inches by 4 feet 3 inches be large enough or piston, 21 horse power. If fred underneath shell and eturn through flue, it would answer; but if the furnace inside the flue, it is too small. It would be better if have at least three times the amount of tuyere opening nto cupola that you should have, though in this re spect much depends upon the kind of fuel. In respect o charging, we cannot advise you, as much depends pon shape and height of cupola and character of fuel. We recommend you to obtain a copy of Spretson on
Casting and Founding, published by Spon, London, Casting and Founding, published by Spon, London,
and West on American Foundry Practice. They will ver much information on P ,
(42) S. F. H. asks: 1. What is the size that umen, the white of an egg. 2. How is an electrotype made from a relief plate in photo-engraving, or is the ectrotype made from a plaster cast, and how? A. wax mould is taken from the relief plate, and then or air blast. The copper is deposited on the plumbago by means of a battery. When the shell is suffliciently thick, it is removed from the wax and filled in at the
(43) G. H. J. asks: 1. Will 3 cells of the waw battery answer for plating small articles, swa ery, like the Daniell or gravity. 2. Can I increase the power by using larger zinces? A. Not to any great ex-
tent in the battery referred to. 3. Can I increase the intent in the battery referred to. 3. Can I increase the intensity by using some other liquid in the place of the salammoniac solution, and at the same time make the
battery more constant? If so, what liquid? A. Better battery more constant? If so, w
(44) L. P. Jr., asks (1) if there is avy ment that can be used on glass and is not soluble in cid phide of carbon. A. Gelatin dissolved in acetic acid 'makes a cement insoluble in bisulphide of car-
on. 2. Also, if there is any way to insulate a steel bon. 2. Also, if there is any way to insulate a steel
magnet so that it will retain its strength, if inserted in a piece of cast iron? A. There is no way to insulate
(45) H. R. E. asks (1) how many cells of e plungebichromate battery, size of carbons and zincs $3 x 6$ inches, I require to produce incandes cence in a
amp similar to Edison's? A. Six cells will operate a 3 candle incandescent lamp. 2. Also, how to make a Consult any work on physics or electricity, or the back numbers of the Soientific American Supplement. The subje
columns.
(46) A. J. N. asks how the supersaturated solution of b!chromate of potassium is made, the same
as is used by $M$. G. Trouve in his illuminated jewelry?
water. Let the solution cool. When the sulphuric
acid is added, the solution will become hot, and redisacid is added, the solution will become hot,
solve most of the crysials formed on cooling.
(47) W. K. R. writes: Supposing that a man had the power to fly through space at the rate of
1046.55 statute miles per hour, in same direction that $1046 \cdot 55$ statute miles per hour, in same direction that
the world revolves, starting from New York city at 12 M., and having flown one hour, would stop and ask what timeit was, would he not get the reply that it was 12 o'clock? He flew another hour, and asked the
time; he was told it was still 12 o'clock, and so on time; he was told it was still 12 occlock, and so on
until he came to his starting point, New York. He has until he came to his starting point, New York. He has traveled all through day time, but when he gets to
New York he is told a night has passed. How do you New York he is told a night has passed. How do you
account for the day gone by and the difference in time? A. As you have put the proposition, why not place the
man on top of some high steeple: In this case he will man on top of some high steeple? In this case he will
be passing through.space at a rate of 1046.55 miles an hour in samedirection as revolution of earth. His relation to objects below him will remain unchanged, but his relation to time will be ever changing. It will be
midday when he is on the nearest approximate side to sun, andmidnight when he is in exactly the opposite face of earth. If, however, he flies at rate stated in opposite direction of rotation of earth, which is probably
what you wish, he will remain on midday line, while that you wish, he will remain on midday line, while ing the mean time it is New York or any point from whichbe may have started which has found the midnight line, and which therefore counts one day as hav ing elapsed.
(48) S. A. R. asks: 1. What is the power and probable cost of a dynamo capable of running dozen incandescent lamps? A. Probably 2 20. 2.
Wuat power of motor would be necessary for running
such dynamo? A. $11 / 2$ to 2 horse power. 3. What size amp is most suitable for an ordinary sized dwelling more than one lamp per room being preferred? A
(49) G. W. L. asks (1) how to change the surface of iron and steel to a black color. A. See answer to query 48 in Soientific American for March 29, 1883. 2. Is there anything that will protect finiehed
iron from rusting? A. See Scientipic American Supiron from rusting? A. See Scientipic American Sup-
plement, No. 226, for recipes of Varnishes for Protect ing Iron.
(50) G. P. W. asks how to treat fence posts to make them last longer in the ground. Some boil in coal tar, others char the ends with fire, others say put
the top end down. A. We would recommend the coal tar treatment. and why not at same time put top end downward? You would then have a very good fluid, to use as an undertaker upon human bodies. A. See A New Method of Embalming Bodies and Preserving Tissues, page 69. Scientific Amerioan for Fepbruary 4, 1882. Also, Brunelli's Process of Em-
balming, page 169, Soientific American, March 18, balming, page 169, Soientipic American, March 18,
1882, and Embalming in Italy, page 52, Soientifio american, July 22, 1882.
(51) W. H. writes: 1. When celluloid col lars have been worn a short time, they tarn yellow Can they be restored to their original color? A. If the coloring does not disappear when the affected portions are rubbed with a woolen clorh and a little tripoli, and
then polished with a clean woolen rag, the injury is a then polished with a clean woolen rag, the injury is a
permanent one. 2. How are the sticky fly papers made that are sold by drugstores? A. Boil $1 / 4$ ounce smal chips of quassia in 1 pint of water, and add 4 ounces glycerine. 3. What metal is it that mixed with tin prevents it turning lead color, but makes it look whiter and more like silver when the article has been used
some time? A. An imitation of silver is made by com bining 3 ounces tin with 4 pounds copper. So that it it bining 3 ounces tin with 4 pounds copper. So that it
possible that by adding copper in suitable quantities th possible that by adding copper
desired result will be obtained.
(52) R. S. B. writes: 1. I want to make caustic sodaliquor for boiling goods. I know that car-
bonate ofsoda boiled in lime and allowed to settle will bonate ofsoda boiled in lime and allowed to settle wil produce the liquor. What is the best way to do this? A. The most convenient way for you will be the best tion be performed. 2. Will the liquor be as strong this way as by putting in 70 per cent soda? $A$. We belleve it will be. 3. Will it be free of lime, as the lime will spoil the goods I want to cook? A. Unless exactly the right amount of lime isused to satisfy the sodium car-
bonate, there will be danger of an excess of lime. To bonate, there will be danger of an excess of lime. To
obviate any difficulty of this sort, the utmost care mus
be used to employ the proper proportions of each.
(53) R. B. R. writes: In my letter to you suggesting what seemed to me to be the natural ar-
rangement of the colors of the spectrum as applied to rangement of the colors of the spectrum as applied to
the musical scale, the order of colors should have been the musical scale, the order of colors sh
reversed in the list given, so as to read:

| Notes. | Colors. Sourd vibrations. |  | Light vibrati |  |
| :---: | :---: | :---: | :---: | :---: |
|  | Red | 106\% $/ 3$ | 458 | lion |
| B | Orange | 120 | 506 | * |
|  | Semitone. | Semiton | Sem |  |
| C | Yellow | 128 | 535 | ${ }^{*}$ |
| D | Green | 144 | 577 | $\cdot$ |
| E | Blue | 160 | 622 | " |
| F | Indigo | 170\% ${ }^{\text {a }}$ | 658 | ${ }^{\prime}$ |
| G | Violet | 192 | 727 | " |

The vibrations per second inthis list increase in the same direction; and you will observe that the differthe semitones. This is evidently no accident on the part of nature, but clearly an indication that she intended we should study sound music and color music
in connection, and not as separate arts. Will you kindly inform me how I can obtain seven distinct franspariont shades of each color I cannot get the in enable me to do it? A. Your investigation, if novel, is an extremely interesting one. We would suggest that excellent effects may be obtained by coating glass
with ordinary shellac varnish (made with bleached shellac) tinted with aniline dyes. The dyes you can easily select of the shade that seems to you most desira ble. The glass must be slightly warmed before applying the varnish. The strongest alcohol should be used
or diesolving the shellacand the powdered (not liquid)
aniline colors. One part of shellac to eight of alcohol
is a good proportion. The varnish should be poured is a good proportion. The varnish should be poured
on and placed evenly over the glass, and the superfluous quantity returned to the bottle. It must not be painted
(54) L. V. T. writes: 1. I send a piece of wall paper, and would like to know if there is any arsenic contained in the green color, and what are
the symptoms of arsenic poisoning? A. The gre spots on the paper are so small and so few that we hink there is very little danger of poisoning from this ource. To determine the quantity of arsenic in the wall paper sent, a chemical examination would be neessary. The symptoms of arsenical poisoning, accord nd sickness, with an intense burning pain in the resion ofthe stomach, increased by pressure. The pain in the stomach, increased by pressure. The pain in is a violent vomiting. In chronic cases there will be nflammation of the conjuctive, with suffusion of the eyes and intolerance of light; also with more or less rritation of the skin. 2. Can you tell us of a substance to mix with Portland cement that will set middling quick and stand weather, and become hard and duraParis, we havetried, but the plaster freezes plaster of in winter and bursts the socket. Is there anything we could mix with the sand and cement to improve it? The following cement will probably suit your wants: 63 parts well borned brick and 7 parts litharge pulverized and moistened with linseed oil. Moisten the surfaces to which it is to be applied. Also see article on Cements, page
mENT, No. 133.
(55) W. R. S. asks whether or not any one has succeeded in photographing in natural colors. If it has been done, what was the modus operandi? A.
Not very successfully. See back Nos. of the Scien Not very successfully. See back Nos. of the Scien-
tific American and Scientific Ambrican Supple tific American and Soientific Ambrican Supple arent for information. We send you catalogue. Supplement No. 149, under the heading Simple given are said to be necessary. Would a single cell, four or six times as large as the one recommended, answer the purpose just as well? A. No. 3. Where, and by whom, is the Chemical News published? A.
Editor, William Crookes, Boy Court, Ludgate Hill, London, Eng.
(56) W. L. T. asks: What is crocus? . The term, as employed in the mechanic arts, usually eefers to a preparation of the oxide of iron used forpolhing metals andgems. But the term is generic and
ot specific, and means, from the Greek, "saffron," color. It is applied also to an oxide of copper and an xide of antimony
(57) D. S. asks: 1. Are all kinds of small castings made to any extent direct from the Bessemer converter into the ordinary sand moulds? If not, why not? A. Bessemer steel demands so high a heat for fuidity sufflcient to pour small castings that ordinary and moulds will not contain the metal in shape. understand, malleable castings are simply ording castings put through a process to extract a part of the carbon. Ifthis is so, and the Bessemer converter decarbonizes the fluid metal to begin with, why should not all linds of castings be made direct into sand moulds from the converter? A. The material of Besemer steel and that of malleable cast iron is radically different, fully as much soas brass and bronze, or lead and Britannia metal. Not only is the resultant mare different. Treatment appropriate to the one is entirely unfitted to the other.
(58) N. D. T. asks for a recipe for making soap bubbles, such as are used for chemical experin 100 grammes warm Water; this is filtered, and to very 100 cubic watimo white sugar is added. Bubbles made with this liquid will last several hours.
(59) E. S. A. asks how the cement is manu actured, or where I can obtain it, which is used to also the kind or paper used for the from slipping? ard wrapping paper and glue. Roughen the surface of the pulley with a coarse flle. Then draw the paper tightly around the pulley, brushing the glue quickly apon the pulley and upon the paper, so that every layer
will be perfectly glued together; put on eight or ten will be perfe
thicknesses.
(60) E. D. L. asks if there is any preparation that you can put on a wall that has been whitewashed, to make paper adhere to it, and thus avoid the trouble of scraping the walls. A. The whitewash must be scratched with a stiff brush, to remove every
particle of loose lime from the surface, after which it particle of loose lime from the surface, after which
should be thoroughly swept down with a broom and then coated with glue size prepared by breaking up sufficient cold water to just cover them, and in the morning the glue will be soft enough to melt readily with a moderate heat; then reduce to desired consisttency by adding suitable amount of water.
Minerals, etc.-Specimens have been reeived from the following correspondents, and examined, with the results stated:
Mrs. J. A. H.-The mineral is simply a very pretty piece of crystallized quartz, and is of no value except as a curiosity.-E. A. B.-Realgar is found principally in Europe, in Austria and in Saxony. It is valuable as mineral, being worth 25 cents to $\$ 2.00$ per specimen. would prevent it from eover be produced artificially valuable.-A. O.-The specimen appears to be colored with oxide of iron or decomposed iron ore. Its nature cannot be positively determined unless it be chemically examined.-L. F. K.-The brown specimen is a close grained silicious materialcolored by iron, and is of no value as an ore. The other specimen is horn-
blende and mica.-G.A.S.-The specimen is simply

INDEX OF INVENTIONS
For which Letters Patent of the United
States were Grant States were Granted

April 22, 1884,

## AND EACR BEARING Tha' date

See note at end of list about copies of these patents.

## Adding machine, w. H. Beatley..

Air cooling device, W. V. Wallace.....
Air medicator and injector, B. McGre
Alarm. See Burglar alarm.
Animal shears, W. F. Winckenden.
Ash pan, steam emptying, J. Desmo
Axle lubricator, car. W. G. Miténell.
Bag. See Mail bag.
Bag turning:mach1
Bale tie, J. White.
Bale tie, J. White.......... ........ . ...........
Baling press, H. V. $\&$ C. F. Scattergood.........
W. Paparatus for plugging and tapping,

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Belt, traveler's treasure, A. H. Keple
Berth, folding, H. S. Hule..
Billiard cue tip, D. Dessaue
Bleaching raw cotton, J. C. Vaniohe.........
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