## The Niagara Railway Sumpension Bridge

Messrs. W. Milnor Roberts, Chief Engineer N. P. R. R. T. E. Sickels, Chief Engineer U. P. R. R., and W. H. Paine Assistant Engineer New York and Brooklyn Bridge, who were lately employed to examine the Niagara Railway Suspension Bridge, and to report upon its state and stability have concluded their labors. They report that they first amined carefully those portions of the bridge supposed to be defective, and found, at the anchorages where the strands are separated and pass to and around the shoes, some of the outer wires somewhat corroded with rust: particularly at the first anchorage opened, where eight or ten wires were corroded quite through.
All of the badly rusted portions of the several wires have been removed until perfectly sound wires were found underneath. The portions removed have now been replaced by splicing a new piece to each individual wire under the strain due to the weight of the bridge.
The state of the strands now at this anchorage, and the general condition of the strands at the other anchorages, lead them to the opinion that there is at none of them a diminu tion of strength from corrosion of half of one per cent, which is as little as might be expected in any iron bridge structure standing the length of time this has stood; and it is to be noted that the oxidation of the wires has not taken place in the main cables between the towers, but at the extreme shore ends near the shoes where the strain is less than it is elsewhere.
Careful tests have proved conclusively that the wire has lost none of its original strength from the strains to which it has been subjected, and there is no reason to believe that the bridge is now less capable of carrying the usual trains or the test load which was at first imposed upon it.
During the examinations they carefully noted that the action of the bridge under passing loads is normal; and as the heaviest locomotives and trains of eight or more loaded freight cars during this period were constantly using the bridge, they had excellent opportunities of observing their effect.
A further report, accompanied with drawings, is to be submitted at an early day, in which will be stated in detail the examinations that have been made and the results of numerous tests of the strength of wire from the cables.

## Effect of Sunlight on Flour.

It is maintained, says The Millstone, that the inferior qual ity of certain kinds of wheat and rye flour is frequently due to the action of sunlight on the flour; even when in bags or barrels the gluten experiences a change similar to that occasioned by heating in the mill. The tendency thus imparted to it, to become lumpy, and to form dough without toughness, is similar to that of most grain, or of flour when it is too fresh, or made from grain ground too early, or when adulterated with cheaper barley meal. Such flour can be improved by keeping some weeks.

## 

## NEW MISCELLANEOUS INVENTIONS

## IMPROVED HAME FASTENER.

Tunis H. Poland, Farmersville, Collin County, Tex.-This hame fastener comprises a pair of plates and a set of gradulated links. Upon one end of the strap is formed an eye or hook to receive the hame loop. Upon the
other end is a hook, to be hooked into one or another of the links. This fastening can be readily fastened and unfastened without taking off the gloves, and with cold and benumbed fingers, and when fastened will hold the hames securely. T
the inventor as above.

IMPROVED BRUSH
Lewis Uttz, Nora Springs, Iowa.-This consists of a brush head, with a Lewis Uttz, Nora Springs, Iowa.-This consists of a brush head, with a
recessed bottom and side lugs, in connection with a broom whisk fastenng
wire, that is wound around the head and the whisk ends, and retained by lugs and suitable ond fastening.
improved slate.
George S. Velez, New York city.-The object of this invention is to provide an improved device for facilitating and expediting the multiplication consists of a slate with a sliding slate rule, guided in a slot or recess of the consists of a slate with a sliding slate rule, guided in a slot or recess of the
slate, and worked in connection with the graduated or subdivided edges or the adjoining slate sections.

## improved bag fastener

Constantin Lazarevitch, Brooklyn, N. Y.-This invention consists in a is shorter than the width of the bag, and is provided with buckle-shaped catches at its lower side near each end, which are each previded with a number of bars. A bar of metal having formed upon it two hooks capable of engaging with the bars of the buckle-shaped catches is sewed on the side opposite the rectangular frame. The parts are so arranged that the
loose sides of the mouth of the bag may be folded in uponits contents, and loose sides of the mouth of the bag may be folded in upon its contents, and
the rectangular frame closed over the loose sides of the mouth. The bar the rectangular frame closed over the loose sides of the mouth. The bar having the hooks is cl-sed over all in such a manner as to draw the side catches.

IMPROVED BALE HOOK
Henry Hauschildt, New York city.-The object is to provide for the handling of bales an improved hook that is rigidly connected to the handle without working loose therein, or injuring the hand of the workman using
it. A cross pin is passed through a longitudinal hole of the handle, and an it. A cross pin is passed through a longitudinal hole of the handle, and an eye of the shank end of thz hook. The shank end may be threaded and
screwed into a screw socket of the handle, the key being also threaded at screwed into acrewed into the wood of the handle at the side opposite to the longitudinal entrance hole of the key
improved combined collar and hame
Ezra Stroud, Riceford, Minn.-This relates to an improved collar and hame combined, which may be fitted in flexible and easy manner to any the hame, and the convenient opening and closing of the collar and hame for putting the same on or off the neck.

José Guardiola, Chocolá, Guatemala.-This consists of a heating furnace new and improved construction, for heating air for drying purposes, and cosing an annular air space, and a inner and outer cylindrical shell in connects the same with the annular air space, and a fregrate and flreplace The device als consists of a cold air pipe leading from the blower pipe to the hot air pipe beyond the heater, for the purpose of introducing cold air in the place of hot air into the drying apartment when desired. This in
vention was described and illustrated on p. 82 , vol. 36 .

## IMPROVED HARNESS TRIMMING.

Isaac N. Just, Belding, Mich.-This consists in the combination of the swinging wedge block, having its bottom concaved, and provided with a
flange along its rear edge, and an extension having the inner side of its flange along its rear edge, and an extension having the inner side of it bottom bar concaved or flat with the terret. In using the device the free end of the tie-strap is passed through the cavity of the extension and is
drawn back ior a suitable distance. It is then drawn forward and draws the wedge block into the cavity of the extension, and clamps the said tie strap securely between the lower edge of the said block and the bottom ba of the extension.

IMPROVED GLAZIER'S DIAMOND HOLDER.
Jacques E. Karelsen, New York city.-The object is to simplify the con they can be made cheaper, and also so as to take up less room in the pocke The invention consists of the breaker being secured to the handle directly and in line with the axis cf the handle and of the swiveled diamond holder The present ferrule construction is thus dispensed with.
improved trace buckle.
Lyman D. Hubbard, Hume, N. Y., assignor to himself and Henry C. tongue section provided with wedge-shaped sides, that slides in horizontal slots of the buckle frame. It is readily opened to detach the trace by pulling the same forward and swinging the lateral tongue section into open
position.

IMPROVED COMBINED DRYER AND SMOKE HOUSE.
Ransom Sabin, Shelby, Mich.-This is a building made of sheet metal and angle iron, having a fireplace, and a flue running around its interior and out at the roof. It also consists in a circle provided with hooks, upon which to hang meat and other articles, and in the arrangement of swinging
shelves for supporting fruit and vegetables. hich to hang meat a

MPROVED OILER.
William H. Harrison, Livermore, Cal.-This oiler is so constructed as to catch and hold any oil that may run down the stem, while atthe same time
it keeps the outside of the can free from oll, and the caught oil free from it keeps the outside of the can free from oil, and the caught oil free from
dust. ust.

## NEW MECHANICAL AND ENGINEERING INVENTIONS.

IMPROVED ORE SEPARATOR.
Wiliam M. Courtis, Wyandotte, Mich.-The tailings are received from the tail-race by a chute, and are projected between blocks and upon the
grating with sufficient force to carry the larger particles over the end of grating with sufficient force to carry the larger particles over the end of
the grating into a vertical chute. By the action of currents of water the heavier of the particles that pass through the grating fall toward the pipe leading to the settling tank, while the lighter of such particles are carried leading to the setting tank, while the ligs.
upward and discharged with the tailings.
improved rail road switch.
William H. Cooke, Wilton, Conn.-This switch is operated by the passing locomotive. A notched bar is connected with the movable switch rails and a locking lever engages with notches of said bar. By means of a
lever, the locking lever is disengaged, and the notched bar and rails ar moved. Levers, which are moved by the locomotive, are placed each side of and remote from the notched bar, and connected with the $T$ lever by means of rods.
improved boat-detaching apparatus.
William McK. Bell, Collingwood, ontario, Canada.-This invention con-
sists of a detaching device applied to the boat, and made of a supporting sists of a detaching device applied to the boat, and made of a supporting
frame with a pivoted tumbling bar and swinging tongue, locking by its frame with a pivoted tumbling bar and swinging tongue, locking by its
toothed or serrated end to a correspondingly toothed projection or catch of the supporting plate, unt.
thereby the same detached.

IMPROVED TURNSTILE.
Alfred F. Swan, Hoboken, N. J.-This consists of parallel guide rails, with central pivoted side standards, having rigid horizontal arms, of which axis of the stile. The side standards and arms are revolved and locked by hinged and spring-acted platforms, which are jointly worked by the weight of the person passing through the turnstile. One platform operates the standards by ring-shaped sleeves, with pins entering spiral recesses of the same. The second platform locks the standards by recesses binding on stop pins, jointly with the first platform or singly, to prevent the return of the person.
improved millstone curb.
William L. Taggart, Niles, Mich, assignor to himself and William $\mathbf{R}$ Taggart, of same place.- -This invention consists in a double walled curb for stones of flouring-mills, the inner wall being provided with opening andiver it to the space between the double walls. Apertures are provided
dell in the top of the curb for the admission of air between the walls of the curb. A tube that connects the space between the walls with an exhaust fan, the object being to provide efficient means for ventilating burr stones, so that the capacity of the stones may be increased and the quality of flour improved.

IMPROVED WATER WHEEL.
Andrew Jamison, Taylorstown, Pa.-This invention consists in a water wheel provided with semi-cylindrical or wedge-shaped buckets, placed in a channel in the midale parts of said wheel. Holes lead from the ring
channel in sadd wheel at the ends of the buckets, out through the ends of the wheel. By this construc'ion the water, as it enters the wheel, impinges upon the buckets, and by its force gives motion to the wheel. At the same time the rapid motion of the wheel keeps the buckets and holes in the lower part of the wheel full of water, so that the wheel will be driven by both the force and the weight of the water.

IMPROVED POST AND PILE DRIVER.
William A. Newton, Pappinville, Mo.-This machine is mounted on Wheels so as to be moved from place to place as desircd. Its standards may which the posts are to be driven is inclined. The standards also serve as ways for the hammer, which may be made in parts securely bolte
so that its weight may be increased or diminished as required.

IMPROVED CAR COUPLING
John B. P. Mohan, Dryden, Minn., assiqnor of one third his right to Thomas D. M. Mohan, of ameme place.-The mode of operation is as follows: The link passes into the drawhead under and against the rear of a lever, lifting the latter against the spring until its recess receives a spring
bolt, which then holds the lever in a horizontal position against the tension of a spring. As soon as the shaft or key is turned sufficiently to forre back the bolt, the spring forces down the rear and up the front end of the lever, thus uncoupling the cars.

IMPROVED CAR AXLE BOX. the u. North Platte, Neb.-This consists in thearrangement vided with split tue a journal box, of a reservoir for containing oil, pro The said tubes communicate with a capsies of holes in the back of brass " or bearing surface of the box through grooves cut in the bras for that purpose. The device also consists in backing the said brass by a IMPROVED CROSS TIE FOR RAILWAYS. Henry S.Wilson, Fernandina, Fla.-This consists of an iron beam havin wide flanges formed on its upper and lower sides, and provided with fixe are, that the cross tie is practically indestructible, and that a track laid pon tics of this description is more durable and less liable to accidents han those laid upon ordinary wooden ties.

## IMPROVED STEAM ROCK DRILL

Joseph C. Githens, New York city.-This rcck drill is so constructed a to avoid the necessity of a large steam chest upon the outeide of the steam
cylinder to enable the drill to be used close to the top of the cutting. The middle part of the piston is made smaller and is surrounded with a sleeve,
the space between the said middle part and the said sleeve serving as a the space between the said middle part and the said sleeve serving as a
steam chest. The steam is introduced through guide pins screwed into steam chcst. The steam is introduced through guide pins screwed int the opposite sides of the cylinder, the inner ends of which enter curved
slots in the sides of the sleeve so that the said sleeve may be turned to admit and exhaust the steam by the longitudinal movement of the piston.

## NEW AGRICULTURAL INVENTIONS.

mproved brush and cane cutter.
Oliver Fickering, Needham, Mass,, assignor to himself and Charles E. Keith, of same place.-This consists in a rerrule provided with the thre hooks, a pivoted button, and a bolt. in combination with the handle, to re-
ceive and hold the skank of the cutter. By this construction the cutter will be held securely in place while in use, and may be readily detached by removing the bolt.

## improved grain separator.

Theophilus Harrison and William C. Buchanan, Belleville, Ill.-From depth and the straw comes to the separator from six inches to three feet in apart by some instrumentality. This is accomplished by rakes mounted on crank shafts, so that they are alternately oscilated and carried forwar over the straw, then down into it and back with it, thus pulling apart the straw at the point of juncture of the sections of the shaker.
improved cranberry separator.
Joseph C. Hinchman, Medford, N. J.-In using this machine, as the berJoseph C. Hinchman, Medford, N. J.-In using this machine, as the ber
ries drop through the space between boards they strike the forward par ries drop through the space between boards they strike the forward part
of the upper side of an upper roller, and the perfect berries bound over the upper edge of the inclined board and pass down from one to another of the Doards until they are received in a box placed beneath the forward lowe part of the case. The perfect berries that were prevented from bounding, and those that struck against the inner side of the board, pass down be-
tween another set of boards to the next roller, where the same operation is repeated, and so on to the last, when the bad berries dropinto a suitable receptacle

## NEW HOUSEHOLD INVENTIONS.

IMPROVED LAMP BURNER.
Charles A. Ferron, Paris, France, assignor to George R. Tuttle, New York city.-This consists of an interior fixed, and an exterior detachable, guide tube ior the wick, to which the air is supplied from the outside hrough the base of the dome, and the iuside through a radial air channe of the conical base, arranged around the stem of the wick-ad justing spur
wheels. The wick is evenly adjusted by intermeshing double spur wheels in connection with flat side aprings of the base part. The upper part of in connection with flat side springs of the base part. The upper part of
the wick is closed, while the lower part is open, the closed part being the wick is closed, while the lower part is open, the closed part being
arrested in its downward motion by a radial top plate or partition of the base section. The chimney, globe, and dome holder are supported on a collar of the base section, and by a guide ring on the outer wick tube.

## IMPROVED LINE FASTENER.

Andrew S. Goodrich, New York city, assignor to himself and Henry oodrich, of same place.-This invention consists of a clothes-line supporter consisting of a supporting plate, which is attached to the window casing cutside of the lower sash, and provided with a flxed horizontal arm, carrying an upright standard and outer hook. On the inclined collar of the standard swings a lever arm that supports the pulley line, the arm be lar, and secured by set-screw in inward or outward position ther

IMPROVED SPICE box
Orvill M. Brock, Monroeton, Pa.-This consists in the combination of a pepper box and salt cellar, the latter being screwed on or otherwise at tached to the former, so that it may be readily detached when salt is used.

## NEW WOODWORKING AND HOUSE AND CARRIAGE

 BUILDING INVENTIONS.
## improved sheet metal roofing.

Henry W. Smith, Waynesburg, O., assignor to himself and Thomas C Snyder, of same place.-This consists in the use of flanged sheets and anchors. The roofng is held securely without driving nails through the
sheets of metal composing the same. The peculiar form of the seam persheets of metal composing the same. The peculiar form of the seam per mits of expansion or contraction without injury to the roof.
improved machine for planing wood. Frederic Godeau, Paris, France, assignor to Pierre Ferdinand Arbey, of same place.-The knife rests on the front bearing or cheek of a lower plate The top plate bears by its front part or face on the knife, and is curved to be raised a short distance above the main part of the knife for the sam purpose of leaving the knife free of pressure at the rear part. The lowe plate is secured by fastening screws passing down through the plate into
the cutter-head, or from below, through the cutter-bead, into the plate The cutter-head, or from below, through the cutter-head, into the plate centsr of the plate, or to the lower plate, as described. For the purpose of sharpening the cutting knives a grinding attachment is arranged at the top of the frame. The side plates of the frame carry a lateral revolving shaft, on which is placed a laterally sliding but axially revolving emery wheel, that is adjusted to the knife to be sharpened by means of a hand lever, connected with suitable mechanism. By moving the lever handle to

## NEW TEXTILE INVENTION.

improved shettle box loom
James Hyde, Stottville, N. Y.-This is an improved fancy loom, so con structed that it may be run at greater speed and at less expense than ordi-
nary fancy looms; and that may be worked without pickers or spindles. The constructioncannot be explained without the aid of detailed drawings, It is, however, exceedingly ingenious, and forms an improvement in weav ingwhich is well worthy of careful examination.

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T. F. D., Jr., will find on p. 315, vol. 29 directions for tempering edge tools. Back numbers of
this journal are sold for 10 cents each. See publishers' this journal are sold for 10 cents each. See publishers'
notice on the second page of this issue.-E. R. does not notice on the second page of this issue.-E. R. does not S. W. H. will End directions for coloring brickwork on pp. 235, 236, vol, 36.-T. P. P. will fnd something on changing the color of the hair on p. 220, vol. 35.-E.
will fnd a recipe for cologne on p. 75, vol. 31.-C. P. G. will ind a full description of the Great Eastern steamship on p. 346, vol. 31.-A. S. will fnd directions for
making crucibles on p. 330, vol. $32 .-$ O. A. P. w1ll fnd making crucibles on p. 330 , vol. $32-\mathrm{O}$. A. P. Whil
directions for recovering tin from tinned plate scrap on directions for recovering tin from tinned plate scrap on
p. 319 , vol. $31 .-\mathrm{F} .1$. J. will find a recipe for a goldplating solution on p. 116, vol. 33.-W. H. H. will tnd
recipe for a silver-plating solution on p. 299, vol. 31.-W C. will fnd a recipe for a stain to imitate black walnut
on p. 90 , vol. $32 .-$ L. G. L. will fnd on p. 379, vol. 31, a ood recipe for a paint for smoke stacks, boilers, etc.. H. B. will find on p.
imitationmarble.-C. M. can drill glass by follow ng imitationmarble.-C. M. can drill glass by follow
ing the directions on p .218 , vol. 31. A cement for fast ening glass to wood is described on p. 143, vol. 33.-E F. M. will fnd a recipe for Vienna bread on p. 185, vol. 33- - N. E. L. will fnd an article on sending the time by
telegraph on p. 358 , vol. 30 . M . G. wiil find directions telegraph on p. 358, vol. 30.-M. G. wiil fnd directions
for ridding fruit trees of insects on p. 200, vol, 36.-G. H. P. will fnd an answer to his query as to the surface lass windows opaque by following the directions on p 264, vol. 30.-E. H. will find something on parhelia and halos on pp. 132, 171, vol. 28.-C. W. B. will find a recipe for a liquid dressing for shoes on p. 107. vol. 36 .
For a recipe for writing fuid, see p. 92 , vol. 33.-S. A. S . will fnd directions for dyeing crimson on p. 235, vol. 36
J . A. will find directions J. A. will fnd directions for mending rubber boots on
p. 203 , vol. $30 .-$ H. J. M. will fnd directions for p. 2203, vol. 30.-H. J. M. will nad directions for makin tions for making rubber hand stamps on p. 156, vol. 31 E. P. willd nd descriptions of emery wheels and their
uses on p. 22, vol. 29.-E. W. will find directions for ridding a house of cockroaches on p. 43, vol. 31. As to
eedbugs, see p. 378, vol. 24.-R. H. M. will find dire bedbugs, see p. 378, vol. 24.-R. H. M. will fnd direc
tions for glazing earthenware on p. 353, vol. 35.-W. H tions for glazing earthenware on p. 353, vol. 35.-W. H.
T. can fasten rubber rollers to their spindles with glue. T. can fasten rubber rollers to their spindles with glue.
For wringing machines, marine glue would be best. See
p. 4 , vol 32 _L L. S. B, will find something on endurance of life in an airtight place on p. 202, vol. 32. To make oxygen, see p. 299, vol. $33 .-\mathrm{L}$. C. will find a recipe for cement for stopping leaks in boilers on p. 202, vol. 34.-
E. H. P. will find a recipe for invisible ink on p. 267, vol E. H. P. will fnd a recipe for invisible ink on p. 267, vol 34.-J. A. T. can calculate the power of his engine by
the rules given on p. 33, vol. 33.-W. C. J. will find diwill find on P 208 , vol 30 a recipe for cement that will Pasten metals to glass.-J. A. McC. can blue his gun
barrels by the process described on p. 123 , vol 31 -J. barrels by the process described on p. 123, vol. 31.-J.
C. K. should trap his moles. See p. 223, vol. 26.-J. R. J. . K. should trap his moles. See p. 223, vol. $26 .-$ or . J . J,
will find directions for making an æolian harp on p . 330 ool. 26.-A. M. N. will find directions for drilling hole solve glass. See p. 203, vol. 33.-C. W. H. will find on p. 171, vol. 36 , a recipe for a cement that will fasten paper to stone or iron.-A. S. will fnd a recipe for wate
proof glue on p. 43, vol. 32 . G. I. M. will find a full de scrption of the East River bridge on p. 99, vol. 35.
(1) A. McG. asks: Why do frost crystals Porm on windows? A. If ice water be introduced into a lass vessel in a warm room, it speedily determines th precipitation of the moisture from the surrounding air, which forms as beads of dew upon the exterior surface
of the vessel. If instead of cold water a mixture of ture will be frozen as it forms into hoar-frost, which is composed of minute crystals of ice. This precipitation and congelation is precisely analogous to that which
takes place upon window panes in cold weather. All rozen water is crystalline
(2) J. R. L. asks: How can I give shirt bosoms he polish and stiffnessobtained by shirt manufacturers A. Rub 1 oz. best potato starch up with a little cold water,
so as to reduce all the lumps; add a tablespoonful of best loaf sugar, an equal quantity of dextrin, a little soluble indigo, and a lump of pure parafin about the
size of a nutmeg. Then add a pint of boiling water, less). The starch should be stroined through a line cloth before using.
(3) D. F. H. asks: What is used on the end do? A. Brass or bone rubber.
(4) J. A. H. asks: 1. In an electromagnet nd size should the core copper wire, of what length wires) be, to give the greatest inductive effect to a secondary coils A. of $73 / 2$ or 8 inches length and $3 / 4$ inch diameter. 2. Which will give the most magnetic power,
a single coil 1 foot in length, or 4 layers 3 inches long, single coil 1 foot in length, or 4 layers 3 inches long,
nd should the iron cores be the same size in each case A. The single coil, with proper battery? 3 . What is the
A. A. The single coil, with proper battery? 3. What is the
rule regulating the proportionate lengths of helices to rule regulating the proportionate lengths of helices to
their diameters and to the diameter of the iron cam? A. About 8 or 10 to 1 is a good proportion. 4. What cale regulates the size of the wire of which the helix i
omposed? A . The wire should be of such size that when flling the proposed space, its resistance abou quals that of the batter
(5) W. S. asks: 1. Please give a description of how a good vibrator is made, and how is it applied
on electrical apparatus? A. Connect one end of the coil of an electromagnet to the armature of the same; the other end, to one pole of a battery; and the opposite
pole of the battery to an adjustable spring against which pole of the battery to an adjustable spring against which
the armature presses when not attracted. The points of ontact of armature and spring should be made of plati-
num. 2. Can you mention a good work on experimenta lectricity and magnetism? A. Read Davis' "Manua
of Magnetism," Pynchon's "Chemical Physics," or
yndalls "Lectures on Electicits"" of Magnetism," Pynchon's "Chem
Tyndall's "Lectures on Electricity."
(6) G. M. F. asks: Will 60 feet silk-covered copper wire, $\frac{1}{1 / 2}$ of an inch in diameter, for the primary
coil, which is 6 inches long, and 1,200 feet of silk-covered copper wire, $\frac{7}{60}$ of an inch in diameter, for the secondary hock? A. Yes
(7) H. F. G. says: 1. I am making a small horizontal steam engine; the cylinder is of brass, cast,
with a 1 inch bore and two inches stroke. How large with a 1 inch bore and two inches stroke. How large
and heavy must I make the balance wheel?
A. Make it 9 inches in diameter, to weigh 4 lbs . 2 . How large must make a boiler of sheet copper, and how much pressure will it stand? How large must I make a boiler of sheet ron, and also what pressure will it stand?
hould be 8 inches diameter and 15 inches high. Copper
hould be ${ }^{3} \frac{3}{3}$ thick, iron $\frac{1}{6}$ thick, for a working pressure should be ${ }_{3}^{3}$ thick, iron $\frac{1}{6}$ thick, for a
of from 50 to 60 lbs. per square inch.
(8) H. P. asks: 1. Would steam at low pressure mingled with compressed air at a higher pressWhat thickness shoul? I make my air tank to stand pressure of 150 lbs ., the diameter being 19 inches? A. About $\frac{5}{5}$, if it is wrought iron.
(9) S. A. H. says: 1. I bought a telegraph ounder having about No. 32 wire onit; and $I$ have made another instrument using No. 18 wire-about 175 feet in
coil. When working it alone, it works well; but when I attempt to work the two instruments together in a short line, I fnd only one of them will work, the one which has the fne wire on it. What is the difflculty? A. The
resistance of the fine wire is too much for the circuit, resistance of the fne wire is too much for the circuit,
both instruments should be wound with the same size wire. 2. Please publion as an insulator in place of the silk covering generally used. A. Shellac and alcohol is sometimes used for the purpose. 3. Can you publish a
process for making hard rubber9
A. See p. 123, vol. 32 .
(10) G. M. G. asks: Has an electromagne more attraction on an armature approaching directly upon it than it has on one approaching in an oblique (11) A. E. T. asks: Of what are the
(11) A. E. T. asks: Of what are the zinc plates made that are used in medical batteries, so that
they do not need to be amalgamated, but can be used untilthey are worn out? I refer to the kind used in ichromate solution. A. A very small amount of merPlease give me details of the zinc before casting, Pease give me details of the process
teel springs A. See pp. 27,363 , vol. 32 .
(12) J. D. J. asks: 1. Is there anything that ill neutralize the attraction of a lodestone? A. Its at fraction can be neutralized bv placing an equal magnetic Has a lodestone ever been used as a light m
(13) D. W. L. asks: 1. Will a small mag neto-electric machine, such as is used for medical pur poses, be sufficient to charge a small magnet? A. No.
2. Has electricity in this form ever been used for teleraphir ${ }^{\prime}$ ? A. Yes.
Is the exhaust steam of
above $212^{\circ}$ Fah. $9^{\text {A. Yes. }}$
(14) A. S. asks: Does it take more time to send one letter by telegraph over a continuous line of
10,000 miles than over a line of 1,000 A. Yes, on
hundred times more.
(15) C. S. M. says: Some time ago I pur hased a second hand galvanic battery; and when I add very slightest current, and that only lasted a few min ates. How can I remedy it? A. We cannot tell you unless you state what the battery is composed of.
(16) J. F. D. asks: Can I run by foot power magneto-electric machine capable of heating a $1 / 2$ inch
(17) W. R. B. says: In maling vinegar, I use a common German generator containing corncob
oaked in vinegar. When I let a stream of cider fow in, the temperature rose to $110^{\circ}$ Fah.; but when it fowed made strong vinegar in this way before, and with the ame apparatus. Can you tell me what is the diffculty A. Add a littlevinegar to the cider and let it ferment a
short time before running through the acetifer; or re turn the liquid to the same, and let it trickle slowly sary.
(18) F. W. J. says: Can you give me a re cipe for a gold wash for watch chains, etc. 9 A. Clean bath of chloride of gold in warm water. Then dip for a moment inte moderately strong solution of copperas,
dry, and polish. Or use an etherial solution of chloride of gold, dry and reduce by contact with hydrogen ga (coal gas will answer) in a tight apartment. Ordip in thegold solution first mentioned, and then in a hot soluon of caustic alkali.
(19) G. S. says: 1. I wish to make a collecton of marine animals, such as sponges, anemones, an um. Which is the best time to commence it, spring o is generally chosen for such collections. 2. Would such nimals live in water mixed with common salt in th ame proportion as salt or sea water? A. Experience has shown that genuine sea water is best. 3. Do you
hink it would improve the health of these animals to have the light of the sun filtered through yellow pape or glass Professor Draper, of New York, says: "The
yellow ray of the sunnlight is that yellow ray of the sunlight is that portion which is the peculiar stimulus of the chemistry of the leaves an plants." I doubt not but that it would have some in
fuence on the polypi, but I would like to have your inion. A. Dim, difused sunlight is best
(20) J. B. H. asks: How can I best make I have a boiler in two parts, and a space between th wo has to be stopped with a $V$-shaped piece of iron. Use a cement made as follows: Cast iron borings 10 lbs red lead 1 lb ., alum $1 / \mathrm{l}$ lb., lime 5 lbs ., sal ammoniac 2
ozs. Dissolve the alum and sal ammoniac in a smal ozs. Dissolve the alum and sal ammoniac in a small
quantity of hot water, and mix in the other ingredients.
(21) J. H. H. asks: Can you give me a recipe for cement with which I can fasten thicknesses of
paper together, which, on application, will cause no enpaper together, which, on application, will cause no enshape or size? A. We do not know of such a prepara-
(22) J. C. C. asks: 1. How can I make stearic acid without an hydraulic press, or the use of costly chemicals? A. It is not practicable. 2. How can
beeswax candles be prevented from guttering? A. Add about 10 per cent of stearic acia to the wax. 3. How is paraffin wax made? A. The mode of obtaining paraffin differs according to its being an educt or product: an product of the dry distillation of brown coal, peat, and brituminous shale. It is usually obtained from petroleum , by distilling the residues after the separation of the lighter oils, with steam at a temperature of from $300^{\circ}$ to $400^{\circ}$. It is separated from the liquid distillate by artififial cold and the centrifugal machine, purifed yy treatment with on of vitriol and steam, and neutral treated in the hydraulic press, as in the preparation of tearic acid.
(23) M. J. B. asks: What is an east and est line? Is it a parallel of latitude or a line running
tright angles to a meridian? A. It is a parallel of latiat right
tude.
(24) E. A. H. says: 1. What is the pressure water freezing in an airtight cy linder? A. A bout 30,000
ibs. per square inch. 2. What is the strength of cast iron nd sheet iron, of $3 / 8$ inch and $3 / 3$ thick respectively, to resistwater pressure? A. Cast iron 18,000 , and sheet
ron 35,000 per square inch. 3. Which plan would be best for ing, a bar 5 feet in length one end not supported, or a 10 feetbarwith both ends supporteds A. There might be而
(25) J. B. O. asks: Is it possible to build an lectro-magnetic engine of one-half horse power? A. It requires a combination of magnets to get continuous work. 3. Will a cast iron magnet answer as w
wrought iron magnet? A. Wrought iron is best.
(26) G. G. says: A little while ago I made a imple telephone, to be used without the electrical cur-
ent. I tried a thin sheet of brass in place of a membrane as a cover to the mouthpiece for receiving and for transmitting the vibrations made by the voice to the connecting line. I found that the brass would not an-
swer. If a sheet of iron or other metal is used, what is wer. If a sheet of iron or other metal is used, what is
the shape, and how is it held in position? A . The transmitting instrument consists of a simple electromagnet in front of which is a tightly stretched membrane of skin; just opposite the poles of the magnet, on the with the former when set in motion by the air. The re eiving instrument is a tubular electromagnet formed of a single helix with an external soft iron case, into is top of which is loosely fitted a light iron plate which
into vibrations by the action of the magnetizing helix. 2. Does it require a circuit to transmit the electrical current? A. Yes. The helices of both elec-
tromagnets are included in one circuit, which may also include a battery.
(27) J. A. T. says: I have an engine $1 \frac{1}{4}$ by 4 nches. What power will it give with a horizontal boiler ery A. Possibly you may realize $1 / 2$ a horse powe
(28) J. A. C. asks: What is the easiest nethod by which a conducting surface can be imparted oo cloth, leather, etc., for the purpose of electro-plating? have tried plumbago, but it will not do for my purpose. . Try the following: Immerse the object ina solation dried, treat with ammonia. After being thoroughly dried, the object should be exposed to the vapor of mer cury, when its surface will become completely metal lized in a few moments; transfer to bath immediately. Great care must be taken not to breathe the mercury
(29) D. C. W. asks: 1 . Which solution in a Bunsen battery requires to be changed, and how often?
A. The nitric acid requires to be changed frst, but the Prequency of change depends upon the work done. The best rule is to change wheneverthe battery becomes too
weak to do the work. 2. How can Imake an electrotype of an autograph A. You must photo-engrave it frst. See p. 2ta, vol. 32 .
(30) F. D. H. asks: If I connect one cell a carion and one cell of a Leclanché battery, for
ither quantity or intensity, doI utilize the entire energy of both, or is there a waste owing to the elements being dissimilarp A. It is a bad plan to connect batteries differing in electro-motive force, for quantity; connected in
series, the resulting electro-motive force is equal to the series, the resulting electro-motive force is equal to the
sum of all the electro-motive forces of the different cells.
(31) C. E. J. says: Inclosed find sample of battery wire. The wires have been in use in an hotel
for two years. About 6 months ago, a portion of the house telegraph ceased working. Upon examination, I ound the battery wire corroded and eaten off; since and in every case same trouble about a dozen the sample. The floor is double, with cement in between. The wires run in a groove cut in the cement; the battery
wire is precisely the same as the room wires, and runs wire is precisely the same as the room wires, and runs
in the same channel. In most cases, the battery wire in the same channel. In most cases, the battery wire
would be in the middle of the other wires; but I צailed would be in the middle of the other wires; but I :ailed
to find that any of the other wires were affected. A. If the wires are in a damp place, the action of the battery probably causes the corrosion. Better use kerite cov-
(32) T. J. L. asks: Is there such a word in he nomenclature of telegraphy as "telehiro " or "tele-
(33) E. W. W. asks: What form of battery will be the best to work a set of alarm bells (four large vibrator on a circuit of about 500 feet length? The main requisites in the battery are to be strength of action

