

The Niagara Railway Suspension 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 examined 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 The portions removed have now been replaced by splicing a new piece to each individual wire under the strain due to the weight of the bridge.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 diminution 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 quality 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.

Recent American and Foreign Patents.

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 graduated 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. This invention is for sale. For terms, etc., address the inventor as above.

IMPROVED BRUSH.

Lewis Uttz, Nora Springs, Iowa.—This consists of a brush head, with a recessed bottom and side lugs, in connection with a broom whisk fastening wire, that is wound around the head and the whisk ends, and retained by lugs and suitable end 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 of larger and smaller numbers by the assistance of mechanical means. It 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 rectangular frame of metal sewed to the mouth of the bag at one side. It 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 provided 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 upon its contents, and the rectangular frame closed over the loose sides of the mouth. The bar having the hooks is closed over all in such a manner as to draw the side against the rectangular frame, and is then hooked to the buckle-shaped 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 eye of the shank end of the hook. The shank end may be threaded and screwed into a screw socket of the handle, the key being also threaded at the end and screwed 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 size of neck of a horse, and which admits the adjustment of the draft on the hame, and the convenient opening and closing of the collar and hame for putting the same on or off the neck.

IMPROVED HEATER.

José Guardiola, Chocóla, Guatemala.—This consists of a heating furnace of new and improved construction, for heating air for drying purposes, and for heating buildings, etc., having an inner and outer cylindrical shell inclosing an annular air space, and a central air pipe and radial pipes, that connects the same with the annular air space, and a firegrate and fireplace. The device also 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 invention 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 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 for 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 bar of the extension.

IMPROVED GLAZIER'S DIAMOND HOLDER.

Jacques E. Karelsen, New York city.—The object is to simplify the construction of glaziers' diamond holders in common use in such a manner that they can be made cheaper, and also so as to take up less room in the pocket. The invention consists of the breaker being secured to the handle directly and in line with the axis of 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. Brown, of same place.—This trace buckle is provided with a swinging 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.

IMPROVED 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 at the same time it keeps the outside of the can free from oil, and the caught oil free from dust.

NEW MECHANICAL AND ENGINEERING INVENTIONS.

IMPROVED ORE SEPARATOR.

William 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 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 upward and discharged with the tailings.

IMPROVED RAILROAD 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 T lever, the locking lever is disengaged, and the notched bar and rails are 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 consists 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 toothed or serrated end to a correspondingly toothed projection or catch of the supporting plate, until the pressure on the tongue is released, and 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 one set extends parallel to the other at an oblique angle to the longitudinal 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 R. Taggart, of same place.—This invention consists in a double walled curb for stones of flouring-mills, the inner wall being provided with openings and deflectors, which receive the air from the interior of the curb, and deliver it to the space between the double walls. Apertures are provided 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 middle parts of said wheel. Holes lead from the ring channel in said wheel at the ends of the buckets, out through the ends of the wheel. By this construction 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 desired. Its standards may be adjusted into a vertical position when the surface of the ground into 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 bolted together, so that its weight may be increased or diminished as required.

IMPROVED CAR COUPLING.

John B. P. Mohan, Dryden, Minn., assignor of one third his right to Thomas D. M. Mohan, of same 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 force 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.

Joseph A. Picard, North Platte, Neb.—This consists in the arrangement, on the upper side of a journal box, of a reservoir for containing oil, provided with split tubes, having screw caps for controlling the flow of oil. The said tubes communicate with a series of holes in the back of the "brass" or bearing surface of the box through grooves cut in the brass for that purpose. The device also consists in backing the said brass by a plate of iron and a heavy sheet of rubber.

IMPROVED CROSS TIE FOR RAILWAYS.

Henry S. Wilson, Fernandina, Fla.—This consists of an iron beam having wide flanges formed on its upper and lower sides, and provided with fixed and removable clips for clamping the rail flange. The advantages claimed are, that the cross tie is practically indestructible, and that a track laid upon ties of this description is more durable and less liable to accidents than those laid upon ordinary wooden ties.

IMPROVED STEAM ROCK DRILL.

Joseph C. Githens, New York city.—This rock drill is so constructed as to avoid the necessity of a large steam chest upon the outside 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 steam chest. The steam is introduced through guide pins screwed into 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.

IMPROVED BRUSH AND CANE CUTTER.

Oliver Fickering, Needham, Mass., assignor to himself and Charles E. Keith, of same place.—This consists in a ferrule provided with the three hooks, a pivoted button, and a bolt, in combination with the handle, to receive and hold the shank 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 thrashers the straw comes to the separator from six inches to three feet in depth, and the shaking packs the straw, so that it requires to be pulled apart by some instrumentality. This is accomplished by rakes mounted on crank shafts, so that they are alternately oscillated and carried forward 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 berries 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 boards until they are received in a box placed beneath the forward lower 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 between another set of boards to the next roller, where the same operation is repeated, and so on to the last, when the bad berries drop into 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 for the wick, to which the air is supplied from the outside through the base of the dome, and the inside through a radial air channel of the conical base, arranged around the stem of the wick-adjusting spur wheels. The wick is evenly adjusted by intermeshing double spur wheels 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 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 Goodrich, of same place.—This invention consists of a clothes-line supporter consisting of a supporting plate, which is attached to the window casing outside of the lower sash, and provided with a fixed 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 being, at the end swinging on the post, inclined in similar manner as the collar, and secured by set-screw in inward or outward position thereon.

IMPROVED SPICE BOX.

Orville M. Brock, Monroeton, Pa.—This consists in the combination of a pepper box and salt cellar, the latter being screwed on or otherwise attached 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 roofing is held securely without driving nails through the sheets of metal composing the same. The peculiar form of the seam permits 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 same purpose of leaving the knife free of pressure at the rear part. The lower plate is secured by fastening screws passing down through the plate into the cutter-head, or from below, through the cutter-head, into the plate. The top plate is secured to the cutter-head by fastening screws near the center 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 either side, the ready following of the revolving emery wheel is caused.

NEW TEXTILE INVENTION.

IMPROVED SHUTTLE BOX LOOM.

James Hyde, Stottville, N. Y.—This is an improved fancy loom, so constructed that it may be run at greater speed and at less expense than ordinary fancy looms; and that may be worked without pickers or spindles. The construction cannot be explained without the aid of detailed drawings. It is, however, exceedingly ingenious, and forms an improvement in weaving which is well worthy of careful examination.

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See Boulton's Paneling, Moulding, and Dovetailing Machine at Centennial, B. 8-55. Send for pamphlet and sample of work. B. C. Machy Co., Battle Creek, Mich.

Notes & Queries

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' notice on the second page of this issue.—E. R. does not send sufficient data as to his boat, engine, and boiler.—S. W. H. will find directions for coloring brickwork on pp. 235, 236, vol. 36.—T. P. P. will find something on changing the color of the hair on p. 220, vol. 35.—E. will find a recipe for cologne on p. 75, vol. 31.—C. P. G. will find a full description of the Great Eastern steamship on p. 346, vol. 31.—A. S. will find directions for making crucibles on p. 330, vol. 32.—O. A. P. will find directions for recovering tin from tinned plate scrap on p. 319, vol. 31.—F. v. J. will find a recipe for a gold-plating solution on p. 116, vol. 33.—W. H. H. will find a recipe for a silver-plating solution on p. 299, vol. 31.—W. C. will find a recipe for a stain to imitate black walnut on p. 90, vol. 32.—L. G. L. will find on p. 379, vol. 31, a good recipe for a paint for smoke stacks, boilers, etc.—J. H. B. will find on p. 130, vol. 35, directions for making imitation marble.—C. M. can drill glass by following the directions on p. 116, vol. 31. A cement for fastening glass to wood is described on p. 143, vol. 33.—E. F. M. will find a recipe for Vienna bread on p. 185, vol. 33.—N. E. L. will find an article on sending the time by telegraph on p. 358, vol. 30.—M. G. will find directions for ridding fruit trees of insects on p. 200, vol. 36.—G. H. P. will find an answer to his query as to the surface of a brake on p. 273, vol. 31.—W. R. W. can make his glass 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 fluid, see p. 92, vol. 33.—S. A. S. will find directions for dyeing crimson on p. 235, vol. 36.—J. A. will find directions for mending rubber boots on p. 203, vol. 30.—H. J. M. will find directions for making potato starch on p. 315, vol. 30.—J. R. will find directions for making rubber hand stamps on p. 156, vol. 31.—E. P. will find 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 bedbugs, see p. 378, vol. 24.—R. H. M. will find directions for glazing earthenware on p. 353, vol. 35.—W. H. T. can fasten rubber rollers to their spindles with glue. For wringing machines, marine glue would be best. See p. 43, vol. 32.—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.—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. 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 directions for removing freckles on p. 187, vol. 32.—J. H. will find on p. 298, vol. 30, a recipe for cement that will fasten metals to glass.—J. A. McC. can blue his gun 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. will find directions for making an eolian harp on p. 330, vol. 26.—A. M. N. will find directions for drilling holes in glass on p. 218, vol. 31. Hydrofluoric acid will dissolve 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 find a recipe for waterproof glue on p. 43, vol. 32.—G. I. M. will find a full description of the East River bridge on p. 99, vol. 35.

(1) A. McG. asks: Why do frost crystals form on windows? A. If ice water be introduced into a glass vessel in a warm room, it speedily determines the 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 pounded ice and salt be introduced, the condensed moisture 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 frozen water is crystalline.

(2) J. R. L. asks: How can I give shirt bosoms the polish and stiffness obtained 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 paraffin about the size of a nutmeg. Then add a pint of boiling water, and boil, with occasional stirring, for half an hour (not less). The starch should be strained through a linen cloth before using.

(3) D. F. H. asks: What is used on the end of magnets to keep the wire in place? Will iron or brass do? A. Brass or bone rubber.

(4) J. A. H. asks: 1. In an electromagnet made of 25 feet of No. 18 copper wire, of what length and size should the core (composed of small soft iron wires) be, to give the greatest inductive effect to a secondary coil? A. Of 7½ or 8 inches length and ¾ inch diameter. 2. Which will give the most magnetic power, a single coil 1 foot in length, or 4 layers 3 inches long, and should the iron cores be the same size in each case? A. The single coil, with proper battery? 3. What is the rule regulating the proportionate lengths of helices to their diameters and to the diameter of the iron core? A. About 8 or 10 to 1 is a good proportion. 4. What rule regulates the size of the wire of which the helix is composed? A. The wire should be of such size that, when filling the proposed space, its resistance about equals that of the battery.

(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 the armature presses when not attracted. The points of contact of armature and spring should be made of platinum. 2. Can you mention a good work on experimental electricity and magnetism? A. Read Davis' "Manual of Magnetism," Pynchon's "Chemical Physics," or Tyndall's "Lectures on Electricity."

(6) G. M. F. asks: Will 60 feet silk-covered copper wire, ¼ of an inch in diameter, for the primary coil, which is 6 inches long, and 1,200 feet of silk-covered copper wire, ⅛ of an inch in diameter, for the secondary coil, give a severe shock? 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 and heavy must I make the balance wheel? A. Make it 9 inches in diameter, to weigh 4 lbs. 2. How large must I make a boiler of sheet copper, and how much pressure will it stand? How large must I make a boiler of sheet iron, and also what pressure will it stand? A. Boiler should be 8 inches diameter and 15 inches high. Copper should be ⅜ thick, iron ½ thick, for a working pressure 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 pressure moisten the air and increase the pressure? A. Yes. 2. What thickness should I make my air tank to stand a pressure of 150 lbs., the diameter being 19 inches? A. About ⅝, if it is wrought iron.

(9) S. A. H. says: 1. I bought a telegraph sounder having about No. 32 wire on it; 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 find only one of them will work, the one which has the fine wire on it. What is the difficulty? A. The resistance of the fine wire is too much for the circuit, both instruments should be wound with the same size wire. 2. Please publish a recipe for a varnish or composition to be used on wire 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 rubber? A. See p. 123, vol. 32.

(10) G. M. G. asks: Has an electromagnet more attraction on an armature approaching directly upon it than it has on one approaching in an oblique direction toward the poles of the magnet? A. Yes.

(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 until they are worn out? I refer to the kind used in a bichromate solution. A. A very small amount of mercury is sometimes put in the molten zinc before casting. Please give me details of the process of tempering steel springs? A. See pp. 27, 363, vol. 32.

(12) J. D. J. asks: 1. Is there anything that will neutralize the attraction of a lodestone? A. Its attraction can be neutralized by placing an equal magnetic force of the same polarity in juxtaposition with it. 2. Has a lodestone ever been used as a light motor power? A. No.

(13) D. W. L. asks: 1. Will a small magneto-electric machine, such as is used for medical purposes, be sufficient to charge a small magnet? A. No. 2. Has electricity in this form ever been used for telegraphy? A. Yes.

Is the exhaust steam of an ordinary engine heated to above 212° Fah.? 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 miles? A. Yes, one hundred times more.

(15) C. S. M. says: Some time ago I purchased a second hand galvanic battery; and when I added the solution and tried to run it, I could only feel the very slightest current, and that only lasted a few minutes. 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 a magneto-electric machine capable of heating a ½ inch steel rod to a red heat? A. No.

(17) W. R. B. says: In making vinegar, I use a common German generator containing corncocks soaked in vinegar. When I let a stream of cider flow in, the temperature rose to 110° Fah.; but when it flowed out at the bottom, it was flat, like warm water. I have made strong vinegar in this way before, and with the same apparatus. Can you tell me what is the difficulty? A. Add a little vinegar to the cider and let it ferment a short time before running through the acetifer; or return the liquid to the same, and let it trickle slowly through it a second time, and even a third time, if necessary.

(18) F. W. J. says: Can you give me a recipe for a gold wash for watch chains, etc.? A. Clean the articles perfectly, and wash them in a strong neutral bath of chloride of gold in warm water. Then dip for a moment into moderately strong solution of copperas, dry, and polish. Or use an ethereal solution of chloride of gold, dry, and reduce by contact with hydrogen gas (coal gas will answer) in a tight apartment. Or dip in the gold solution first mentioned, and then in a hot solution of caustic alkali.

(19) G. S. says: 1. I wish to make a collection of marine animals, such as sponges, anemones, and algae. Which is the best time to commence it, spring or summer? A. We believe the latter part of the summer is generally chosen for such collections. 2. Would such animals live in water mixed with common salt in the same proportion as salt or sea water? A. Experience has shown that genuine sea water is best. 3. Do you think it would improve the health of these animals to have the light of the sun filtered through yellow paper or glass? Professor Draper, of New York, says: "The yellow ray of the sunlight is that portion which is the peculiar stimulus of the chemistry of the leaves and plants." I doubt not but that it would have some influence on the *polypt*, but I would like to have your opinion. A. Dim, diffused sunlight is best.

(20) J. B. H. asks: How can I best make a cement that will stand fire and not wash or crumble out? I have a boiler in two parts, and a space between the two has to be stopped with a V-shaped piece of iron. The cement that I have used dries and crumbles out. A. Use a cement made as follows: Cast iron borings 10 lbs., red lead 1 lb., alum ½ lb., lime 5 lbs., sal ammoniac 2 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 enlargement (expansion or contraction) or alteration in shape or size? A. We do not know of such a preparation.

(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 acid 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 educt as from petroleum, neat-gil, ozokent, etc., and a product of the dry distillation of brown coal, peat, and bituminous 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° to 400°. It is separated from the liquid distillate by artificial cold and the centrifugal machine, purified by treatment with oil of vitriol and steam, and neutralized with lime water. It is then rapidly redistilled, and treated in the hydraulic press, as in the preparation of stearic acid.

(23) M. J. B. asks: What is an east and west line? Is it a parallel of latitude or a line running at right angles to a meridian? A. It is a parallel of latitude.

(24) E. A. H. says: 1. What is the pressure of water freezing in an airtight cylinder? A. About 30,000 lbs. per square inch. 2. What is the strength of cast iron and sheet iron, of ½ inch and ¾ thick respectively, to resist water pressure? A. Cast iron 18,000, and sheet iron 35,000 per square inch. 3. Which plan would be best for strength of resistance to the hammer in riveting, a bar 5 feet in length one end not supported, or a 10 feet bar with both ends supported? A. There might be no difference, if the bars were sufficiently rigid. Steel or wrought iron would answer for the bar.

(25) J. B. O. asks: Is it possible to build an electro-magnetic engine of one-half horse power? A. Yes. 2. If so, what size of magnet will be required? A. It requires a combination of magnets to get continuous work. 3. Will a cast iron magnet answer as well as a wrought iron magnet? A. Wrought iron is best.

(26) G. G. says: A little while ago I made a simple telephone, to be used without the electrical current. 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 answer. 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 membrane, is a small permanent magnet which vibrates with the former when set in motion by the air. The receiving instrument is a tubular electromagnet formed of a single helix with an external soft iron case, into the top of which is loosely fitted a light iron plate which is thrown 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 electromagnets are included in one circuit, which may also include a battery.

(27) J. A. T. says: I have an engine 1¼ by 4 inches. What power will it give with a horizontal boiler 18 inches x 12½ inches with tubes 1½ inches in diameter? A. Possibly you may realize ½ a horse power.

(28) J. A. C. asks: What is the easiest method by which a conducting surface can be imparted to cloth, leather, etc., for the purpose of electro-plating? I have tried plumbago, but it will not do for my purpose. A. Try the following: Immerse the object in a solution of nitrate of silver in wood naphtha. When partially dried, treat with ammonia. After being thoroughly dried, the object should be exposed to the vapor of mercury, when its surface will become completely metallized in a few moments; transfer to bath immediately. Great care must be taken not to breathe the mercury fumes.

(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 first, but the frequency of change depends upon the work done. The best rule is to change whenever the battery becomes too weak to do the work. 2. How can I make an electrolyte of an autograph? A. You must photo-engrave it first. See p. 272, vol. 32.

(30) F. D. H. asks: If I connect one cell of a carbon and one cell of a Leclanché battery, for either quantity or intensity, do I utilize the entire energy of both, or is there a waste owing to the elements being dissimilar? 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 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 found the battery wire corroded and eaten off; since then I have had the same trouble about a dozen times, and in every case was the battery wire eaten off, as in 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 in the same channel. In most cases, the battery wire would be in the middle of the other wires; but I failed 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 covered wire, and be sure the covering is perfect.

(32) T. J. L. asks: Is there such a word in the nomenclature of telegraphy as "telehiro" or "telehier"? A. No.

(33) E. W. W. asks: What form of battery will be the best to work a set of alarm bells (four large gongs and six small gongs) all controlled by one large vibrator on a circuit of about 500 feet length? The main requisites in the battery are to be strength of action