ENGINEERING INVENTIONS.

A muffler to prevent or lessen the disagreeable hissing sound caused by escaping steam has been patented by Mr. Thomas E. Hill, of Rahway, N. J. The invention covers a novel construction, combination and arrangement of parts, whereby the valves will permit the free escape of steam beyond the capacity of the boiler to generate it.

A metallic railway tie has been patented by Mr. Timothy Gleason, of Red Wing, Minn. It is cast or otherwise formed in trough shape, with flat bottom and vertical side pieces, and has cross pieces with a flange through which pass keys for supporting the fish plates, the upper surface of the bottom being formed with a crown, to strengthen the tie and prevent water from standing in it, with other novel features.

A railway crossing alarm has been patented by Mr Sterling P. Van Nort, of Manchester, Mo. All the rails upon either side of each section of the track in connection with which the alarm is arranged are placed in electric communication by means whereby pedestrians, teamsters, etc., will be notified at the crossing of a highway and railroad of the approach of a train, and after its passage the alarm will be automatically stopped.

A boiler tube cleaner has been patented by Mr. Charles F. Bower, of Philadelphia, Pa. A spider with three arms is made integral with a nozzle shell, and a deflecting plate connected to the spider has an external head, while there are means for supplying steam to the nozzle, so that its inclined peripheral face will bear hard against the end edges of the bore of the tube, and steam passing in will strike against the entire inner face of the tube.

AGRICULTURAL INVENTIONS.

A horse rake has been patented by Mr. James Dunkin, of Bridgeport, West Va. This invention covers a novel construction and arrangement of parts for a hay rake and carrier, intended to gather up the hay as it lies in the swath, load it into a carrier till it accumulates sufficiently, then carry it to place of storage and dump it.

A hay drag has been patented by Mr. William B. Null, of Evansville, Mo. It is provided on its main beam with runners, wheels, or supports, and has a supplemental runner, wheel, or support for the outer ends of the drag teeth, the construction being such that the drag can be readily transported from one place to another and may easily pass through gates.

MISCELLANEOUS INVENTIONS.

A loose belt alarm has been patented by Mr. Jacob Paff, of Amboy, Minn. A friction wheel is journaled on the pulley, with its periphery extending beyond that of the pulley, on which an alarm is mounted to be operated by the friction wheel, in such way as to indicate audibly the slipping of the belt.

A thill coupling has been patented by Mr. E. Lanson Dunklee, of Wyalusing, Pa. The invention covers certain novel features, whereby a thill coupling is made practically noiseless, and is very easily adjusted and reliable, not expensive, without danger of disengagement, and has a neat appearance on the running gear of a vehicle.

A fruit jar has been patented by Mr. Robert E. King, of Warrenton, N. C. It has a main or fruit chamber and a supplemental or sirup chamber, the chambers being connected by a contracted channel or opening, so the fruit will be prevented from passing into the sirup chamber, while the sirup may pass into the fruit chamber.

A pipe connection has been patented by Messrs. William E. Jones and Harry Winniatt, of El Paso, Texas. The invention consists of two pipe heads fastened together and turning on a spring bolt, with a packing placed between the pipe heads to prevent leakage, to permit swinging several connected pipe sections at angles to each other.

A gas lamp has been patented by Mr. Gustave H. Ulmann, of Paris, France. This invention provides a cylindrical regenerating chamber, with air inlets, and a series of conical tubes, for the escape of the products of combustion, whereby the air will be mixed with the gas in a way designed to produce a white and brilliant light, with a minimum consumption of gas.

A clothes line has been patented by Mr. James Cavanagh, of New York City. Combined with two pulleys attached to a window frame and a pulley attached to a post is a line passed over all the pulleys, to form specified angles and an open loop connection, whereby two full length lines are made available, and any slack can be easily taken up.

A holdback iron for wagon tongues has been patented by Mr. Augustus Smith, of Laurin, Montana Ter. The invention covers a novel construction of a device for the ends of wagon tongues, which will prevent the neck yoke from escaping in case of accident to the harness, the yoke being easily removable when desired.

A vehicle wheel has been patented by Mr. William C. Hodnett, of Douglasville, Ga. It is composed of a tire made of two semicircular pieces of metal, spokes, and a central metal sectional hub, the semicircular sections of tire being connected by splice plates and bolts, and the spokes being easily removable from their sockets, with other novel features.

An apparatus for drying malt has been patented by Mr. William S. Plummer, of Rochester, N. Y. It consists of a revolving drying floor, twenty to forty feet in diameter, suitably supported, with a series of movable or adjustable wickets, provisions for the forcible application of heated air and for the discharge of the malt, with other novel features.

A drag saw support and guide has been patented by Mr. John R. Van Winkle, of Aberdeen, Washington Ter. It is a roller support, with a main bar made in two jointed sections, a clamping device at the joint, one section having dogs for attachment to a log and the other carrying a support and guide for the back of a saw blade, making a simple device for facilitating the undercutting of logs.

A cartridge extracting implement has been patented by Mr. Clarence R. Hart, of Sioux City, Iowa. It consists in a pair of jaws pivoted to a bowed spring and having a ratchet bar and catch for holding them in position, making a combination tool in which the jaws are adapted at one end to receive the flanged end of a cartridge and at the opposite end to act as tweezers for handling small objects.

A whiffletree coupling has been patented by Mr. Albert Hensser, of Taylor, Nevada. The invention covers certain novel features of construction and combination of parts for a coupling calculated to be strong, durable, cheap, and effective, and adapted also to be used in coupling bolsters to head blocks of vehicle running gear, and for other purposes where a strong, non-rocking, pivoted connection is required.

A thread guard for cap spinning and twisting machines has been patented by Mr. Leedham Binns, of Philadelphia, Pa. The guards are made of partly circular form at their backs, and peculiar shape at their front edges, where they are made to interlock with one another, with other novel features, the design being to prevent the several yarns from interfering or entangling with each other when being spun and twisted.

A machine for splicing wire hoops for barrels, etc., has been patented by Mr. James H. Bard, of Jackson, Tenn. This invention covers novel constructions and combinations of mechanism, in which the ends of the wire are made with a lock that consists of a bend and a coil of the extremities of the wire loosely fitting upon each side of the bend, with or without a space between the two coils for a spacing sleeve or wedge.

Business and Personal.

The charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information, and not for publication.
References to former articles or answers should give date of paper and page or number of question.
Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all, either by letter or in this department, each must take his turn.
Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.
Scientific American Supplements referred to may be had at the office. Price 10 cents each.
Books referred to promptly supplied on receipt of price.
Minerals sent for examination should be distinctly marked or labeled.

(1) L. L. & X. ask: 1. In the Atlantic cable, how is the circuit completed? A. By ground circuit, a condenser being used at one or both ends. 2. How is a break in the cable detected, and how located? A. If a fault in insulation, by determining the resistance and comparing it with that of the whole cable; if a breakage in the conducting wire, by determining the electrostatic capacity as compared with that of the entire cable. Either of these comparisons fixes the point.

(2) W. B. B. asks: 1. Can I electrify my body so that on shaking hands with some person, it will produce a shock if a circuit is formed with a chloride of silver battery, as described in SUPPLEMENT, No. 157? A. By using an induction coil or a spark coil you can arrange a wire circuit so as to shock as described. 2. Could I work a set of telegraph instruments a half mile or less? How many will it take on each end? A. Five or six chloride of silver cells would work a half mile telegraph line. This number at each end would give an excellent working current.

(3) A. M. S. asks for the process of liquefying nitrous oxide gas and oxygen gas so as to compress 100 gallons into cylinders, as it is put up for dental use and oxygen treatment. A. Nitrous oxide is liquefied by pressure. It is pumped into cylinders until the pressure reaches about fifty atmospheres, when it liquefies and continues to do so as long as it is pumped in. Oxygen cannot be liquefied except by special processes, such as Cailletet's or Pictet's. It is used in the oxygen treatment from cylinders into which it is pumped under heavy pressure, but in which it never leaves the gaseous form. The apparatus can be bought from dealers in scientific apparatus.

(4) E. McD. asks: How can I prepare a liquid such as is used in grenades, etc., for extinguishing fires, to be used with a hand force pump? A. The liquid consists of sodium chloride, ammonium chloride, and hydrochloric acid dissolved in water with the addition of potassium carbonate, and subsequently sodium bicarbonate, and last of all a little free crystallized tartaric acid. See the answer given to query 7 in SCIENTIFIC AMERICAN for February 7, 1885, also recipes in Spons' "Workshop Receipts," second series, which we can send you for $2.00, post paid.

(5) F. A. B. writes: In hardening our goods, we have been using iron pots to hold the lead in which we bring the articles to a hardening heat. The result is that the iron pots will only stand the necessarily intense heat for a few days, then give way in the bottom, and the lead runs into the fire. Can you tell us of any material that will be durable, of which to have our pots made? Say size 12 inches by 8 inches by 4 inches. Would a crucible work well, and if so, how could it be best supported in the fire? A. A plumbago crucible resting upon a fire brick will be durable. We recommend an oval or round shape, with slightly rounded bottom. Set these on three fire bricks standing on end, which will give support and prevent too strong fire on the bottom.

(6) W. J. D. asks: What is the difference between a tornado and a cyclone, and from what authorities? A. The word tornado is used to indicate any wind of extreme violence, from 90 to 120 miles an hour. The word cyclone is properly used to denote whirlwinds, which in the northern hemisphere rotate in direction opposed to that of the hands of a watch. The Cyclopedias, Haswell, and Ganot all speak of the subject.

(7) G. H. McC. asks: 1. What is the copper colored paint used to paint the bottoms and water lines of fresh water yachts and vessels? A. Essentially it is oxide of copper with tar and a solvent. The composition is a secret. 2. Will it get soft under water? A. No. 3. Is there any way to prevent weeds and moss from growing on the bottoms of small yachts? A. Use verdigris or approved copper paint, or coat with bronze powder and copal varnish.

(8) J. P. asks: Can a locomotive start a greater weight than itself, on the track, providing there is no play between the couplings? A. The power of a locomotive is largely in excess of the requirement of starting a given load, of many times its own weight, by a dead pull. The play of the couplings only becomes of value in excessively heavy and long trains. The engine's hold on the rails depends on sliding friction. The resistance of the cars outside of inertia depends principally on rolling friction. The latter is far less for a given weight than is the first.

(9) G. B. T. asks why, in listening to an echo, one can only hear the last part of a sentence. A. The last words of the speaker drown the echo of the first words, which is returning while one is speaking. Daniell's Physics treats the kinetic theory very thoroughly. We mail it for $4.

(10) S. S. S. asks (to decide a bet) the proper door to open and the door to shut, after lighting the fire, to insure proper draught and combustion, in starting a fire in the furnace of a regular heating boiler. A. The question is one which cannot be fully

answered by simply saying one or the other, or by a yes or no, as is sometimes the case in a question on which a wager is pending. Such disputes usually arise from a misunderstanding, or a difference in statement of the terms, rather than in a variance of opinion as the actual question at issue. Fires are started both ways, with the ash pit door or with the furnace door open, according as the fire is laid, the attention to be given it and the time. Ordinarily a fire under a boiler should, if possible, be lighted on top of the kindling material, so that the first combustion shall be perfect to start the draught. The top door should be open that the fresh air may reach the flame and prevent dense smoke. When the kindling wood is well on fire, open the lower door a little way to clear the smoke from the ash pit and establish a draught through the grating. Then put on coal and shut the upper door, opening the lower door enough to keep the fire bright. With a little management in this way a fire may be started under a house heating boiler without filling the house with smoke. In starting a fire under the grate, with the ash pit door open, the fuel must be more carefully laid to insure a draught to start with, and the intial progress is then frequently accompanied with puffs of smoke.

(11) H. R. F. asks what chemicals, if there are any, will separate tannic acid from gelatine, also what will dissolve common tanned leather? A. It is one of the first illustrations frequently employed in the study of chemistry, that tannic acid and gelatine make a chemical, and not a mechanical, compound, and become an insoluble one. The gelatine and tannic acid cannot be recovered back from such compound; nor can tannic acid, fibrine, and gelatine, of which tanned leather is made, be ever brought back to their orignal condition after being once made into leather. There are some adherents in Germany of a theory that tanning is a mechanical and not a chemical combination, but it has never been proved. A great difficulty with the subject lies in the fact that there is much difference in the action and power of combination of the tannins obtained from different substances, for reasons which are not understood; the tannin from gambier, valonia, sumac, etc., can be washed out of a skin to a certain extent in a way which cannot be accomplished when the tanning is done with oak or hemlock bark.

(12) R. G. P. asks how many Grenet batteries it will take to run a boat 20 ft. long by 4 ft. 4 in. beam, and 21 in. deep, and how many miles an hour. A. About 3,000 ordinary sized Grenet cells would be required to develop a speed of 6 to 7 miles an hour. If you want to use batteries, you need special large sized low-resistance cells, and of these far fewer would be needed, say 350 cells.

(13) T. E. writes: We have a barge sunken; her decks are tight, but 24 feet below the surface of the river. In pumping her out, please tell me which will require least power—to pump the water above the decks, and discharge it 23 feet below the surface, or to pump it above the surface of the river? A. The same power will be required, assuming the water to be discharged exactly at the surface level in the second case supposed. If discharged above the surface, the extra height represents extra power.

(14) L. L. asks how frozen glue is made, such as is used by leather manufacturers. A. Frozen glue is what its name denotes. The glue while gelatinous is sliced, placed on nets and allowed to freeze by natural cold. Of course the process can only be conducted in cold weather. The product is porous and much more bulky than hard glue, but is a better article, as it dissolves more easily. It sells largely in New England, where it is preferred by buyers to the hard glue.

(15) J. H. P. asks: 1. The kind of iron and the mixture for making malleable iron. A. No. 5 and 6 iron mixed, or scrap and No. 6. 2. The best kind of scale to put in the annealing cans, and how long should it take to anneal a round piece, say one-half inch thick. A. Forge scales or pulverized hematite, anneal 4 to 6 days at red heat. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 399, "Malleable Iron Castings."

(16) M. E. P., Kentucky, asks: Is there any means of patching or resilvering mirrors, which I could do at home? A. Clean the bare portion of the glass by rubbing it gently with fine cotton, taking care to remove any trace of dust or grease. If this cleaning be not done very carefully, defects will appear around the place repaired. With the point of your knife cut upon the back of another looking-glass around a portion of the silvering of the required form, but a little larger. Upon it place a small drop of mercury; a drop the size of a pin's head will be sufficient for a surface equal to the size of the nail. The mercury spreads immediately, penetrates the amalgam to where it was cut off with the knife, and the required piece may now be lifted and removed to the place to be repaired. This is the most difficult part of the operation. Then press lightly the renewed portion with cotton; it hardens almost immediately, and the glass presents the same appearance as a new one.

(17) G. H. W., Waterville, Me., asks: 1. How can I remove tincture of iron stain from a cotton fabric, and indelible ink stain from linen? A. Use dilute hydrochloric acid in order to remove the iron stain, and javelle water or some of the hypochlorites for the ink stain. See "Table for Removal of Stains and Grease Spots," in SCIENTIFIC AMERICAN SUPPLEMENT, No. 158.

(18) W. G. McC., Lake Forest, Ill., asks how to make a white ink. A. For writing on black or dark paper, use the finest or lightest zinc or white lead in a weak solution of gum arabic or dextrine. For writing on blue paper, tinted with ultramarine, use a solution of oxalic acid.

(19) A. M., Lowell, Mass., wants the manner or process of curling feathers worn on ladies' bonnets. A. When the curl has come out by washing the feather or getting it damp, place a hot flat iron so that you can hold the feather just above it while curling. Take a bone or silver knife, and draw the fibers of the feather between the thumb and the dull edge of the knife, taking not more than three fibers at a time, beginning at the point of the feather and curling one-half the other way. The hot iron makes the curl more durable.

(20) A. C. M. asks: Will two cells of Grenet battery (size of zincs 2⅛ by 4¾ in.) have sufficient power to run a one candle power electric lamp? A. Four cells would be necessary to give satisfactory results.

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