ENGINEERING INVENTIONS.

A fascine for the protection of harbors has been patented by Mr. Jacob Elmer, of Biloxi, Miss. It consists of a tubular body made of saplings bound together and filled with stones, the diameter of the fascine to be from one to three feet, and its length from ten to forty feet, for the protection of harbors and banks of rivers and filling of crevasses.

A spark arrester has been patented by Mr. James N. Weaver, of Sayre, Pa. This invention covers improvements on a former patent issued to the same inventor, and includes certain means whereby cinders or dirt are prevented from being drawn into the valves or cylinders, an even draught on the fire is secured, and an increased length of smoke stack within a given space is obtained, with other novel features.

A car coupling has been patented by Mr. Patrick Ryan, of Guelph, Ontario, Canada. The drawhead has a pivoted coupling hook, with a transverse bar under connected with a bar having the outer end pivoted to the car, and the inner end pivoted to the transverse bar, the inner end of the pivoted bar being connected with a spring for pulling or pressing it upward, and pressing the coupling hook up into the drawhead.

A steam boiler has been patented by Mr. William F. Hatcher, of Chariton, Iowa. This invention relates to improvements in boilers designed to heat houses, the boiler being cylindrical, with an inner concentric shell extending from the bottom of the cylinder to the crown sheet, and extending across the shell at its upper end, thus forming a continuous cylindrical waterspace closed at the bottom and opening at its upper end into the steam and water space, and keeping up a constant water circulation.

MECHANICAL INVENTIONS.

A bench hook has been patented by Mr. James McVane, of Boston, Mass. It is constructed with two bolts held to slide vertically on a plate, the bolts having their lower ends pivoted to the ends of a lever pivoted on the plate, whereby one bolt will be raised when the other is lowered; the bolts can be locked in place by a latch, and the hook can be used for holding planks on the bench flat or edgewise.

AGRICULTURAL INVENTIONS.

A grain sower has been patented by Mr. John B. Wright, of Ridge's Creek, N. C. This invention covers a combination of harrow with pivoted beam, supplemental beam pivoted thereto, and carrying the driving wheel, lifting handle, catch and cord, semicircular hopper, with other novel features of construction.

A plow cleaner for sulky cultivators has been patented by Mr. Charles E. Ridley, of Mapleton, Iowa. A scraper is connected with the plow beam, the arched axle, and the coupling sleeve of the cultivator by bars so arranged that the partial revolution of the sleeve will move the scraper downward and the plow beam and plow plate upward, with other novel features.

A combined cotton cultivator and chopper has been patented by Mr. James W. Roberts, of Moody, Mo. A frame is mounted on wheels, with an axle, and carrying standards and beams connected with the frame by hooks and staples, and by levers for scraping and plowing the plants, with other novel features of construction, to facilitate the cultivation of cotton, and promote convenience in controlling the machine.

A novel quilting machine has recently been patented by Mr. Evans Wood, of Lyons Station, Texas. Combined with a needle frame adapted to carry a series of needles are a feed plate, eccentric shaft, rock shaft, and various special features of construction, it being designed to operate the machine at the rear of a cotton condenser of a cotton gin, so that the thick bat of cotton as it issues from the condenser may be fed between the upper and lower webs of cloth used for making the quilt.

MISCELLANEOUS INVENTIONS.

Improved neck wear is the subject of a patent issued to Mr. Howard Selvage, of Brooklyn, N. Y. The invention consists of a neck wear shield with a diagonal or oblique edge, a pin projecting from the edge adapted to hold the free end of the neck band.

A moistening case for cigars has been patented by Mr. Charles N. Swift, of New York city. The invention covers a tobacco case, with a removable perforated bottom, and a removable moistening tray, sliding beneath said bottom, so the cigars can be kept moist by the moisture in the tray.

A grain cutting machine has been patented by Mr. John B. Frost, of Cuyahoga Falls, O. Combined with a revolving hollow feeding drum, with apertures through the rim, is a reversely revolving cutter drum, with cutters and gauges, and various novel features of construction and arrangement.

An earth scraper has been patented by Mr. David Harper, of Jonesborough, Ark. The scraper bowl has a point at one side of its forward end, and the forward edge of its bottom slanting rearward from this point to the opposite side of the scraper bowl, the lower side corners of the scraper being grooved.

A pillow sham holder has been patented by Mr. Jonathan A. Pierce, of Austin, Minn. This invention provides a simple and inexpensive device for holding pillow shams in place over the pillows of a bed, and for holding the shams in raised position while the bed is in use, or when being made up for the day.

A cuff retainer has been patented by Agnes L. Franklin, of Frankfort, Ky. This invention consists of a pointed stud attached to the sleeve button, and capable of engaging the edge of the sleeve under which the cuff is worn, the object being to provide a simple and convenient device for retaining cuffs in place upon the wrist.

A middlings purifier has been patented by Mr. David L. Ellis, of Brookville, Pa. This invention consists in certain novel features of construction in the grading reel, in the screens, in the arrangement of the air passages, in order to give a machine of large capacity on little floor space, and save grading machines, spouting, and other now needed appurtenances.

An automatic register for grain, feed, and other substances has been patented by Mr. John Wherry, Jr., of of Putnam, Ill. This invention is to improve registers formerly patented by the same inventor, and by novel features of construction renders the meter less liable to become choked or clogged, and consequently more reliable in operation.

A shaft buckle for harness has been patented by Mr. Felix A. Bennett, of Prather, Ind. It is a device for single harness contrived to be hitched in the trace and buckled around the shafts in a manner to provide simpler and more substantial means for connecting the shafts, traces, back strap, and belly band than is afforded by other means now in use.

An adjustable desk and seat has been patented by Mr. Herman W. Groehl, of Vincennes, Ind. This invention covers peculiarities of construction whereby school seats and desks, office desks, etc., can be adjusted higher or lower, as desired, and locked in position, the seat being adjusted independently of the desk, and the desk independently of the seat.

A stop watch has been patented by Mr. Samuel C. Scott, of Brooklyn, N. Y. The invention consists in an adjustable hollow arbor, attached to or a part of the arm of the lever for operating the chronograph mechanism of a watch movement, the arbor to receive the square winding arbor of the watch, the shoulder of which winding arbor operates the said lever.

A hand power lifting and force pump has been patented by Mr. Olof Patterson, of New Boston, Ill. This invention covers a novel construction to facilitate the raising of water from any depth, with a minimum of power, and to reduce the wear on the working parts and the amount of attention necessary for keeping an efficient pump in order.

A saddle for horse collars has been patented by Mr. Christopher G. Calo, of Newark, N. J. The invention consists in a saddle constructed to fit upon the top of a horse collar, with side loops to receive thill or tug straps, so the thills or tugs can be supported from the collar, and with other novel features to simplify the construction and cheapen the manufacture of harness.

A garbage separator has been patented by Mr. George T. Waldeck, of New York city. The invention provides a reciprocating screen with a chute, a water tank with a chute, and drums journaled in the tank, an elevator belt, and operating devices, constituting an apparatus for separating ashes, cinders, and other powdered refuse from bones, rags, and coarse garbage.

An ear guard has been patented by Mr. William T. King, of Grand Rapids, Wis. The invention covers a combination of plug to fit into the ear, a pad to rest on the face, braces, and a spring hook, to protect the ear from being injured by loud and sudden sounds, such as the firing of artillery and the noise of mills, as well as to protect the ear from wind or cold, from insects, etc.

A car heater has been patented by Mr. Richard H. Brown, of Omaha, Neb. In combination with a stove extending above and below the car floor, there is a tank below the floor and a coil within the stove connected with the tank, with other arrangements for making a low pressure steam heater, designed to prove more efficient and safer than heaters now in use.

A carpet stretcher has been patented by Mr. William Hill, Jr., of Limestone, N. Y. The stretcher has a toothed head pivoted to a lever, in combination with a pivoted bar, having a pivoted dog, and other novel features, so the operator may fasten the stretcher with the carpet held in position and tack down the carpet leisurely before proceeding to stretch a second piece.

A carpet stretcher has been patented by Mr. Charles A. Cooper, of Chicago, Ill. The invention consists in a metal plate or drag with teeth at one end, the other end being connected by a loop with a slotted lever, a curved projecting from the plate on the opposite side from the teeth; the teeth enter the carpet from the under side, and therefore cannot injure the face of the carpet.

A process of moulding plastic substances has been patented by Mr. Chester A. Weller, of New York city. This invention provides a specially contrived press for moulding clay, artificial stone, etc., having a cylinder with an opening in its bottom, a spindle carrying screw blades journaled therein, a sliding platform under the cylinder, a mould plate hinged to the platform, with other novel features.

A sleigh knee has been patented by Mr. Laurent Jacques, of Lake Linden, Mich. Combined with a sleigh knee or leg are hook rods held in grooves in the side of the leg end, passed through the cross piece and having nuts screwed on the upper ends; rods projecting upward from the runner pass through longitudinal grooves in the front and rear sides of the leg and through the cross piece.

An earth scraper has been patented by Mr. William H. C. Goode, of Sidney, O. By this invention about one-half the material of the ordinary back plate is saved by carving up the rear end of the bottom along the curved rear edges of the sides, and the back is thus made curved from bottom to top without the necessity of forming the sides in separate pieces from the bottom.

A combined rule and square has been patented by Mr. George D. Umland, of Osceola Mills, Wis. The invention consists in attaching to or forming on the end of the jointed rule a metallic abutment block, which, when the outer section is folded inward, laps over the knuckle joint at the middle of the rule, and forms a stop, against which the other section of the abuts when it is exactly at right angles.

A transmitter for telephone time systems has been patented by Mr. Charles W. Ruehle, of Detroit, Mich. The invention consists in combining with a clock movement a circuit controlling apparatus to send electric signals at one second intervals, an intermitting device for discontinuing them at fixed periods, and stopping and starting mechanism for determining time of sending signals and limiting their duration.

A side spring carriage has been patented by Mr. Antipas P. Marshall, of Lancaster, N. H. By this invention the springs have their ends extended or spread out laterally relatively to the main portions of the springs, and the links are of correspondingly increased width, with shackles to conform, thereby giving bearings of increased width, to prevent side spring carriages from swaying or swinging sidewise.

A device for casting printers' leads has been patented by Mr. Arthur H. McClure, of Buffalo, N. Y. The invention covers a simple hand apparatus, in which two frames are hinged together, with plates on their inner faces, one of which is adjustable, to make leads of different sizes required, whereby printers may conveniently use old leads or type metal to recast into new sizes of leads as they require them.

A lifting jack has been patented by Mr. John W. Clarke, of Hallowell, Me. With an adjustable or extension standard is combined a lever for operating the lifting block, and straps or cords in adjustable connection with the lever and block, making a double adjustment, giving great lifting power with little weight, and the construction admitting of the jack being used from either the front or back of a carriage wheel.

A sun dial has been patented by Mr. Hugh G. Christian, of Chagrin Falls, O. This invention combines two half ring dials with longitudinal lines and transverse slightly curved lines, with two balls, the dials being supported on pivots, and having means for adjusting them for different latitudes, one scale and one dial being for each half of the year, and the dial being calculated to give the time by five-minute marks.

A permutation padlock has been patented by Messrs. Charles E. and Albert G. Smith, of Washington, Ga. By this invention the sliding bolt is provided with a thumb piece projecting through the case for operating it, there are oppositely revolvable disks with recesses in their adjacent peripheral edges, so when brought into alignment with each other and the bolt, the bolt may be thrown or retracted, with other novel features.

A lifting jack has been patented by Mr. Gardner Hunting, Jr., of East Hampden, Me. An axle support is connected with a standard by pivoted links and levers, the lower ends of connecting bars being pivoted to the latter, the bars having their upper ends pivoted on the axle support, so the support will be raised and locked in place by swinging the lever down against the standard, thus making a simple, light, and strong jack, without screws, catches, or springs.

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.

Name 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 mail, each must take his turn.

Special Information requests on matters of personal rather than general interest, and requests for **Prompt Answers by Letter**, should be accompanied with remittance of $1 to $5, according to the subject, as we cannot be expected to perform such service without remuneration.

Scientific American Supplements referred to may be had at the office. Price 10 cents each.

Minerals sent for examination should be distinctly marked or labeled.

(1) G. W. C. asks how to make a copying pad for copying letters. A. A recent formula for this purpose is the following:

Good ordinary glue	100 parts.
Glycerine	50 "
Barium sulphate (finely powdered)	25 "
Water	3 75 "

(2) D. W.—The use of diluted salt water is regarded as a most excellent tonic for the eyes; as to whether its use will permit the laying aside of glasses is a consideration which depends upon so many circumstances that we cannot answer it. Certainly, however, it can be said that, if the glasses are worn for weak eyes, quite likely they may be given up.

(3) E. A. K. asks if there is any kind of sheet iron or steel which will stand the heat of molten cast iron better than wrought iron. A. There is none.

(4) F. Q. asks the temperature of an egg to hatch. A. The temperature in incubators is steadily maintained at 102° to 104° Fah.

(5) E. J. K.—To soften paint brushes that have become hard, soak them twenty-four hours in raw linseed oil, and rinse them out in hot turpentine, repeating the process till clean; or wash them in hot soda and water and soft soap.

(6) P. O. D. asks if there is an instrument or liquid that, by placing on the ground, will indicate where are mineral substances, such as iron, silver, or any mineral. A. There is no satisfactory method of determining mineral deposits except by having an examination by an expert mining engineer. The compass will indicate the presence of iron, but unless used by a competent individual would be unsatisfactory.

(7) M. E. E. writes: I am anxious to learn how to preserve natural flowers. Could you give me the process in this way? A. Dip the flowers in melted paraffine, withdrawing them quickly. The liquid should be only just hot enough to maintain its fluidity, and the flowers should be dipped one at a time, held by the stalks and moved about for an instant to get rid of the bubbles. Fresh cut flowers, free from moisture, make excellent specimens in this way.

(8) J. T. V. asks: What is Crême d'Argent? Please give formula. Would its application to stamp mill copper plates be advantageous before the first application of quicksilver, and prevent the rising of the oxide of copper through the quicksilver? A. Crême d'Argent is silver cyanide. Its application is to produce a silver coating in Hamerton's positive process of engraving or etching. We think it would be too expensive for your purpose.

(9) J. P. W. asks in what book he can get information concerning the method of analyzing phosphates and other commercial fertilizers. A. This information can readily be obtained from any text-book on analytical chemistry, such as Fresenius' Hand-Book of Quantitative Analysis or Cairns' Manual of Quantitative Analysis.

(10) B. B. S. writes: Will you please let me know if there is some cheaper copying process than the electric pen that will do good work? I wish something for examination papers in school, so I can take impressions from same. A. Use the hektograph, described in our SUPPLEMENT, No. 443.

(11) C. N. L. asks if there is any sulphurous odor at or near the locality where lightning strikes. A. There is an odor of ozone. There might be a sulphurous odor if the lightning should strike anything containing sulphur.

(12) J. B. asks if paper pulp can be run into moulds, and if it can be hardened, and to what extent, if so. A. It can be pressed into moulds, and if mixed with size will become hard when dry. Clay is sometimes added to the pulp.

(13) J. W.—We think the process you refer to is not nickel plating, but tinning. The knives are first thoroughly cleaned, then brushed with soldering fluid, then dipped in a bath of melted tin. The tin is covered with wax or tallow to prevent oxidation. We know of no practicable process of nickel plating without a battery.

(14) W. L.—London cement, for mending broken glassware, china, ivory, etc., is prepared by boiling Gloucester cheese three times in water, each time allowing the water to evaporate, and taking the paste thus left and thoroughly incorporating it with dry quicklime. It will mend glass, wood, china, etc., very effectually.

(15) T. L. G. says: I have heard stated that four persons could lift a heavy man from the floor without the least effort, by taking together a long, deep breath and putting their forefingers under the one to be lifted at the same time. If true, how can it be explained? A. If each of the four persons is able to lift one-fourth of the weight with his forefinger, there is no reason why four persons together could not lift the entire weight. There is nothing mysterious about it.

(16) C. C.—Coning the wheels is intended to prevent most or all of the sliding of wheels on average curves. If the curve and wheels are adapted to each other, there will be no slip.

(17) W. J. L. asks: What is a non-conductor to magnetism? I have tried a number of metals, but have not been successful; but I find loadstone will not attract brass, but it will attract through it. A. An insulator of magnetism has long been sought, but never found.

(18) E M.—Siemens said that electrical engineering is simply an adjunct of mechanical or civil engineering. As a profession, apart from these, it would hardly be desirable. You can take a course at one or the other of our technical schools, or you can gain the practical part by engaging yourself in some branch of manufacture, or both.

(19) I. W. R.—Probably the readiest way to blacken the inner surface of your telescope is to mix lampblack with very thin shellac varnish and apply with a small sponge on a stick. Use a liberal quantity of lampblack and very little shellac. Try your varnish on a piece of metal before applying it to your tube.

(20) W. M. C. asks: Will a ship sink to the bottom of the sea, the depth being 5 miles, and the reason? A. If it would sink at all, it would go to the bottom. The reason is that water is practically incompressible, and a given bulk of water at the bottom of the ocean weighs scarcely more than the same bulk at the surface; and any body having greater weight than the water can as easily displace its bulk of water at the bottom of the ocean as at the top.

(21) T. D. M.—We think your method of destroying weeds, etc., by means of a heated roller would be impracticable, as earth is a very poor conductor of heat, and you would require not only a very hot roller but a very slow movement.

(22) W. R. C.—We cannot suggest a remedy for your difficulty without knowing more about the construction. Are the magnets strong? Have you used fine wire on your bobbins? Are your pole extensions very near the diaphragms? Is your fence wire perfect throughout, or is there a break or a bad joint somewhere?

(23) R. J. O'R. asks the present condition of the Hudson River Tunnel. A. On the New York side one tunnel has been built about 200 feet, through the bulkhead of the pier. On the New Jersey side one tunnel has been built 1,600 feet and another 600 feet. There is no work now being done, construction having been stopped for about a year from want of funds.

(24) J. D. G. asks a simple rule to determine the amount of condensation per square foot of surface on steam pipes of different thickness and temperature. A. We do not know of any simple rule such as asked for, but the following is the result of experiment. Steam pipes used for heating a room and maintaining a temperature of 60°, with good circulation, will condense 0·357 pound of steam per square foot of surface, each hour; a coil under similar conditions will condense 0 29 pound of steam.

(25) P. W. W. asks: Would not a lathe in which the slide rest is made to travel by means of a rack and pinion, cut a perfect screw? A. Certainly, only have a rack and pinion without backlash, and easily reversible. The method is not impracticable, nor is it new.

(26) W. R. P. writes: Will you please give me the best formula for making ink for copying pad? A. Try the following: Dissolve one part methyl violet in seven parts distilled water on the water bath, and add, when cool, two parts of glycerine.

(27) J. W. writes: I wish to learn how to make the bluing used by washwomen and sold by all the grocers. A. The liquid bluings are as follows: 1. Dissolve indigo sulphate in water, and filter. 2 Dissolve good cotton blue such as aniline blue 6 B in cold water. 3. Dissolve Prussian blue with one-eighth part of oxalic acid in water. 4. Dissolve Tiemann's soluble blue in water with 2 per cent of oxalic acid.

(28) J. J. McV. asks: What are considered to be the best materials and proportion of ingredients, color, etc., for paint, for outside iron work, like bridges of iron, railway and highway? A. There is nothing that stands wear and weather so well as red oxide of iron and boiled linseed oil. This may be tempered with chrome yellow, white lead, and lampblack for shades. On the great East River Bridge white lead is used. The elevated railways in New York are painted with Prince's metallic paint and chrome yellow. If it is not desirable to have the paint dry quickly, a little raw linseed oil mixed with the boiled makes an easier spreading paint and adds to its durability.

(29) J. H. asks how to make a cheap steam whistle, one that is loud, but not shrill. I intend to use a globe valve, if possible, so it will start to whistle gradually and die out gradually. A. A tinsmith could make you a steam whistle upon the same plan as an ordinary mouth whistle or an organ pipe, only on a large scale. We do not think that you can make one cheaper than the regular article of the same caliber.

(30) J. M. F. asks the latest receipt for the manufacture of carbon paper for use on the type writer. A. We know of no more satisfactory method than that of rubbing the surface of thin post or tissue paper with black lead and a little oil, and carefully removing the excess of coloring substance by rubbing with a clean rag.

(31) F. C. C. asks: In regard to the power of a small boat engine and boiler of the following dimensions: Boiler 11 inches diameter, 24 inches high, sixteen 1 inch flues, fire box 10 inches diameter, 14 inches high, engine cylinder 2x4 inches, 3 inch stroke, 40 or 50 pounds steam, half an inch feed. A. Your boiler, with good strong draught, would give you from 1¼ to 1½ horse power. The engine can furnish no more than the boiler is sufficient to supply.

(32) B. E. G.—The vessel from which the air is exhausted is lighter in consideration of the air extracted, therefore it will float easier than one containing air. The floating of a vacuum inclosed by a metallic case depends entirely upon the weight of the envelope.

(33) T. E. G. asks what he should use to paint a boiler with. Something that will not burn off. A. A coal tar varnish is very good, or the Norwood "smoke pipe paint;" the coal tar varnish can be obtained from gas works.

(34) W. S.—The reversal of the valves makes the cylinders act as pumps driven by the momentum of the engine and train, cushioning the steam before the pistons and driving it back into the steam chest and to the boiler, drawing steam and smoke from the exhaust pipe to follow after the piston.

(35) S. P. B. says: I use a two flued boiler 24 feet long, and use coal for fuel. I thought of making an experiment with coal oil to increase the heat in the flues by combustion of coal oil in atoms. I would conduct the coal oil to the flues through a quarter or half inch pipe. Would there be any danger in exposing the pipe, say a quarter or half an inch diameter, to a red heat? A. Not if of wrought iron. But a better way would be to send the oil into the furnace on a "spray" by a jet of steam, an operation similar to that of an injector.

(36) C. L. B. says: I am a machinist; have been oiler on several steamships, and wish to become an engineer. I am studying the indicator, and have learned to work up a card to a certain extent, but cannot understand the true curve, or theoretical curve, as it is termed. What I do not clearly understand is getting the cubic capacity of the cylinders. A. The length to be added to the length of the card is such a fraction of the working stroke of the piston as shall be equal to the cubic contents of clearance passages and openings from the valve to the piston when the latter is on its center, or extreme end of the stroke. If for instance the clearance was 1 inch and the stroke 40 inches, then the clearance alone would equal one-fortieth the contents of the cylinder, and if the cubic contents of the passages and openings, from the valve to the cylinder was equal to 1 inch length of the cylinder, then the clearance and passages would be equal to 2 inches length of the cylinder, or one-twentieth the capacity of the cylinder. It will be very difficult for you to understand the cards from a compound engine, except you make the subject a severe study or obtain instruction from some one familiar with taking, reading, and calculating such cards.

(37) J. W. R. asks: Does the crosshead of a locomotive engine move backward when the engine is moving ahead, and *vice versa*? A. The crosshead never moves backward upon the rail except when the wheels slip.

(38) H. W. B.—You may make a fusible alloy of tin 12 parts, lead 25, bismuth 50, cadmium 13, parts by weight, that melts at from 150° to 160°. A fusible alloy may be made of tin 1 part, lead 1 part, bismuth 2 parts, that melts at 200°. This may be tempered by adding mercury so as to bring the fusing point down to 150° or less. The alloys are conductors.

(39) J. L. H. asks how dry scale can be best separated from steam boilers. A. For removing scale Caustic soda dissolved in the feed water, about an eighth of a pound per horse power, and fed to the boiler one day each week, allowing it to remain all day and then blow off often during the next day, will soon remove the scale. After two or three applications the boiler should be thoroughly cleaned out, and examine angles or corners where deposits might accumulate and clean such deposits out.

(40) J. H. S. says: I want to get a tank to pickel beef in, either of zinc or galvanized iron, and would like to know which of them is preferable? Would such a tank be injurious to the meat? A. Zinc and galvanized iron are not as good for corning or pickling beef in as oak barrels or casks. Whichever is used, frequent cleaning is necessary. People are frequently made sick from eating corned beef, who are totally ignorant of the cause. Stale meat, saltpeter, and want of cleanliness in the pickle vat are at the bottom of this trouble; we recommend an oak tank.

(41) E. D. C. asks: 1. Can I drain a pond by means of a siphon made of 3 inch gas pipe 1,500 feet long with an 8 foot fall? A. You can drain the pond, provided the inflow is not as great as the outflow, by your siphon, which will deliver at best only about 40 gallons per minute. With a siphon the decreasing level in the pond would gradually lessen the flow. 2. Is there any rule by which a person can determine the distance that a pond can be drained under a given fall with a siphon? A. Rule for flow: Divide the constant for the diameter of pipe under one foot head by the square root of rate of inclination; the quotient will give the volume in cubic feet per minute. The constant for 3 inch pipe=73·5; the constant for 4 inch pipe=151. The rate of inclination is the length divided by the height.

(42) J. A. B. asks: Has the sulphur in the gas any influence on the bath in an open hearth furnace? Have there been any experiments made to investigate the matter, and if so, by whom, and where are the results published? A. The aim of iron makers is to keep the furnace as free from sulphur as possible, although probably a small percentage may not affect the iron. This can be ascertained by a trial, the visible effect of which is to make the iron *hot short*, or brittle at a red heat. The latest and best practice in iron making is described in various technical journals. For interesting details you may do well to examine articles published in SCIENTIFIC AMERICAN SUPPLEMENT —No. 24, Little's process; No. 55, Rees' process; No. 70 and 71, paper by Dr. Siemens; No. 157, direct process; No. 362, Sulphur in Iron and Steel; No. 282, Hay process; No. 364, Bromfield process; No. 380, Bull's process.

(43) J. H. L. asks about the process for the manufacture of picture mouldings, gilt and other plaster covered mouldings. And what book or in what way a person can procure practical instruction for the carrying on of such work. A. We have no knowledge of any work upon the manufacture of the ornamental or composition work upon picture frames. They are made by pressing a composition of oil and whiting in carved hardwood moulds or moulds cast in type metal.

(44) T. M. C. asks who or what is the best authority on the capacity of pipes for delivering water. Also, what quantity will an 8 inch pipe deliver, under 150 feet head, the pipe being half a mile long, and without much curvature? Also, what will a 12 inch pipe deliver under same conditions? A. Neville's Hydraulic Tables and Formulæ is high authority. Your 8 inch pipe will deliver 48 cubic feet per minute; 12 inch pipe will deliver 133 cubic feet per minute.

(45) W. S. V.—If it is a real fireproof paint about which you ask, the material constituting the fireproof qualities is probably composed of mineral or incombustible substances such as asbestos, clay, or pulverized slate or other cheap mineral colors, the resin and coal tar being only used in sufficient quantity to cement the real fireproof material.

(46) S. & D. write: We propose erecting tank for windmill pump; tank is to hold 50 barrels, and is to be elevated 30 or 40 feet. Will you be kind enough to tell us what pressure the tank will supply for water motor, size of connecting pipe 1 inch or 1¼ inch? A. For 30 feet elevation, 13 pounds pressure; for 40 feet elevation, 17¾ pounds pressure.

(47) F. J. S.—For carpenters' tonnage the rule is: Multiply together length, breadth, and depth, and divide the product by 95. You will find the various rules for tonnage in Haswell's Engineer's Pocket Book.

(48) B. R. N. asks for the mode of rendering horn transparent amber color, like tortoise shell. A. The imitation of tortoise shell with horn is as follows: Mix up an equal quantity of quick lime and red lead with soap lees; lay it on the horn with a small brush in imitation of the mottle of the tortoise shell; when it is dry, repeat it two or three times; or grind 1 ounce of litharge and half an ounce of quick lime together with a sufficient quantity of liquid salts of tartar to make it of the consistence of paint. Put it on the horn with a brush in imitation of tortoise shell, and in three or four hours it will have produced the desired effect. It may then be washed off with clean water; if not deep enough, it may be repeated. The original preparation consists in roasting the horn over a fire made of the stalks of furze; when rendered soft it is slit on one side, and kept expanded flat between a pair of tongs; it is then placed between iron plates, which are greased. The horns are suffered to remain until they are cooled; they are then soaked in water enough to be pared down to the required thinness, with a large knife worked horizontally on a block. Their transparency is thus acquired; and after being immersed in lye, they are polished with whiting and the coal of burnt willow.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

H. J. L.—The specimen is a hornblendic rock containing pyrites or iron sulphide, a mineral which frequently, if not always, carries gold with it. The amount of the latter, if any, can only be determined by assay. —L. D. B.—The specimen appears to be feldspar; it is so small that it cannot be easily determined without analysis.

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August 5, 1884,

AND EACH BEARING THAT DATE.

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