ENGINEERING INVENTIONS.

A steam trap has been patented by Messrs. William and Willie D. Puffer, of Janesville, Wis. This invention covers certain novel features in constructing a steam trap to operate with either cold or hot water, and allow the cold air to pass out of the pipe, so the water may enter the trap.

An improvement in railroad signals is the subject of a patent issued to Mr. John Mayne, of Atchison, Kansas. With the outer end of an arm carrying the signal board, a connecting rod is fitted, which passes with the arm into the building, the connections being all positive, and such that the signal can be readily operated from inside the building.

A spark arrester, for use in connection with the smoke stack of a locomotive, has been patented by Mr. John C. Albrecht, of Columbus, Ga. It combines volute and horizontal partitions, with branches, scrolls, and special passages, in connection with the smoke pipe and a cone, to arrest cinders and force them back into the fire, and also increase the draught.

A high pressure alarm for steam boilers has been patented by Messrs. Charles W. Johnston and Patrick Brown, of Philadelphia, Pa. The principle of the device is such that the weight lifting part exposed to the action of the steam is kept in continuous or frequent motion by the varying pressure above a given and set limit, so that danger from sticking, as in the ordinary valve, is avoided.

MECHANICAL INVENTIONS.

An improved lever power mechanism has been patented by Mr. Frederick Kubec, of Riverside, Iowa. This invention provides a special means of reversing the pawls for a pair of toothed wheels geared together in a frame, so as to reverse the motion of the object to be driven quickly and easily at the will of the operator.

A tile laying machine has been patented by Messrs. Jesse T. Graves and Benjamin F. Belt, of Colo, Iowa. It is to facilitate the embedding of drain tiles in the surface of lands, and covers a special construction in which the cutters cut the soil loose at the sides of the trench, so that the two slices formed on two inclines shall slide down against each other and form a cover for the tiles and trench.

AGRICULTURAL INVENTIONS.

An improved cultivator has been patented by Mr. Alvah Schoonover, Jr., of Elliott, Iowa. The invention covers a special construction and arrangement of parts for connecting the plow beams with the axle, so the rear ends of the plow beams can have a free, vertical, and lateral movement, and their forward ends be adjusted inward or outward.

A cornstalk rake has been patented by Mr. George A. Runyan, of Augusta, Kansas. This machine, while adapted for marking from the provision of four transporting wheels, arranged in pairs in a particular manner, has a raking attachment that may be locked or held out of action at will, so that it may also be used as a marker alone.

A seed planter has been patented by Mr. Asahel Smith, of Chatham, Ontario, Canada. The object is to promote accuracy in operation and facilitate the adjustment of the seed dropping mechanism, the seed dropping slide being held against a cam wheel which is seated upon a flanged wheel attached to the drive wheel, so that the slide can be operated with certainty and the cam wheel readily adjusted.

A land marker has been patented by Mr. William H. King, of Little Silver, N. J. The object of this invention is to facilitate the marking of land for planting, and it consists in a special construction and combination of parts, so that when the machine is drawn forward, the plows open channels to receive seed, etc., and a shoe marks the ground parallel with the channels opened by the plows, at such distance from the outer channel as to be midway between the plows at the next passage of the machine across the field.

MISCELLANEOUS INVENTIONS.

An insecticide compound has been patented by Mr. Henry Pool, of Westminster, Md. It consists of slaked lime, plaster of Paris, ammonia, sugar, oil of worm seed, and oil of sassafras, in specified proportions.

A sofa bedstead has been patented by Mr. John Baggs, of Baltimore, Md. This invention relates to that class of lounges to which various devices are attached for convenience in surgical operations, and covers a special construction and combination of parts.

An improved harness hook has been patented by Mr. Samuel B. Edson, of Monterey, Ind. It is a rigid hook or buckle adapted to be used in the place of an ordinary snap hook, the hook having a curved body with a concaved outer surface, with a pin near its end, and loops and guard.

A clamp for ruling pens has been patented by Mr. John W. Dirhold, of St. Louis, Mo. This invention consists in a combination and arrangement of parts to improve ruling machines, in which the pen holders are moved laterally in parallel position by levers connected by pivots to form a lazy tongs.

A convertible bridle and halter has been patented by Mr. John A. Nesbit, of Charlottesville, Ind. With a ring of the bridle is combined a halter attachment with rings and strap, the whole specially designed so that the bridle may be readily converted into a halter, or the halter into a bridle.

A ditching machine has been patented by Mr. Alonzo Purcell, of Monticello, Ill. A special construction of wheel, plow, shovel, shifting board, and mould board chutes—so framed and combined as to make an easily guided machine to cut a furrow or ditch of required depth by successive cuttings.

A ball trap, being an improved device for throwing targets, such as clay pigeons, etc., has been patented by Mr. Charles F. Stock, of Peoria, Ill. There is a novel device at the outer end of the throwing arm for holding the target, it being adapted to retain the target during the swing of the arm, and release it at the proper time.

A fire escape has been patented by Mr. Charles Von der Linden, of Rhinebeck, N. Y. This invention consists principally of a holder containing two pulleys, and a brake plate adapted to act upon the pulleys, so that a person descending from a burning building by means of a rope may readily regulate the speed of his descent.

A broom holder has been patented by Messrs. Alexander Frazier and Daniel J. Coburn, of Maywood, Ill. This is a rubber jaw-like clamp, with box for holding it, for holding brooms by their handles when not in use, without regard to length of the handle or portion inserted in the holder, and which will be automatic and self-adjusting.

A mail bag fastening has been patented by Mr. Roy B. Scott, of Denton, Texas. A chain is fixed to one side of the bag, so as to swing on the lower edge, and having hooks or studs to pass through the eyes of the two sides of the bag and around or through another chain on the other side of the bag, making a simple, firm, and easily manufactured fastening.

A hame fastener has been patented by Mr. Benjamin F. Jones, of Beauregard, Miss. The end parts at the top and bottom are connected with hooks and toggle, so that the hames may be drawn more or less closely together according to the size of the horse's neck, the parts therefor showing special construction and combination.

A fire escape has been patented by Mr. Henry Poole, of New York city. This invention covers a special construction of easily portable fire ladder, which, as it is elevated, also raises a continuous canvas chute, down which persons from the burning building may safely slide, it being designed to have a mattress at the bottom.

A cartridge reloading tool has been patented by Mr. James H. McCabe, of Jacksonville, Fla. The die groove has hardened steel pins to crimp the open ends of the cartridge tubes over the wads; a creasing lever and bit is also provided for this purpose, the tool being readily opened and the tube inserted as far as required.

An automatic rain water regulator for cisterns has been patented by Mr. Frederick E. Lord, of St. Louis, Mo. This invention covers a special construction of valves and pipes to so regulate the flow of water into a cistern or tank that the dirty water coming first in a rain will be carried off, and when the tank is sufficiently full the overplus will be carried away.

An improved cistern has been patented by Mr. James W. Barnum, of New Orleans, La. In house cisterns, such as receive water from the roof, the construction is such as to obviate all danger from the tank overflowing during hard or continuous rains, and during such times accumulated dirt is allowed to pass off from the bottom, the tank being thus self-cleaning.

A liquid cooler has been patented by Mr. Herman Lindenberg, of Jersey City, N. J. The invention consists in a flat sheet-metal vessel adapted to be connected with the spigot of a barrel, and having in its lower part a cock or spigot, such vessel having transverse partitions, which cause the liquid to circulate therein and be cooled by coming in contact with the side of the vessel placed in a box filled with ice.

An improved metallic pen has been patented by Mr. Hezekiah Hewitt, of Birmingham, Eng. The extreme points of the nibs are bent backward to provide a flexible curved writing surface on the under side, and a minute reservoir on the opposite side, there being also connected a main ink reservoir in the concave body, to hold a greater quantity of ink than ordinary pens.

A folding basket has been patented by Mr. Anthony Daul, of Jamaica, N. Y. The opposite edges of the front and back are hinged to the bottom, the ends being hinged to the ends of the front, and the cover is made of two halves hinged to the upper edge of the back; the basket, also, has handles with hooks, which can be fastened to the basket when erected or folded.

A folding egg case has been patented by Messrs. Samuel M. Toay and Edward Harris, of Cambria, Wis. It has hinged end, front, and rear boards, a hinged transverse partition, and a cover formed of two sections hinged to each other, of which one is hinged to the rear board of the case, thus permitting the end boards to be folded inward and the front and rear boards to be folded over them.

A tile ditching machine has been patented by Mr. John Arthur, of Streator, Ill. In combination with a wheeled truck and an elevator thereon is a spade, vertical ways for the spade, means to reciprocate the spade therein, longitudinal ways for the spadeways, etc., the power which runs the spade also running the elevator, and the speed being regulated by the hardness of the earth.

Cards for playing loto and other games form the subject of a patent which has been issued to Mr. Henry H. Harrison, of New York city. The invention consists in a card with a base plate having the numbers printed thereon, an intermediate plate with slots over the rows of numbers, a top plate with openings over the numbers, and slides for covering the numbers.

An improved churn has been patented by Mr. William H. Tawney, of Louisburg, Kansas. The dasher consists of a plate or blade apertured centrally, and preferably square at the bottom, to work small quantities of cream to better advantage, and a simple and effective lever power apparatus is provided for working the dasher, which is also applicable for other light running machinery.

A bale-tie splice has been patented by Mr. Frederick Bommarius, of New Orleans, La. This invention is for utilizing the scraps or short lengths of bands, by making a simple and firm band-splicing tie, having reference to metallic bands such as are used in baling cotton, whereby waste is avoided, and the bands are not likely to loosen by jarring, as occurs when rivets are used.

An improved lumber drying kiln has been patented by Mr. Lafayette Rollins, of Mountain Creek, Ala. The drying kiln or house is preferably of brick, with an extension at one end with furnace and boiler, and pipes extending along the floor beneath the tracks over which the lumber is moved, with certain novel features of construction for the convenient handling of lumber and entire removal of the sap therefrom.

A bottle filling device has been patented by Mr. Philip J. Hogan, of Negaunee, Mich. This invention provides for the accurate measuring of the fluid with which bottles are filled, has a vent with a long flexible pipe, a discharge valve with a tubular side perforated stem, with special means for adjusting the vent pipe and outlet, making a rapidly acting measure as well as a bottle filler.

A fire escape has been patented by Mr. Aaron Walker, of Kokomo, Ind. It relates especially to an improvement connected with a former patent granted to the same patentee, and combines with a windlass one or more ropes, pulleys, and weights, whereby the swinging balcony suspended from a windlass is balanced and remains stationary at any desired point.

A ruffling and shirring attachment for sewing machines has been patented by Mr. William Dudley, of Newark, N. J. It provides a novel and improved device, of simple construction, for overlapping or folding a cloth or fabric, the fabric on the bed plate being carried forward by a straight and reciprocating motion, making a neater fold or plait than when the spring finger rocks or swings.

An improved wagon brake has been patented by Mr. James Hocking, of Denton, Neb. It is of the form in which brake shoes are automatically applied to the wheels by the back thrust of the team, is intended to act while the wagon is turning as well as when straight, is easily applied, and permits the wagon to be lengthened or shortened, while it is light and strong of construction.

A beer cooler has been patented by Mr. Charles L. Krum, of Minneapolis, Minn. A false rail or front is attached to and forms part of the slide, and contains the tap hole for the faucet, with a plate and closer therefor, permitting the door to be opened on its hinges, and to the plate is a narrow sheet of rubber or other flexible material, with a hole to close around the faucet when the keg has been shoved back into the cooler.

A velocipede has been patented by Mr. George L. O. Davidson, of Manchester, Eng. There are such improvements in the mounting of the frame and wheels, and with relation to the rear driver's seat and front passenger's seat, as to cause the weight of the mounted driver to overbalance the weight of the passenger, and to hold the steering wheel to the ground, except when the driver dismounts to push the machine by hand.

A harmonic coupler for piano actions has been patented by Mr. William S. Wright, of Dover, N. J. In combination with key levers are coupling levers, with their front ends over other levers, with slitted, beveled sliding blocks for coupling the front ends of the coupling levers to the key levers above which they rest, with device for adjusting all the coupling blocks to couple simultaneously, so harmonic sounds can be produced by depressing one key.

A fire escape has been patented by Mr. William Wise, of Medway, Ohio. A tubular mast with telescoping sections has a rope attached to the inner section, pulleys on the other sections over which the rope runs, means for raising the mast and a sheet metal fire escape car closed at the top and bottom, so that several windows may be supplied with means of escape for the occupants by swaying the mast from side to side.

A lightning arrester, for electric lines, has been patented by Mr. Charles W. McDaniel, of Carthage, Mo. Its object is to prevent the coils of telephone instruments from being burned and destroyed by strokes of lightning, and it provides for an insulating strip on an insulating base, with as many metal plates as there are clamps on the base, the strip passing into the clamps, and the intermediate plate or plates connected with the ground wire.

An improved air pump has been patented by Mr. Miguel Boom, of Port-au-Prince, Hayti. It is intended for compressing air as well as making a vacuum, by turning a cock plug in a tube uniting the inlet and outlet tubes at the end of the cylinder, the plug having channels for establishing communication between the outer air and the inlet or outlet pipes of the cylinder, and between the pipes, and a tube united with the vessel for receiving compressed air, or in which a vacuum is to be produced.

An improved filter has been patented by Mr. Edwin L. Barber, of Chicago, Ill. The invention covers a cylindrical water vessel with slanting partition from the bottom to one side below the top, a vent tube in the partition extending to the top of the vessel, holes in the bottom of each compartment, one or more chambers to hold filtering material connecting said holes, and a faucet entering the inclosed compartment near its bottom, all to make a filter to purify water for drinking.

NEW BOOKS AND PUBLICATIONS.

DIE MOTOREN DER ELEKTRISCHEN MACHINEN MIT BEZUG AUF THEORIE, CONSTRUCTION UND BETRIEB. By Th. Schwartze. A. Hartleben, Vienna.

This book constitutes vol. xxi. of the Elektro-technische Bibliothek, and might primarily be called a treatise on prime movers, their theory, construction, and working. These include windmills and the various hydraulic, steam, hot air, and gas engines. In connection with the chapters on the steam engine are several on steam boilers and illustrating several smoke preventing devices. In addition there are chapters on the theory of governors and dynamometers. Altogether, the volume is interesting, and will, no doubt, prove valuable, especially to students, giving as it does a concise review of nearly all prime movers, and their application to the driving of electric machinery.

SILVER-LEAD DEPOSITS OF THE EUREKA DISTRICT, NEVADA. Abstract of Report of the United States Geological Survey. By Joseph Story Curtis.

The ore deposits of this region have been of great interest, not only for their exceeding productiveness, but from the obscure character of their structural relations, and they have been the cause of a good deal of litigation, in the course of which geologists and mining engineers have presented very different views. It was partly on these grounds that Mr. Curtis was deputed by the Director of the United States Geological Survey to undertake a special study of the Eureka mines, and this monograph is the result. The information given is important locally, as justifying mining to still greater depth in the sections examined, but is of much wider interest among geologists and miners from the peculiarities of the occurrence of irregular bodies or argentiferous lead ores in limestone. The report is accompanied by an elaborate and beautifully executed geological map of the district, with sectional views through different mines.

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.

No attention will be paid to communications unless accompanied with the full name and address of the writer.

Names and addresses of correspondents will not be given to inquirers.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries do not appear after a reasonable time should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from $1 to $5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

Any numbers of the SCIENTIFIC AMERICAN SUPPLEMENT referred to in these columns may be had at the office. Price 10 cents each.

Correspondents sending samples of minerals, etc., for examination, should be careful to distinctly mark or label their specimens so as to avoid error in their identification.

(1) F. A. P. asks: How long will galvanized cast iron stand exposed to the weather (such as an iron fence) without signs of rust? A. If the iron is perfectly galvanized, it will last for a long time. If the union of the zinc and iron is imperfect, rust will appear very soon.

(2) C. M. W. asks: 1. When two spur wheels rolling in contact are partly worn out, are the teeth the proper shape for a uniform transmission of motion? A. If the metal of which the wheels are composed is homogeneous, the wheels will wear so as to transmit uniform motion. 2. Will the teeth of two pairs of spur wheels of same diameter, same pitch, and conveying same power wear to the same shape, when one pair had involute and the other epicycloidal teeth when new? A. Yes.

(3) C. J. H. writes: In the process of amalgamation of gold bearing ores, it is desirable to reduce the ore to a very fine state of subdivision by abrasion or trituration, after having been roasted and crushed with Cornish rolls. Buhr millstones are sometimes used for grinding the ore. I have suggested that cast iron disks faced with heavy plates of soft copper be used instead of buhr stones. In your opinion, would copper faces be as efficient for the purpose as buhr stones? What would be the probable result in using the copper faces? I wish to reduce the ore to the finest state attained by mechanical process, wet or dry. A. It is possible that some of the harder particles of the ores might embed themselves in the copper and act something after the manner of diamond dust on a lap, but we fear the results would not be very encouraging. You could test the matter experimentally.

(4) L. C. M. writes: I wish to ebonize some maple by boiling it in a dye, so as to have it penetrate into the wood. I can dye the pieces, but cannot season them after taking them out of the dye without nearly all of them becoming checked. The wood is kiln dried before it is put into the dye, and stays in the dye about twenty-four hours. Does immersing wood in a solution of caustic soda have any tendency to toughen it? A. Your difficulty is probably due to some lack of proper manipulation, which could only be detected by seeing you work. The following, if properly conducted, might give satisfactory results: Into a quart of boiling water put 1½ ounces of copperas and 2 ounces of logwood chips. Lay on hot; when dry, wet the surface again with a solution of two ounces of steel filings dissolved in half a pint of vinegar. When dry, sandpaper down the grain and get a smooth face, and as the work to be ebonized must be quite free from holes, oil, and fill in any of these with powdered drop black mixed in a filler. Then give a coat of quick drying varnish (made by dissolving black wax in spirits of wine), and finish the work by rubbing down with finely pulverized pumice stone and linseed oil until a good surface is acquired. We fail to understand how any advantage can be gained by using caustic soda.

(5) W. S. N. asks: 1. Can you give me a receipt for the preparation of washing blue in powder, similar to what is now put on the market in boxes with perforated tops? A. We give herewith 4 receipts for the manufacture of liquid bluings, any of which will answer: (*A.*) Dissolve indigo sulphate in cold water and filter. (*B.*) Dissolve good cotton blue (aniline blue 6 B.) in cold water. (*C.*) Dissolve Prussian blue in cold water, adding one-eighth part oxalic acid in water. (*D.*) Dissolve Tiemann's soluble blue in water with 2 per cent of oxalic acid. See also SCIENTIFIC AMERICAN, page 261, for April 28, 1883, for formula of disinfecting wash blue. 2. Can you give me a receipt for a washing compound, such as is put on the market as pearline, etc.? A. Pearline is simply a trade name given by James Pyle to a soap manufactured by him, and it would be impossible to say anything about its composition, unless it were definitely analyzed and its exact ingredients ascertained. Morfit's work on soaps will give you numerous receipts to select from.

(6) A. T. D.—You could not compress gas in a balloon. It would not help the lifting power if you could. You can make hydrogen gas in barrels, by charging with zinc, 25 or 30 pounds to a barrel. Then half fill the barrel with a mixture, 10 parts of water to 1 part sulphuric acid. Attach a rubber tube to the bung, with its other end attached to another barrel partly filled with water to catch any acid vapors that may come over. A half dozen barrels, attached to one receiver, and the receiver connected with the balloon with a larger tube, will answer your purpose. A description of how hydrogen gas is made is to be found in SUPPLEMENT 241.

(7) F. W. G. asks: 1. What appliance is used in drawing room coaches and cars to store carbon gas for illuminating purposes? A. The Pintsch (German) system is used in Europe on railroads; in this country on the Erie and the New York, Providence, and Boston railroads. 2. If it is compressed in a cylinder, and how much will cylinder hold? A. Illuminating gas for portable purposes is not compressed in this country; it is flowed into India rubber bags from street gas mains at the ordinary pressure, and its outflow is governed by weights pressing on the flexible bag. 3. Is it patented, and who is the patentee? A. We do not know that it is patented.

(8) A. M. F.—We know of no cheap process of reproducing maps and drawings in black lines. The ordinary photographic method is as good as any. Twenty to twenty-five cells of Bunsen battery will light a room with a small arc light. For an incandescent light more battery power would be required. We cannot advise the plan of lighting by means of batteries. Write dealers in electrical supplies who advertise in our columns.

(9) C. H. P. asks the safe velocity for fly wheels of different sizes and weights, and the rule for calculating it? A. Cast iron fly wheels well proportioned and fitted, and of good material, may be run safely with speed of 60 ft. per second, and frequently have been run at a greater velocity for special purposes. You will find rules for fly wheels in "Bourne on the Steam Engine," "Bourne's Catechism of the Steam Engine," "Marks on Proportions of Steam Engines," and "Regg on the Steam Engine."

(10) H. G.—There is nothing so cheap or convenient for a freezing mixture as pulverized ice and salt. In chemical laboratories other materials are used for experimental refrigeration. They are too expensive for general use. The following are some of these combinations:

Sal ammoniac	5 parts.
Niter	5 parts.
Water	10 parts.
Nitrate of ammonia.	
Water	equal parts.
Sulphate of soda	5 parts.
Diluted sulphuric acid	4 parts.

See also SCIENTIFIC AMERICAN SUPPLEMENT, No. 89, for methods of freezing mixtures.

(11) S. B. asks: If in a dynamo machine constructed like the one in SUPPLEMENT No. 161, but with field magnets 6 inches wide (and consequently an armature 6 inches long), it would do to wind the armature with No. 30 wire to a resistance of 35 ohms for a current of the highest possible tension? If not, please give the best size of wire and the best resistance for the armature of a high tension machine like the above. A. You can get a high tension current in the manner proposed.

(12) F. A. R. asks: What is the best kind and size of battery, and how many cells will it take to operate a telegraph line half a mile long? A. Use four cells of gravity battery.

(13) J. G. H. asks: What is the best and most durable preparation to paint smoke stacks and other surfaces subjected to heat? A. Coal tar makes a good paint for smoke stacks. If it is thin enough to add a little finely ground plumbago, it will keep its color better for it. A paint made with boiled oil, lamp black, and plumbago is also good, and will keep its color fairly on heated iron work.

(14) J. E., Jr., asks: 1. What is the best means to secure uniform power from a wind wheel? A. The use of a governor to change the sails according to velocity of wind. 2. How can I estimate the power of a wind wheel with sails square to the wind? The *average* power can only be determined by experience, so as to obtain the average velocity of wind at any given location. 3. To what density is it practical to compress air in cylinders to be used as steam? A. It has been carried to 1,000 pounds per square inch.

(15) W. H. B. asks: 1. How much greater area of cross section should an iron lightning rod have than a copper one, to give the same conducting power? A. The sectional area of the iron rod should be six times as great as that of copper to secure the same conductivity. . With roof surface of 1,000 square feet, copper rod one-half inch square, and a wet clay soil, how far ought I to continue the rod underground, through a bed of charcoal 1 foot deep and 1 foot wide, to give a proper ground connection? A. Carry the rod down till you strike soil that is permanently damp.

(16) F. M. S. writes: I am told that when one is some fifty feet or more down in a well, if he will look up toward the heavens he can see the stars. Will you please be so kind, at your convenience, to explain to me through your able paper the philosophy thereof? A. In the darkness of deep wells and mine shafts the eye becomes very sensitive, and thus is enabled to see the larger class of stars. It is the glare of daylight that blinds the eye to delicate sight. One or two of the largest stars have been seen in open daylight under favorable conditions of the atmosphere. The planet Venus is sometimes seen in broad daylight. Stars can be seen with telescopes in a clear atmosphere during the day.

(17) W. T. B. asks: How can the exhaust from a small steam engine be utilized for heating purposes? A. The exhaust of your engine can be entirely condensed and all its heat utilized by conveying the steam through iron pipes around your room or rooms, in the same manner that you would do for heating with live steam, only with this modification: keep the area of all the pipes combined and all the feed branches fully equal to, if not larger than the area of the main exhaust. Put a back pressure valve in the main exhaust to turn the steam into the heating pipes, arrange all the coils so that the water of condensation will run naturally with the steam to the drips and the vent pipe at the further end of the circulation from the engine, from which point a generous vent pipe should be carried outside or to the roof.

(18) S. A. H. asks: If a tree were to fall on an uninhabited island, would there be any sound? A. Sound is vibration, transmitted to our senses through the mechanism of the ear, and recognized as sound only at our nerve centers. The falling of the tree or any other disturbance will produce vibration of the air. If there be no ears to hear, there will be no sound. The effect of the transmission of the vibrations upon surrounding objects will be the same, with or without the presence of sentient conditions for recognizing them. Hence there will be vibration, but no sound to the things that cannot hear.

(19) J. M. A. asks: Could I use the lenses of a quarter size camera tube to make a magic lantern? Would the object glasses of a field glass be of use as condensers to intensify the light from an oil lamp? A. The lenses of a camera are suitable for a magic lantern. Your object glass is not suitable for a condenser. It has too long a focus for its diameter. The condenser should be composed of two plano convex lenses, convex sides together, 4 inch diameter, 6 inch focus, for a quarter size camera. See SCIENTIFIC AMERICAN SUPPLEMENT 173, "How to make Lantern Slides;" also 236, "Lenses;" 87, "Magic Lanterns."

(20) A. C. McK. writes: I have a machine that I would like to run at a high rate of speed. The balance wheel is 10 in. in diameter, 5 spokes, 1 in. by ½ in. thick, rim 1 in., rounded and securely fastened by a set screw let into the shaft. Please let me know in your answers to correspondents the greatest rate of speed I can attain with safety. The machine does better work the faster it is run, and runs better with a balance wheel than without one, but I don't want to take chances. I have heard of wheels bursting when run at a high rate of speed, so would like to know what rate such a wheel would safely stand. A. If your wheel is of cast iron, we would not recommend greater than 1,450 to 1,500 revolutions per minute; if cast steel, the speed might be increased to 1,750 or 1,800 revolutions per minute. In any event, have a good, strong case fastened over the wheel to limit damage, as all cast metals are very treacherous.

(21) G. W. W. writes: I have a portable engine with a driving pulley 24 in. diameter, making 200 revolutions per minute, and cannot keep steam. If I take off the 24 in. pulley and substitute a 48 in. pulley, and make 100 revolutions, what will be the result? How much more steam will it require, and give rule or method of calculating the same? A. To do the same amount of work with the 48 in. pulley and 100 revolutions that you are doing with the 24 in. pulley and 200 revolutions, you will require double the pressure in the boiler. If you are now carrying the limit of pressure in the boiler, this change cannot be made. You will gain power by increased pressure and slower speed with proper expansion. You may make the pulley 36 in. with a speed of 133 revolutions, which will require 50 per cent more pressure, to great advantage. You may find that the slide valve is not properly set for expansion, or that the piston is leaking steam. This should be examined by some good engineer. The next is good water for the boiler, and clean fines. In the absence of essential data we cannot give further advice.

(22) F. W. C.—We believe the fastest printing presses can make 32,000 impressions per hour, using two impression cylinders, and giving one impression on each side of the sheet. Think there is no press that will do 60,000 in this way.

(23) S. B. asks: What is the real name of the white, spongy part of the bread? A. The crumb.

(24) J. C. Z. asks if an inch piece of bar iron, say 10 feet long, will bend under less pressure than an inch gas pipe, outside measure, of the same length? A. Iron pipe is *much* stiffer for a given weight than solid iron. For a given outside diameter the iron bar will bear the most weight. We cannot tell how much, as there is a great difference in the condition of hardness in both iron and pipe.

(25) J. M. M. says: Please give me the cause of a "poll parrot," of the gray African species, 12 years of age, who lived her life *alone* in a cage, laying two eggs? A. To which another correspondent, J. W. C., replies as follows: The "African gray parrot 12 years of age, who has lived her life *alone* in a cage," has made her mark by "laying *two* eggs." This is the first instance coming to our notice where a bird of this species *gave an ovation* under such peculiar circumstances. The common fowl, *Hennipenna domestica*, has a habit, we are told, of occasionally doing things in this way. But no amount of incubation will bring forth chickens from the eggs she lays. The parrot in question has not only been extraordinary in specific performance, but in the act has *revealed a secret regarding* her sex, which birds of her kind and feather generally keep to themselves. All African gray parrots are wonderfully similar in appearance, and do not seem to age after the *fourth year*, and as to their being *male* or *female*, "no fellow," this side of Africa, "has ever been able to tell" until this one *let out* the facts. Our querist being a dentist, seeks naturally for the *cause* of this ovarian outbreak. We may sound the depths of being, and not find it; but this case suggests *mental impression* as a primal motor. Disturbance, commotion, eruption, are links in the chain of evolution as apparent in the progress of an egg as of a tooth. This Mattoon bird is a treasure, and by way of enhancing her value we observe that she has an obvious talent for *ciphering*, as shown by her *putting down two* and *carrying*—how many? Pretty, pretty polly! Let her beat the hens at *hatching*, if she can.

(26) C. R. asks how to make chloride of gold? A. Gold is dissolved in nitro-hydrochloric acid, and evaporated until all the nitric acid is driven off, and the result is gold chloride. It is best, however, to evaporate the solution to crystallization, and then dissolve the mass in water.

(27) G. L. T. writes: In a late number of your valued journal, SCIENTIFIC AMERICAN, date Jan. 26, 1884, I noticed under head of Notes and Queries (No. 17), W. J. wishes directions for making nickel electrotypes; for his benefit I will state that it is only necessary to proceed in the same manner as for copper, using of course a nickel bath. Nickel is much less injured by friction and pressure, and type faced with it can be used for any color, whereas copper faced type is corroded by some bright colored inks; another advantage of nickel is its hardness, which is almost that of steel, and will therefore last ten times as long as copper faced type. Another circumstance worthy of consideration is this: Copper deposited by electricity from solution has a matte, dull surface, which inclines to crystallization; if a thin coat is used, it is rough and uneven. Nickel, on the contrary, is deposited in an even layer, with a smooth surface, and in consequence it reproduces the lines, in fact the very finest, with a uniformity that never fails. The nickel plating may be as thin as required, and its surface is always equally smooth. A galvanic battery with one liquid may be new to some of your readers; it is composed of zinc and carbon placed in a mixture of 40 parts water, 4·5 bichromate potash, 9 parts conc. sulph. acid, 4 parts sulph. soda, and 4 parts of the double sulphate of potassa and iron. This produces a very regular current, the zinc needs no amalgamation, and no sulph. hyd. gas is evolved.

(28) C. W. asks: What filler should I use for pine wood, which is stained before varnishing; also a good filler for hard woods, as ash? Can it be bought prepared, if so, what should be asked for? What is the process to give cherry the beautiful red finish? Is it in the varnishing, if so, what varnish should be used? A. For filling use whiting, 6 oz.; japan, ½ pint; boiled linseed oil, ¾ pint; turpentine, ½ pint; corn starch, 1 oz. Mix well together, and apply to the wood. On walnut wood add a little burnt umber, on cherry a little Venetian red, to the above mixture. In the SCIENTIFIC AMERICAN for May, 28, 1881, is an excellent receipt for a filler for hardwoods. They can be bought of paint houses in the city. The price varies from 10 cents to 12 cents. The red finish of the cherry is brought about by the use of dragon's blood, which is applied in the varnish or a a stainer.

(29) H. S.—Creosoting, or treating the wood with creosote, is considered the most satisfactory means of counteracting the influence of the teredo in timbers located in the water.

(30) A. G. asks how the gold lettering is put upon the back of books, etc., and what is put on to cause the gold leaf to adhere? A. The letters or design are coated with size or white of egg and stamped into the cloth or leather; gold leaf is then applied to the book, and it adheres where the size is, and the surplus gold is rubbed off with a rag. 2. How the gold printing is done upon cards and paper? A. Gold printing is similar; the design is composed with type, and a size is used instead of ink on the printing press. Bronze or gold powder is dusted over the printing before the size is dry, generally with a piece of cotton, and adheres where the size has been printed on the paper.

(31) T. J. H.—There is no metal of greater power of dilatation by heat under a temperature of 400° than zinc, under moderate pressure.

(32) P. M. S.—Patents cannot be antedated.

(33) D. McR.—Your drain system needs ventilating. The *blind well*, if air tight, does not make room for the water that is suddenly plunged into the pipes. This makes a pressure which breaks the seal of the weakest trap. Make an air vent at the well, if there is no trap between the sink and the well. If there is a trap in the main, then a vent pipe leading from the top of the main vertical pipe to the roof will be requisite to prevent the blowing of the trap seals.

(34) A. T. asks if German silver is injurious to use for a smoking pipe or cigar holder, if so, what other metal would answer for same? A. German silver is not necessarily poisonous or injurious, but we should prefer to recommend some non-metallic substance, such as celluloid or artificial ivory. A silver plated piece could be used.

(35) J. S. asks for a receipt for a lacquer that will put a gold color on copper plated work? A. A pale gold lacquer can be made as follows: 1 gallon methylic alcohol, 10 oz. of bruised seed lac, and one half oz. of red saunders; dissolve and strain. A deep gold lacquer can be prepared of 3 oz., seed lac turmeric 1 oz., dragon's blood one-quarter oz.; alcohol, 1 pint. Digest for a week, frequently shaking, decant, and filter. By using a diluted solution of the latter or by increasing the color of the former, the exact shade wished for can be obtained.

(36) H. C. A. asks how to condense metallic sodium after having put the different ingredients in the retort and heated, or in other words how to collect the sodium? A. The metal will become condensed to a liquid in running along the tube of the retort. It is collected in rock oil or naphtha. A description of the process is given in Lippincott's "Cyclopedia of Chemistry," page 848, vol. ii.