ENGINEERING INVENTIONS.

An automatic station indicator has been patented by Mr. Charles W. May, of Omaha, Neb. The invention covers a novel construction and arrangement of parts for a device to be actuated by the motion of a car, to automatically indicate the streets, stations, and other prominent points on the route.

A boiler cleaner has been patented by Messrs. Robert S. Smith and John Meiklejohn, of St. Thomas, Ontario, Canada. It is a flue cleaner attached to a cleaner plate or carrier, with rods by means of which the plate and its cutters may be moved along the tubes, and clean the latter of accumulations and sediment.

A rail joint has been patented by Mr. George J. Ferguson, of Greenville, Texas. It is a device designed to make the joints equally strong with other parts of the rails, providing for modifications and variations in structure, the improvement being also applicable to close joints at switches, frogs, and guard rails.

An automatic railway station indicator has been patented by Messrs. William B. Bradsby and Edward W. Hagee, of Greenville, Ill. It is for displaying to passengers on cars the names of successive stations along the route, and working automatically, the invention consisting of novel features of construction and the combination of parts.

A car coupling has been patented by Messrs. Thomas Kirby and Abram Singer, of Petoskey, Mich. The invention covers certain novel features of construction and the combinations of parts in a coupler designed to be perfectly automatic, and which can be conveniently used in connection with the ordinary drawhead and link coupling.

A dredging machine has been patented by Mr. Cornelius C. Sullivan, of Roorkee, India. It consists essentially in a pair of jaws or cutters, forming when closed a scoop or bucket, and an oscillating hammer for driving the jaws or cutters into the soil by percussion, the jaws and hammer being pivoted on a common axis, with a hoisting chain and subsidiary parts for working the hammer, opening and closing and hoisting and lowering the bucket.

AGRICULTURAL INVENTION.

A forcing frame has been patented by Mr. Jacob Siem, of Homburg-vor-der-Höhe, Germany. It is an arrangement for producing and maintaining the heat of hot beds for horticultural purposes by means of hot water, a hot water reservoir being arranged below the bed, in which the inlet and outlet pipes are so located that the water heated in a boiler outside continually circulates to maintain a uniform temperature.

MISCELLANEOUS INVENTIONS.

John S. Moore, of Corvallis, Oregon. It is made of a decoction of tea in water, salt, borax, aqua ammonia, glycerine, bay rum, tincture of cantharides, musk and other perfume, compounded in certain proportions and manner specified.

A shoe sole plate has been patented by Mr. Charles Williams, of Blenheim, Marlborough, New Zealand. It is a metal toe plate, having on its ground bearing surface inner and outer grooves, with apertured countersunk portions to receive screws or other fastenings for attaching the plate to the sole.

A scaffolding has been patented by Mr. William S. Welch, of Westfield, N. J. It is for use on sloping roofs where the gutter cannot be utilized, and in connection with ordinary ladders to make a swinging scaffold, the invention covering various novel features of construction and the combination of parts.

A paper file has been patented by Mr. John M. D. France, of St. Joseph, Mo. It has a base or main plate, ratchet arms secured thereto having their rack teeth provided with beveled upper surfaces, with a slide plate and locking bar, making a convenient device for filing bills and papers.

A salt cellar has been patented by Mr. Metellus Thomson, of Kenton, Ohio. Its top is provided with a slot or slots, with a disk or disks operating therein, sockets receiving the salt when in the cellar and discharging the salt when the disk is turned to bring the sockets out of the top.

An axle skein has been patented by Mr. Edmund N. Hatcher, of Columbus, Ohio. The invention consists in forming an axle skein of a single piece of metal, and in cutting the blank in such manner that angular recesses in the edges are avoided, and also in novel details of construction.

An oil cup has been patented by Mr. Samuel D. Mershon, of Rahway, N. J. It is adapted for use on moving bearings, as crank pins, cross heads, and eccentrics, and is of a novel construction, calculated to feed an ample quantity of oil when the machinery is in motion, but none when it is stationary.

A post hole digger has been patented by Mr. James H. Humphrey, of Platte City, Mo. This invention relates to a device with plungers for removing the earth from the cylinder when filled, and also for packing the earth in the cylinder to retain it therein when being raised out of the hole, there being various novel features of construction and arrangement.

A harness pad has been patented by Mr. William S. Webster, of Newark, N. J. The back pad is formed without a jockey, the skirt on each side being made continuous from the saddle to the lower end and an opening being formed therein for the back band to pass under the skirt at a point somewhat below the terret.

A calf weaner has been patented by Mr. Robert L. Rickman, of Graham, Texas. It consists of a simple arrangement of pivoted plates, which can be readily adjusted upon the nostrils of a calf so that it will breathe without difficulty, with projecting points that will prick the cow when the calf attempts to draw milk.

An electric door opener has been patented by Mr. Albert C. Woehrle, of New York City. Besides a special construction of the door opener, the invention consists principally in so arranging the electrical connections that the circuit will be broken when the door stands open, also when closed and the button has been once pressed.

A galvanic battery has been patented by Mr. Frank J. Crouch, of Eugene City, Oregon. It is of that form in which one of the elements is revolved to constantly bring new portions of the same into contact with the exciting fluid, the invention covering novel features of construction and arrangement of parts.

A stove has been patented by Mr. Richard A. Rew, of Pomeroy, Washington Ter. The invention covers a peculiar construction of the supply pipe, and the combination of the pipe and stove, whereby the air will be taken from the lower stratum in the room, thus withdrawing the foul air, at the same time preventing danger from sparks.

A door check has been patented by Messrs. James P. and James H. Swift, of Evansville, Ind. The invention provides for the ready adjustment of a curved locking bar for variously hinged doors, furnishing a latch for working the check bolt, with arrangement for locking the latch, locking the door, and sounding an alarm by the turning of the door knob.

A thermotic valve controlling device has been patented by Mr. Henry Deymann, of Toledo, Ohio. One of the connected pipes has an air chamber at its upper end, a tube extending into the pipe and into the air chamber and connecting with a diaphragm upon which is supported a rod or stem, the upper end of which fits into the flame passage of the burner.

A process of waxing paper has been patented by Messrs. Charles A. Wilkinson, of East Somerville, and William S. McDonald, of Boston, Mass. It is a process wherein the web of paper is drawn over a blanket saturated with heated wax or paraffine, the wax being distributed upon a web in contradistinction to being distributed upon a sheet of paper.

A car starter and brake has been patented by Mr. Charles Merckelbagh, of Brussels, Belgium. By the ordinary brake shaft and handle an apparatus is set in motion whereby the car may be stopped, while the momentum is taken up by springs, which, when released, operate upon the axles to give the car a forward impetus.

A folding anchor has been patented by Mr. Thomas G. Edmondson, of Tarpon Springs, Fla. It has a slotted shank, with an eye near the crown, and is so made that the stock may be readily folded along the sides of the flukes to render the anchor compact when stowed, while it may be readily cleared when the flukes become fouled by obstructions.

A ladder has been patented by Mr. William Horsefield, of Morristown, N. J. Combined with the ladder is a screw rod to pass through the side pieces of the ladder and enter the side of the building to hold the ladder in upright position, there being also side projections to space the ladder from the side of the building, particularly adapting it for painters' use.

An animal trap has been patented by Mr. Evans Wood, of Lyons, Texas. A spear is fitted to slide in a frame, there being a spring to force the spear down, a pivoted trigger, and other novel features, the trap being designed to catch burrowing animals, of simple construction, and one which will operate equally well when set vertically or at an angle.

A stirrup has been patented by Mr. John P. Walker, of Grand Forks, Dakota Ter. It has lower and upper rollers journaled on its main frame, the frame and its lower rollers being swiveled to the stirrup strap loop, with other novel features, the construction being such that, should the rider be thrown, his feet would slip readily from the stirrups.

An electric gas lighter has been patented by Mr. Justus B. Entz, of New York City. This invention relates to burners in which the gas is automatically turned on and a spark produced at the burner tip to ignite on closing the lighting circuit, and on closing the extinguishing circuit the gas is turned off, the device being compact, efficient, and economical.

The cleansing, disinfecting, and testing of drain pipes in dwellings and other structures forms the subject of a patent issued to Mr. William D. Schuyler, of New York City. The drain pipe common to all the receptacles has independent discharge connections, with valves between the receptacles and the drain pipe, with independent hand valves in the drain pipe below, and other novel features.

A templet for use in gaining stair stringers has been patented by Mr. William H. Parry, of New York City. The plate is formed with slots meeting at an angle bounded on either side edges and having rounded extremities, with other novel features, making a convenient device for gaining stair stringers for the reception of treads and risers, and readily adjustable for stairs and winders of different pitches.

A wagon brake has been patented by Mr. Charles W. Loomis, of Otisville, N. Y. An arched shaft forms the main crank or lever of the brake, and the brake blocks upon the ends of this shaft are each acted upon by a spring coiled about the shaft and connected to the blocks in such a way as to normally hold the upper end of each block away from the wheel, the brake being very powerful.

A shell capper and extractor has been patented by Mr. Peyton A. Lee, of Coushatta, La. Combined with a shell holder having a capper is a magazine at right angles to the holder and having a cap-receiving track, its delivery end terminating in a space in the path of the capper, with a spring-impelled follower to automatically force the caps out of the magazine into the path of the capper.

A coin operated induction coil has been patented by Mr. William R. Pope, of Baltimore, Md. It is a device for administering electricity, so constructed that the circuit will be broken except just at the time when made operative by the insertion of a coin or other detached article, so that the instrument may be set up in public places to care for itself and make its own collection.

A velocipede has been patented by Mr. David Horn, of Carterville, Ill. It is designed to make the main wheels seven to eight feet in diameter and the steering wheel four to five feet in diameter, the weight of the rider being carried from a point below the axles of the main wheels, making a vehicle which can be propelled at high speed on ordinary roads and readily steered in any direction.

A fishing reel has been patented by Mr. Elbert B. Porter, of Penn Yan, N. Y. It has a fixed spring barrel and friction spring therein, in combination with a driving spring, a reel inclosing the barrel, planetary gearing between the barrel and reel, and a system of gearing for winding the spring, whereby perfect control of the line and the fish may be secured, and the tension of the line accurately regulated.

A corkscrew has been patented by Mr. Ernest D. Williams, of Boston, Mass. The handle has a socket carrying a spring pawl, in combination with a pointed screw or worm which carries a ratchet and is formed with a squared portion just below the ratchet, being operated with a rotary reciprocating motion to advance the screw into the cork, while the turning of the handle to the left withdraws the cork.

A sash fastener has been patented by Messrs. Nicholas B. McGrath and John H. Pierce, of Plantsville, Conn. It is adapted to be attached to either the upper or lower sash, or to either the right or left hand side of the sash, the construction being cheap and simple, and such that the main parts can be cast without cores and put together without boring or extra fitting.

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.

NEW BOOKS AND PUBLICATIONS.

THE NEW ASTRONOMY. By Samuel Pierpont Langley, Ph.D., LL.D. Illustrated. Boston: Ticknor & Co. 1888.

This work is emphatically an *edition de luxe*. It is devoted to an attractive presentation of the recent work in the photographic, photometric, and spectroscopic branches of astronomical investigation. To these the author has given the name of the new astronomy, and

he makes an earnest plea for assistance to be given to investigators in these lines. Our readers are already familiar with some of this class of work, from our description of Professor Pickering's work at the Harvard College observatory, and considerable space is given to the results of the Henry Draper memorial investigations in the book before us. The illustrations include solar and stellar studies, plates of spectra, and representations of lunar photographs. Some terrestrial views of the scenes in the mountains where the tireless observers were at work give a graphic idea of the hardships of the astronomer's field life. The paper is heavy, the margins are wide, and with its ornamental binding the book presents a most attractive appearance, and one quite in consonance with the holiday season.

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We have received a copy of the above catalogue, which is devoted to the publications of this well known house. Space does not permit us to more than hint at its contents. It comprises a large assortment of standard works on technical subjects, and the principal works have a synopsis of the contents given, so that a buyer can order safely from the catalogue, knowing in advance whether what he is buying will be likely to suit his requirements. An "Index to Subjects" is a distinguishing feature that enhances the value of the catalogue. It is sent free of postage to all wishing it.

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.

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

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Minerals sent for examination should be distinctly marked or labeled.

(1) N. B. D. asks: 1. How many gear wheels would make a good set for ordinary use on a small Barnes lathe, which I wish to convert from a hand feed to an automatic screw-cutting feed? How many teeth should the several wheels contain? A. For a small lathe for amateur work the screw should be 10 threads to an inch. If the screw has a left hand thread, it will require a 4 gear train. If a right hand thread, it will require a 5 gear train. The left hand screw and 5 gear train gives the best control of the distance between the centers of spindle and screw. The change can be made movable on a radius bar to accommodate the varying distance made by the different sizes of thread gear. The teeth should be about three-sixteenths inch pitch. The spindle, change gear, and inside stud gear may be 36 teeth. Then for outside stud gear and screw gear for—

	Stud gear.	Screw gear.
10 threads.	32	32 teeth.
12 "	40	48
14 "	40	56
16 "	20	32
18 "	20	36
20 "	20	40
22 "	20	44
24 "	20	48
26 "	20	52
28 "	20	56
30 "	20	60

2. Which would be the most economical and practical form of rotary engine—one of large diameter and short through shaft, or small diameter and greater length? Would not the first develop greater power at slower speed? Theoretically, the rotary engine would seem to be the best form of steam motor, as there are no dead centers and motion is continuous in one direction. Since steam can also be used expansively in this form of engine, what are the objections that prevent its more general use? A. No form of rotary engine has as yet been found to be economical when the factors of wear and waste of steam are considered. This is probably the secret of their scarcity in the list of steam engines on the market for practical and durable work. The large diameter rotary has narrow disks sweeping over large surfaces that are difficult to adjust to prevent leakage. The small diameter rotaries are the class that have mostly been adopted by builders of such engines.

(2) J. A. asks how he can make a magnet exert its magnetic attraction through 6 inches of metal—alternate layers of steel (hardened) and iron. A. This is practically impossible. The mass of iron distributes the magnetism so as to act as a magnetic shield.

(3) S. M. L.—The springs of steam gauges are made of seamless tubing flattened by drawing over a flat mandrel, and bent to the proper form after being filled with resin or fusible metal, the filling melted out, and the springs then burnished. They are generally made of an alloy of copper 1 pound, tin 1 ounce, zinc 4 ounces. Very small gauges have been made for special purposes, having springs 1½ to 2 inches diameter.

(4) J. B. asks a cure or, at least, a relief for chilblains. A. Dissolve 1 ounce ammonium chloride in ½ pint cider vinegar, and apply frequently: ½ pint alcohol may be added to this lotion with good effect.

(5) W. B. desires a receipt for making blackboard. A. Take ½ gallon shellac varnish, 5 ounces lampblack, 3 ounces powdered iron ore or emery. If too thick, thin with alcohol. Give three coats of the composition, allowing each to dry before putting on the next. The first may be of shellac and lampblack only. The Harvard liquid slating sold by paint houses is likewise an excellent preparation for this purpose.

(6) C. W. F. asks: 1. How can I make a good sticky fly paper? A. In a tin vessel melt together 1 pound resin and add 2 fluid drachms of linseed oil. While the mixture is warm dip a spatula into it and spread what adheres to the blade on foolscap paper. Different samples of resin require varying proportions of oil to make it spread properly. 2. What cement can I use to glue brass or steel to a thickly painted surface? A. No cement will make such a joint. 3. I have quite a quantity of tar, used for making gravel roofs. What can I mix it with to make a paint for shingles? A. Use coal tar benzol to dissolve or thin the tar.

(7) E. A. J. asks (1) how to make a strong parchment paper. A. Mix dilute strong sulphuric acid with ½ its volume of water and allow it to cool to about 65° Fah. Then immerse unsized paper in the cold acid for 10 to 50 seconds, according to its thickness. The paper is then well washed in cold running water, and dipped in dilute ammonia, again washed in water and finally dried. 2. How to make a good and cheap roofing paint—practically fire and water proof. A. Use the formula given in SCIENTIFIC AMERICAN SUPPLEMENT, No. 113, under "Recipe for Roofing Paints."

(8) E. T. S. asks: 1. How can I give pine wood an ebony finish? A. Use the following: Dissolve 4 ounces shellac with 2 ounces borax in ½ gallon water. Boil until a perfect solution is obtained, then add ½ ounce glycerine, after which add sufficient aniline black (soluble in water), and it is ready for use. 2. How to crystallize glass so that it will not wash off. I have used salts and sour beer, but the least moisture destroys it. A. After you have allowed your salts to crystallize, thin-coat the glass with a light coat of varnish. Otherwise you must use the sand blast or some permanent method. 3. How to transfer any lithograph or printed picture of any kind on glass, so that it will be visible from both sides, and will last a long time? A. The process consists essentially in giving the warmed glass an even coating of balsam or negative varnish. Place the face of the print on the surface thus prepared, when the varnish is partly dry, but still tacky. Smooth it out and let it stand in a cool place until the varnish sets. Then apply water, and with a soft piece of gum rubber, or the finger tips, rub off the paper so as to leave the image on the varnished glass.

(9) C. P. S. asks (1) the point at which gasoline becomes a vapor or gas so that it can be burned. A. Gasoline is inflammable at the ordinary temperature, and can be burned. In using this as a gas, it is generally the habit to force air through a convenient vessel filled with shavings, saturated with gasoline, and as it comes out it may be ignited. 2. Can kerosene be burned as a gas? That is, what temperature must be applied? If it will form a gas in this way, is there any residue left in the tank? A. Kerosene has a burning point of 100° Fah., or upward, according to its quality. If properly burned, there will be no residue except carbon, same as in gas.

(10) W. S. desires a recipe for the padding glue so commonly used by printers throughout the country. A. Use a cheap glue, with five per cent glycerine, made into a mixture with any suitable coloring material. Some use ordinary rubber cement, made by dissolving rubber in carbon disulphide.

(11) A. G. M. asks how to clean kid gloves. A. Provide a tall glass cylinder, in the bottom of which place strong aqua ammonia. Be careful to remove from the sides of the jar any ammonia that may have been spattered upon them. Suspend the gloves to the stopper of the jar and allow them to remain for a day in the atmosphere of ammonia. They must not come in contact with the liquid. Rubbing with bread crumbs, in connection with the above, or without the use of ammonia, is also much practiced.

(12) L. S. C. asks the formula used in making oil coats (the light yellow ones worn by teamsters). A. As far as we can learn, the process consists simply in dipping the articles into boiled linseed oil. An excellent receipt is boiled oil 15 pounds, beeswax 1 pound, ground litharge 13 pounds. Mix and apply with a brush to the article, previously stretched against a wall or a table, first well washing and drying each article before applying the composition.

(13) H. G. H. asks for information on the following points concerning the construction of an induction coil, similar to the one described in SUPPLEMENT, No. 160, but 16 inches in length. What size of wire should be used for the primary coil? How many thicknesses of varnished paper should be placed between the layers of the secondary coil, the layers being wrapped entirely across the coil? A condenser of how many square feet should be used? How many cells bichromate of potash battery will best operate the coil? How long sparks ought such a coil to give? A. Use the same wire as specified in the article in SUPPLEMENT, No. 160, for a 16 inch induction coil. Put 60 to 80 square feet of tin foil in the condenser. Do not wind the wire all the way across the coil, but divide in four or more divisions. Use four or six bichromate cells. You should get 3 inch sparks.

(14) S. J. S. asks (1) a receipt for a dead black paint for photo. use and inside of optical instruments. A. For a dead black for inside of tubes use lampblack or artists' boneblack mixed with alcohol in which a few drops of shellac varnish have been mixed. No more shellac than will just make the black stick. Make a trial on a piece of metal. If, on drying, it shows the least shining surface, there is too much shellac. If, on the contrary, the black readily rubs off with the fingers, there is not enough shellac. A drop of shellac varnish to a tablespoonful of the mixture may change its drying character to a shining or a dead surface. As but a very small quantity of the blacking is needed for an instrument, we cannot readily give the precise quantity. 2. Can a wooden tray be coated with rubber so as to resist acids (chemicals used in photography)? If so, how? A. A wooden tray can be coated with rubber varnish and dried in an oven. We recommend paraffine as more suitable for chemicals. Warm the tray and send the paraffine well into the wood with a warm iron.

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