

## ENGINEERING INVENTIONS.

Mr. Thomas H. James, of Republic, Mich., has patented a simple car coupling which relates to the drawheads of cars in which the common link and pin are used as couplers, whereby it is made automatic in its action, and the parts are rendered accessible.

An improved railroad gate has recently been patented by Messrs. D. McNeely and J. A. Drake, of Princeton, Ind. This gate is automatic in its action, being raised by the action of the cow catcher upon upright arms, which arms serve to deflect bars at the side of the track, thereby elevating the gate. The gate is retained in its raised position by the action of the wheels of the cars upon the bars located at the side of the rails.

## MECHANICAL INVENTIONS.

Mr. Charles L. Heisler, of Wapakoneta, Ohio, has obtained a patent for an improved vegetable cutting machine. This machine is provided with a cylinder having knives arranged in its outer surface, the whole so arranged as to be rotated in its bearings, and so constructed that the slices as they are cut will be deposited in the receptacle prepared for them.

Mr. J. O. Madison, of New York city, has patented an improved instrument for dividing lines into any desired number of equal parts. The invention consists in a series of cog wheels having different diameters and mounted on the same shaft, combined with a series of racks engaging with the cog wheels at diametrically opposite points, so that they will move in opposite directions when the cog wheels are rotated.

An improved fire escape has recently been patented by Mr. C. J. Lung, of Rochester, N. Y. It consists of an endless ladder of wire ropes arranged on grooved drums or pulleys at top and bottom, the pulleys being mounted in brackets projecting from the side of the building, and the ladder having an air brake contrivance connected with it, to regulate the descent of persons by the running of the ladder on the pulleys by the weight of the persons on it. Guides are provided to prevent the ladder from swinging forward and backward in case of being slack on the pulleys.

Messrs. L. H. Coburn, of Seneca, Kas., and E. D. Thompson, of Havana, Ill., are the patentees of an appliance for stripping and heading sorghum and sugar cane. This apparatus consists in a table or carrier for feeding the cane, a series of strippers and beaters or scrapers, and a suction fan or device and draught tube, which is adjustable for stripping the leaves from the cane and removing them, together with all dust, dirt, insects, and foreign substances. It also includes devices for cutting off and removing the heads from the cane. The apparatus will largely economize labor, it is claimed, and should prove a valuable adjunct to the equipment of both large and small plantations.

A patent has been recently issued to Mr. A. L. Lee, of West Chester, Ohio, for a scoop balance attachment for weighing scales. The object of the invention is for automatically balancing the weight of the scoop, so that only the net weight will be weighed by the scale. It consists of a lever under the platform, wherein the weight of the scoop is balanced by means of a stud projecting from the center of the bottom of the scoop into a hollow space in the upper part of the platform standard, and bearing on a stud projecting up from the arm of an intermediate lever having a fulcrum on the main lever, and bearing at its other end against the under side of the platform; the levers being so adjusted that they bear upward against the stud of the scoop with a power equal to the weight of the scoop.

## AGRICULTURAL INVENTIONS.

Among the recent inventions in harrows is the patent of Mr. A. A. Werts, of Big Creek, S. C. The invention consists in connecting together a number of small triangular harrows by suitable connecting bars. The harrows are adjustable according to the work to be done and the width of rows to be planted, and further they are reversible on their pivots, so that they may turn and yield to any obstructions that may be in the way. This machine may be used with either two or three horses; in the former case, two of the harrows may be removed in order to lighten the draught.

Mr. Walter G. Gray, of Ringgold, Tenn., has recently patented a corn planter constructed with a seed receiving box having a seed dropping slide, and provided with spring-pressed plates for controlling the removal of seed from said box. With the seed dropping slide is connected an elbow lever, a spring, a crank shaft, a bent hinged bar, and their connecting rods, whereby the seed will be dropped by the descent of the hinged bar into a cross furrow. With the seed dropping slide, the elbow lever, and the spring are also connected a crank shaft, a connecting rod, and a cord, whereby the seed can be dropped by hand.

A combined chopper and cultivator has been patented by Mr. Ellison A. Daniel, of Bluff Mills, Texas. The frame of the machine is V-shape, and the plows are arranged upon this in suitable position and relation, and all is so contrived that the driver from his seat may operate the plows to any required depth or may hold the plows entirely above the ground. The driver is also able to shift the plow frame directly backward or forward and also give the frame lateral play, so that the plows may be moved so as to avoid any plants which may have been set in the ground out of proper line.

Mr. Louis Gairaud, of Santa Clara, Cal., has recently obtained a patent for a simple device for marking off land to facilitate the planting of trees. The invention consists in a land marker constructed with two parallel bars provided with adjustable slides, carrying plow standards and plows, and with adjustable handles. Several plows may thus be secured at equal distances apart upon the parallel slides, and several lines drawn across the field simultaneously, one of the plows being drawn along a furrow previously made,

thus regulating the equal distances of the lines apart. After the field has been marked with parallel lines the machine is drawn across the field at right angles to the first marking, and the plants are set at the points of intersection.

## MISCELLANEOUS INVENTIONS.

Mr. Lee Roy Arthur, of Glen's Falls, N. Y., is the patentee of a simple contrivance for turning small sacks, as the fingers of gloves and other like articles of leather or cloth that are required to be turned after being sewed up, so that the seams will come on the inside.

A very simple and effective coal sieve has recently been patented by Mr. J. G. W. Punnam, of Saratoga Springs, N. Y., which is so constructed that the coal and ashes can be sifted with very little labor, and the spreading of the dust is avoided.

Mr. Volkert Van Vleck, of New York city, has secured a patent intended to promote strength and durability in dental plates, and also to secure a more accurate fit and a more natural expression to the face than is practicable when the plates are made in the ordinary manner.

An improved animal shears have been patented by Messrs. L. D. Gleason and R. A. Holt, of Lebanon, Mo. This invention relates to shears for shearing sheep, and provides a pair of shears which holds the skin of the animal stretched during the action of shearing, to prevent the skin from puckering up between the blades of the shears.

Mr. Michael Sexton, of New York city, has recently received a patent for an automatic flushing tank constructed with a series of graduated tanks placed one above the other, and provided with connecting siphons and a vent pipe, whereby a fixed quantity of water will be discharged automatically and at regular intervals of time into the place to be flushed.

An improved stove pipe and chimney attachment has recently been patented by Mr. J. M. Egnor, of Catskill, N. Y. The object of the invention is to form an upwardly tapering jet tube, which guides the products of combustion to the center of the pipe and prevents the air through which said products are ascending from forming a downward cold current to the fire, thereby preventing what is known as a "smoking pipe or chimney," and making a more uniform and thorough burning of the fuel.

Mr. John E. Evans, of Spanish Fork, Utah Ter., has recently patented a barbed wire fence. It consists in an arrangement of stellate or wheel bars within loops of the fence wires, said wheel bars being mounted horizontally on a couple of pointed wires, each having one end looped for interlocking with each other and passed through or around the opposite strands of the loops of the fence wires, the straight, or perpendicular, and interlocked bars forming the axis on which the wheel bars freely rotate.

Mr. D. C. Baughman, of Albion, Ind., has recently patented a device for opening and closing the cocks or valves of gas burners from a distance by automatic means, more especially street lamps, so that the lamps of a given district or section can be extinguished at once, and also lighted simultaneously by electricity. The invention consists in valve chambers combined with the burners and connected by air pipes, so that by pressure of air the valves or cocks can be moved.

Messrs. Alfred Roovers and Alexander Roovers, of New York city, have recently received a patent for an improved electric cane constructed with two tubular sections connected with each other and the lower section by non-conducting couplings, and provided with a battery and an induction coil connected by a screw, a rod, and wires with the metallic head and ferrule of the cane. The object of this cane is to provide a galvano electric machine for remedial purposes, which can be easily and conveniently carried.

Mr. Walter S. Phelps, of Wortendyke, N. J., has recently secured letters patent for a simple and effective device for placing torpedoes on the tracks of railways in case trains are to be signaled and stopped during foggy weather or at night. The invention consists in a box adapted to contain a series of torpedoes and provided with a sliding bar which grasps the torpedoes and carries them out of the box and holds them on the rail, to be exploded by the wheels of a passing train, to which bar torpedoes are fed automatically by a spring contained in the box. The torpedoes are fed through a spout on the end of the box toward the rails, the spout being provided with a hinged gate, which is automatically locked in position when no torpedo is held on the rail.

A patent has been issued to Mr. Homer E. Jenne, of Ben Lomond, Cal., for an improved interest indicator. This invention consists of a weighted disk provided with interest or other tables on its opposite faces, and journaled between two graduated stationary circular screens of the same diameter, provided each with a pointer and a slot, whereby the figures on the opposite faces of the disk and opposite the windows can be read. The circular screens are secured at their circumferences to a metal band provided with a hooked arm adapted to engage in the socket of a plate secured to a wall or other object, whereby the indicator may be turned around when desired, the metal band being provided with a brake to hold the disk in any desired position.

An improved steam cooking apparatus has been patented by Mr. James M. Johnson, of Northumberland, N. H. The invention consists in a cooking steamer constructed with a vessel having inwardly projecting beads near its upper and lower ends, and provided with a perforated lower partition, a close upper partition, and a water return pipe. The cover of the vessel has a conical top, and is provided with an annular trough and a water discharge pipe. Upon the top of the cover are two compartments, provided with wire gauze screens and discharge faucets. With this construction the cooking will be done with live steam under pressure, so that the substance being cooked will not become soggy or water soaked, and will be quickly and thoroughly cooked.

## NEW BOOKS AND PUBLICATIONS.

ILLUSTRATED CATALOGUE. Poole & Hunt, Engineers and Machinists, Baltimore, Md.

In this catalogue the publishers have most attractively presented the many good features of their Lefell turbine water wheel. The book is copiously illustrated with fine engravings showing some of the many applications of their wheel. The subject matter consists of descriptions and valuable tables, and the publishers have set a commendable example by omitting all recommendations and certificates.

A TEXT BOOK OF INORGANIC CHEMISTRY. By Professor Victor Von Richter, University of Breslau. Translated by Edgar F. Smith, A. M., Ph. D., Professor of Chemistry in Wittenberg College, Springfield, Ohio. P. Blakiston, Son & Company, 1,012 Walnut Street, Philadelphia, Pa.

With its eighty-nine illustrations and a chart of the spectrum this volume is a valuable "text book" as its title indicates. The "special part" contains an epitome of natural philosophy as applied to inorganic materials, that is in itself a text book to natural phenomena; and the department devoted to metals is particularly full of hints, suggestions, and directions to metal workers. The book, which is in a convenient form, is at once an instructor and a technical guide. The composition of the metals and the uses of their oxides form no inconspicuous portion of the volume.

## Notes &amp; 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) W. E. T. asks how to prevent nickel plating from rusting, and also how to restore its brilliancy. A. Nickel plating if well done on solid metal ought not to rust. If on cast iron which is porous, the nickel will be also porous if not thickly plated. You may oil the articles with linseed oil and heat to a little above the temperature of boiling water. Then polish with whiting, chalk, or electro-silicon. The oil fills the pores and prevents future rust.

(2) E. H. M. asks the meaning of all the figures in framing squares manufactured by Sargent & Co. Also if there are any fractional threads in pipes, and what is standard measure for any given size. A. For full explanation of the use of the carpenter's square, see the SCIENTIFIC AMERICAN SUPPLEMENT Nos. 88 and 89.

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| Iron pipe, $\frac{3}{8}$ has 27 threads.             |  |
| $\frac{1}{2}$ 18 threads.                            |  |
| $\frac{3}{4}$ 14 threads.                            |  |
| $1\frac{1}{4}$ 11 threads.                           |  |
| $1\frac{3}{4}$ 8 threads.                            |  |
| For bolts the usual threads are:                     |  |
| $\frac{1}{4}$ 16 threads.                            |  |
| $\frac{3}{8}$ 12 threads.                            |  |
| $\frac{1}{2}$ 11 threads.                            |  |
| $\frac{3}{4}$ 10 and 11 threads by different makers. |  |
| $\frac{1}{2}$ 9 and 10 threads.                      |  |
| 1 8 and 9 threads.                                   |  |
| $1\frac{1}{4}$ 8 threads.                            |  |

There has been much effort to harmonize the bolt threads among makers, but without success. Many machine shops have variations from the above.

(3) W. S. asks: What is malleable iron, and how made? A. Malleable iron is cast iron deprived of most of its carbon by burning out in melting; then casting as with ordinary cast iron; then annealing at a red heat for several days, the castings being embedded in an oxidizing material, generally pulverized hematite or anvil scales. Cast iron boxes are used for packing the pieces in, and for convenience of handling.

(4) W. K. — For staining wood black, see SCIENTIFIC AMERICAN SUPPLEMENT No. 207, page 3301. Brazil wood is used for producing red stains. Thus: Take 1 pound of Brazil wood to 1 gallon of water, boil three hours with 1 ounce pearl ash, brush it hot on the wood, and while hot brush the wood with a solution made with 2 ounces of alum in 1 quart of water.

(5) A. F. S. asks (1) how to finish mahogany wood in French polish, such as is usually applied in finishing photographic cameras; and can it be finished in a darker shade than the wood, where it is of light

shade? A. We would recommend you to use a red stain such as the following: Boil 1 pound Brazil wood and 1 ounce pearl ash in a gallon of water; brush over the work until of proper color. Dissolve 2 ounces alum in 1 quart water, and brush the solution over the work before it dries. Take a gallon of the above stain, add 2 ounces more pearl ash, use hot, and brush over with the alum solution. Then polish until of satisfactory tint. 2. Also how to finish maple to imitate mahogany? A. Mahogany stain on maple: Dragon's blood,  $\frac{1}{2}$  ounce; alkanet,  $\frac{1}{4}$  ounce; aloes, 1 drachm; alcohol, 16 ounces. Apply with a sponge or brush.

(6) J. R. asks (1) how to extract alumina from clay on a small scale. A. Alumina is prepared in decomposing the double chloride of aluminum and sodium, by heating it with metallic sodium, fluorspar or cryolite being added as a flux. 2. How to extract metallic sodium from common salt? A. Sodium is obtained by distilling a mixture of sodium carbonate with charcoal and chalk in the following proportions: Dry sodium carbonate, 717 parts; charcoal, 175 parts; chalk, 108 parts. 3. How to extract magnesium from any one of its compounds? A. Magnesium may be prepared by the electrolysis of the magnesium chloride (fused) or by the reduction of magnesium chloride with metallic sodium. For details in regard to these methods, consult Roscoe and Schorlemmer's Treatise on Chemistry.

(7) W. K. A. asks (1) if gutta-percha plates will answer in place of glass ones in the Toper-Holtz machine. A. Gutta-percha, or rather vulcanized rubber, has been used for the plates of a Holtz machine, but it is neither as cheap nor as good as window glass. 2. If they will answer, do they need varnishing? A. If used, it would probably be well to varnish them with shellac. 3. What will cement hardwood to glass or gutta-percha? A. Owing to the shrinking and swelling of wood by hygrometric changes, an elastic cement is required. Equal parts of pitch, gutta-percha, and shellac will answer the purpose. Hard rubber or vulcanized fiber would be better than wood.

(8) C. M. asks: 1. Is electricity ever used for warming houses or for cooking food? A. Experiments have been made in this direction, but this method of heating is very expensive. 2. Is a shrill note, or a low, dull note heard at the greatest distance? A. Experiment shows that the lower notes are heard the farthest. 3. Has the experiment of warming houses and of supplying steam for other purposes by using boilers situated a long distance from the place of its use, been successful? A. Steam is conducted long distances for heating and power purposes. Companies have been formed in New York and pipes laid for supplying steam for manufacturing and heating purposes on this principle. 4. Would two cannon balls of equal size and weight, fired from a gun on level ground, using the same quantity and quality of powder, the gun to be elevated at an angle of 45 degrees—under such conditions, would the ball, thrown exactly in a westerly direction, reach the same distance as the other ball thrown in exactly an easterly direction? A. There would be no appreciable difference.

(9) W. T. A.—Hand punches such as watch makers use for punching springs will punch holes in hoop skirt wire. Drill in a small drill press if you wish to save drills. Probably you use too much pressure upon the drill. Any jeweler in your place could tell you all you require to know about drilling small holes.

(10) M. W. T. writes: To settle a controversy, will you kindly give a comprehensive definition of momentum and inertia? The text books at hand are too indefinite upon the subject of momentum, saying simply that it is velocity multiplied by mass. Yet they say that it is "on account of" inertia that a ball keeps in motion after it has been projected from the hand. That, it seems to me, conveys an erroneous impression, for inertia is not a force which can carry a ball. By inertia we understand the incapability of a body to move itself while at rest, or to stop itself while in motion; that is to say, its incapability of doing anything; a purely negative quality, which is always the same in a body whether it is at rest or in motion. If mass is multiplied by velocity, the result is certainly a live force. The exertion of throwing a ball converts muscular force into motion, and this through the medium of the ball is delivered in the form of heat, etc. Thus the ball while between the points of impulse and impact is possessed of the force. What is the name of that force? It is not impulsive force, for that ends with the effort. It is not inertia, for inertia is not a force. A. According to Newton's law, "a body if in a state of rest or motion continues to be ever in a state of rest or motion unless acted upon by some extraneous force." In both these cases the body is in a state of inertia. To say that a body when once set in motion continues to be in a state of motion on account of inertia is simply to assert that it is obedient to Newton's law. It is set in motion by some extraneous force, but it continues in motion forever in a straight line on account of the absence of any force to deprive it of its motion, i. e. on account of inertia. "Inertia is that property of matter which cannot of itself change its own state of motion or of rest" (Ganot). We think that the difficulty you experience about momentum is due to your misapprehension of the meaning of the word. Momentum is not a force; it simply measures the force which has been communicated to a body. "Force is any cause which sets a body in motion or which changes the magnitude or direction of its velocity if in motion" (Ganot). We should say therefore, when force has been expended in setting a body in motion, that "between the points of impulse and impact" the body was possessed of energy. In what way this energy will develop itself when brought into relation with some other body or bodies, as air, body at rest, body in motion, etc., can only be determined by the conditions.

(11) B. W. — The black coating on the sample of zinc received we take to be bronzing. The following is used for that purpose: 1. Dissolve 5 drachms iron nitrate in 1 pint of water. 2. 5 drachms iron perchloride in 1 pint of water. 3. Dissolve 10 ounces arsenic chloride in spirits iron perchloride and 1 pint of water. 4. Japanning and japans; for full information on this subject see article with above title on page 5040 of SCIENTIFIC AMERICAN SUPPLEMENT, No. 316.