

RECENTLY PATENTED INVENTIONS.
Engineering.

LOCOMOTIVE BOILER FURNACE.—John Milton, Alexandria, Va. This is an improvement in other boiler furnaces of the same inventor, in which air is introduced into the fire box through perforated pipes in an inclined partition above the fire, protected by water beds or refractory jackets. According to this invention, water pipes are arranged in the fire box above the fire and have communication at both ends with the water space of the boiler, the pipes supporting two layers of detachable fire brick having cavities in their adjacent faces and perforated air pipes being arranged between the layers.

Railway Appliances.

CAR TRUCK.—George F. Fischer, Rochester, N. Y. This truck consists of saddles connected with standards connected by a spring truss, a bracket connecting the saddles being supported by the truss, while also connected with the truck is a center bearing and friction rollers, the latter being received by a platform provided with alldeways. The truck will support any car body, or may be used in pairs or in any desired number, or may be used without a floor as a support for a tank body, or as a flat or logging car. A special form of coupling is provided, and the trucks automatically return to the center of the body which they support when passing from a curved to a straight line of track.

COAL CHUTE.—John F. Schmadeke, Brooklyn, N. Y. For use where coal is liable to be broken by being dropped from cars on a high dump this invention provides a novel form of chute for connection with the hoppers. The chute is open at its top and has one side open, but adapted to be closed by a series of vertically sliding doors, which may be successively raised, beginning with the lowest door, so that the chute may be opened for a little distance from the bottom or for its entire height, according to the quantity of coal to be discharged.

Electrical.

BATTERY.—Charles H. Brown, Portland, Oregon. This battery has positive plates formed of an alloy of zinc and aluminum, preferably equal parts, the aluminum being first melted in the crucible and the zinc added, when the whole is agitated until the mixture is complete. Great economy is thus designed to be insured in the protection of the current, and by employing a number of positive plates, placed near each other but not in contact, the electrolyte is economized. The battery may be used for either open or closed circuit work for motors, electric lighting, etc.

Mining.

ORE SEPARATOR.—Robert Dilworth, El Paso, Texas. To rapidly separate gold and silver from sand and other tailings is the especial object for which this machine has been designed. A horizontal table held in inclined position and supported on lifting carriages separated from each other by transverse rifles, the lowermost rifle discharging into a trough through which pass the finer tailings, and there being mechanism for giving longitudinal and lateral oscillation to the table and a screen secured on it over the rifles. The heavier tailings do not pass into the rifle pans, but may be returned or delivered to a stamp for further treatment.

Agricultural.

HARROW.—Augustus Neal and Robert B. Suhr, Ashland, Neb. This is a sulky harrow in which provision is made for the use of parallel rows of teeth, to be laterally reciprocated in opposite directions when used upon an unplanted field. Means are also provided whereby certain of the teeth may be removed and a shield attached to the beams carrying the teeth in such a manner as to cause the shield to cover and protect young plants while the ground is being cultivated around them. By means of a simple and easily operated device the teeth may be made to enter the ground more or less deeply.

AUXILIARY MOULDBOARD FOR PLOWS.—Charles E. Fox, Natchez, Miss. This is an attachment to enable an ordinary plow to be used successfully in cultivating small plants, the auxiliary mouldboard facilitating the placing of the earth around such plants without injuring or covering them. The auxiliary mouldboard is shallow as to width and has a graduated overhanging upper edge curved upward and outward from the body, the forward end of the overhanging section meeting the front edge of its body portion, while the rear section is arched over the rear upper edge of the body. By the use of this device the storage and cost of an extra implement may be avoided.

ROTARY PLOW AND PULVERIZER.—George F. Whitmore, West Union, Iowa. The rotatable digger frame has colter disks connected near their outer edges by radial blades forming buckets in which operate followers automatically discharging the dirt after it has been elevated. A pulverizing platform receives the dirt forced out of the buckets and drops it to the rear of the colter frame.

Miscellaneous.

PRODUCING CHLORINE AND PURIFYING LEAD.—Farham M. and Cecil H. M. Lyte, London, England. This invention covers a process whereby chlorine is produced conjointly with the purification of lead and recovery of silver therefrom, the process being based upon the decomposition of a soluble chloride by nitrate of lead. The operations are carried on in a cycle, fresh quantities of lead and of calcic chloride being added for each cycle, the same nitric acid being used over and over again indefinitely, while silver is recovered as rich silver from impure lead, and pure lead is recovered, the calcic chloride liquors being decomposed into chlorine and lime.

VACUUM PUMP.—William S. Moore, New York City. This is a portable apparatus with a vacuum chamber, into which leads a pipe from a return,

in which ammonia may be subjected to heat, producing gas, which expels the air from the chamber. The exit pipe being closed, the gas is condensed by the admission of a few drops of water from a sealed cap, when, by opening a valve in an inlet pipe, the vacuum chamber may be filled with any fluid desired by placing the inlet pipe in communication therewith.

PIPE FITTING.—John McIntyre, Jersey City, N. J. This fitting is provided with an annular recess, from which extend branch openings to the pipe sections, a nut screwing in the recess to press the packing material through the branch openings into the pipe sections. A metallic packing is also provided, formed by concentric rings connected with each other by branch arms, the fitting very securely connecting the pipes with each other without danger of leakage at the joints or through sand holes or other defects in the castings.

A further patent of the same inventor provides a fitting more especially designed for pipes carrying corrosive fluid, to prevent leakage by the destruction of the threads in the couplings or other pipe fittings. The fitting has nuts having differential screw threads, and screwing one in the other, and both on the adjacent ends of the pipes, there being a packing between the nuts and pressed in contact with the joint of the pipes when the nuts are screwed up one on the other.

BRACE FOR TRENCHES, ETC.—George M. Picher, Logansport, Ind. A bearing block is connected with a plug in one end of an open-ended tube by a universal joint, while a head screwed on the other end of the tube has a removable outer annular section, through which a screw rod extends into the tube, a bearing block being pivotally connected with the screw rod at its outer end. The device is especially adapted for use in bracing the banks of excavations, being of simple and durable construction, easily applied and adjusted, and not liable to have any of its parts accidentally detached.

BATTENS AND PADDING IN HOUSE BUILDING.—George Knower, Greenwood, Wis. Thin, flexible lumber for making arched wooden ceilings by being bent into form, and too thin for tonguing and grooving, is liable to shrink and expose the joints—a defect which this improvement is designed to obviate. For this purpose battens of peculiar construction are provided, with padding of a paper material, so that on the shrinking of the lumber the padding and battens keep the joints closed and water and air tight. This padding and battens may be readily applied and made to serve as an ornamental finish for the woodwork.

WAGON SEAT.—Charles C. Field, New York City. This invention provides a simple and strong seat support, useful particularly on city trucks, to permit the driver to conveniently swing the seat over when not in use. Sockets are secured to supporting posts on the truck floor, and each of the sockets is formed with a rest, which is engaged by a bar hinged on the socket and fastened to the seat proper. The seat is readily swung forward and folded against the front sides of its supporting posts when not in use.

OILCLOTH CUTTER.—James W. Lewis, Ganister, Pa. Dealers who cut oilcloth from the web are provided by this inventor with a cheap and simple device by which the cloth may be conveniently measured, squared, and cut off. It comprises a guide, consisting of parallel and slightly separated strips, having longitudinal grooves in their inner edges, and a knife adapted to slide between the strips, with a guide plate at its lower end aiding between the grooves. A tape measure is hung at one end of the guide.

CABINET.—William S. Stanley, Washington, D. C. A chiffonier or chest of drawers, washstand, etc., is afforded by this improvement, the construction being such that when the cabinet is not used as a washstand or dresser, its upper portion will be closed and conceal all contained therein. The front panel may be occupied by a mirror, and brought into the best position for use without interfering with the furniture of the washstand, and the sides may be used as splashboards, with or without mirrors.

SPRAYING DEVICE.—John J. Dugan, Salem, Oregon. For spraying plants by hand, the hollow handle of this device is adapted to support any desired form of nozzle in such way that it will by gravity assume a position to direct the sprays upward, so that the water may be directed to the under sides of the leaves. The device is particularly adapted for spraying solutions to kill insects on the plants.

CIGAR-TIP CUTTER.—Ira C. C. Rinehart, Kansas City, Mo. This is a portable device, to be set on a counter, and it has a coil spring mechanism with revolving cutter, and an escapement with gears and trigger tripped by the entrance of the cigar tip, thus allowing the cutter to rotate and cut off the cigar tip.

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NEW BOOKS AND PUBLICATIONS.

HOME WARMING AND VENTILATION AND HERENDEN MANUFACTURING COMPANY'S SOUVENIR EDITION OF CATALOGUE OF FAULTLESS FURNACE HEATERS. Geneva, N. Y. 1893. 16mo. Pp. 64+288, illustrated.

Both the hot water and steam heating systems are described. The souvenir catalogue is chiefly filled with half tone cuts of houses in which the heating apparatus of the Herenden Company has been installed. The pamphlet on home warming and ventilation is composed of a collection of articles by persons who are thoroughly familiar with the subject but who are not connected with any business firm, so that their judgment in regard to various systems is not biased by mercenary motives.

ELECTRICITY UP TO DATE. By J. B. Verity, London and New York: Frederick Warne & Co. 1893. 16mo. Pp. 168. Illustrated. Price 75 cents.

This little work has now reached its third edition. We learn from the preface that the author finished his work in January, 1893. The book is intended for non-professional readers and does not go into details. It probably answers a useful purpose among this class of readers.

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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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(5320) The Harrodsburg Water Company write: Is there any phone attachment by which you can detect leaks in water pipes, such as dropping wire in service box or attaching same to pipe? Also, I have a pressure gauge at pump station graduated in pounds and feet, by which I determine when stand pipe is full. When same is at rest I have no trouble, as the hand is still and steady, but, while pump is working, the hand vibrates 15 or 20 pounds, and cannot tell when pipe is full only by stopping the pump. Is there any attachment to steady same? I take pipe to gauge out of discharge of pump. A. There has been a number of devices invented for detecting water leaks and waste from neglect during the night, by attachments to the street service pipe; some by phonograph and others by differential pressure by nearly closing the street cock. There are practical difficulties in their adaptation, mostly in the expense of maintaining a uniform system. It was tried in New York some years since, and found to cost more than the lost water. By putting a cock in the pressure gauge pipe and almost closing it, the gauge hand will not vibrate to any extent, and the mean of the small vibration will show the pressure or height of water in the stand pipe. By simply holding a rod of wood against the pipe, a current of water passing through it can be detected. If the cocks are supposed to be closed, such current would indicate a leak.

(5321) W. F. S., Jr., Sandusky, O., says: I send you a specimen of worm found in a yard adjoining our premises. It was found lying on the sidewalk under a crab apple tree. As nobody around here ever saw one like it, any information you may give in the columns of your valuable paper concerning it will be of interest. A. Reply by Professor Riley: The specimen is the larva of the Turnus swallowtail (*Papilio turnus*, Linn.), a large and handsome lemon yellow butterfly, the wings of which are banded and bordered with black. It is not uncommonly seen flitting about orchards and over meadows, and is one of our handsomest and most striking species. It is widely distributed, being found in nearly all parts of the United States and Canada, and its larva feeds on a great variety of trees and plants and affects particularly apple, cherry, and allied trees and also basswood. The larva occur singly and are rarely abundant enough to be of any economic importance, and

have a purely aesthetic and scientific interest. The very young larvae are black in color, roughened with brownish black tubercles. When full grown the body is smooth and greenish, thickening toward the reddish brown head. On the dorsal edge of the first segment is a raised yellow fold from which the larva protrudes, when disturbed, a fleshy, yellow, forked organ giving off a very disagreeable odor, which is the means of defense of this otherwise helpless larva against its vertebrate or other enemies. Other markings peculiar to the larva are a raised yellow fold on the hinder portion of the fourth segment, bordered with black, and an eye-like spot inclosed with black on either side of the third segment. The larva transforms to a chrysalis in the early part of August, fastening itself for support to fence posts or other objects by the help of a silken band around the middle of the body. This chrysalis changes to a dull brown color, and in this state the insect hibernates until the following spring, when the butterfly is disclosed. The first specimens of the butterflies appear during May and become more abundant during June and July, depositing their nearly round dark green eggs singly on the leaves of the food plants.

(5322) C. E. D. asks: 1. Is there any process, chemical or other, by which illustrations, half tones or even woodcuts, may be transferred onto white paper? A. We do not think there is any very satisfactory way of accomplishing this. You might, however, try saturating the print with naphtha, and applying it to the plain paper under very heavy pressure, leaving it for some hours to dry. 2. Would like to know the best method of repairing a flute of grenadilla wood that has become cracked sufficiently to slightly injure the tone. A. Probably the best method of repairing the flute will be to fill the crack with a cement composed of gutta percha, pitch and shellac, equal parts. 3. Please to give directions for making leaf photographs. A. If you refer to photographs which lie flat without mounting, we think you will succeed by stretching the paper in a suitable frame while wet, and allowing it to dry under tension. 4. At what height above sea level will eggs cease to boil, and why? What would be the temperature of boiling water at 15,000 feet above sea level? A. The height varies with the pressure of the barometer. At high altitudes water may boil at a temperature below that required for cooking eggs.

(5323) R. S. C. writes: 1. The wheel on my wagon is 3 feet 11 inches diameter. How many revolutions will it make in a mile? A. Your query is one of simple arithmetic. A wheel 3 feet 11 inches in diameter will be 12 3/4 feet in circumference. A mile is 5280 feet; 12 3/4 (the circumference of the wheel) will go in 5280, 427 7/8 times, which is the number of revolutions made by the wheel in the distance given, provided there are no slips. 2. Also please tell me where I can get the directions for making the telephone used by the Bell Telephone Company. A. For directions for making telephones consult SUPPLEMENT, No. 142.

(5324) J. T. D. says: I wish to build a reservoir for holding water. I want it to cover about two acres for cutting ice from. The ground upon which I wish to construct pond is partly clay and partly black loam. Can you tell me what is necessary in order to make it hold water, as I expect to get my water supply from wells outside of pond? A. In excavating for an ice pond in a mixed soil of clay and loam, the loam should be carried to the banks and the clay saved for a clay and sand or clay and loam puddle over all parts of the ground where there is no clay bottom found, and up the sides of the bank to above the water line. The clay puddle should be made as thick as the clay found in the excavation will permit, and not less than 6 inches for shallow pond for ice purposes, say of 3 feet in depth. On the surface should be spread a layer of as clean sharp sand as can be found, 3 inches or more in depth, extending to the top of the bank. This will keep the water clear and free from clay and will make clear ice.

(5325) J. A. W.—Answer by Professor Riley: The plant sent is a species known to botanists as *Ezochorda grandiflora*, a species which only occurs in cultivated gardens in this country, but which is native in northern China. There are only two or three species of the genus to which this plant belongs, and all of them come from the same region in China. They are flowering plants belonging to the family Rosaceae, and the one in question is not uncommonly met with in botanical gardens or in ornamental cultivation.

(5326) A. H. S. writes: I have a cellar walled and arched with brick, cemented inside with Portland cement, top, sides and bottom. I have it thoroughly drained. When the atmosphere is dry the walls of cellar are dry, but when the atmosphere is moist (as for instance 2 or 3 days before a storm) the walls begin to sweat, which will gather in large drops and run down to floor, making a rather puddle of water. What can I apply to the walls to stop this condensation? A. The best remedy for condensation on a cellar wall is to fir off, lath, and plaster, on all parts exposed to earth backing. Only a non-conducting material between the wall and the moist air will prevent the condensation. A covering of felt would do, but should be made of asbestos or mineral wool to avoid any unpleasant odor.

(5327) G. B. writes: I would like to put up a bell in my house and use an earth connection. Now if I connect the wire with the gas pipe on second floor, and then connect the street side of meter with the house side, would I get a good earth? If not, could you tell me how to get a better one without running a wire all the way down to the cellar. A. Your proposed plan for making the ground connection is very good. We think it will be unnecessary to make a connection around the meter.

(5328) L. E. Y.—We see no fault with your diagram. Your difficulty probably arises from too much resistance in your circuit or too little battery power. Try 2 or 3 additional cells of battery.

(5329) F. W. B. asks: What is the origin of the word penny as applied to nails? A. Nails are called 6, 8, and 10 penny according as 1,000 of a particular kind weigh 6, 8, or 10 pounds; "penny" being the old term used for pound.

(5330) W. T. D.—Reply by Professor Riley: The spider sent is one of the orb-weaving species known as *Epeira domi-urum*, Hentz. It is not