

Swedish navy; Captain Nepean, director of the English life-saving society, etc.

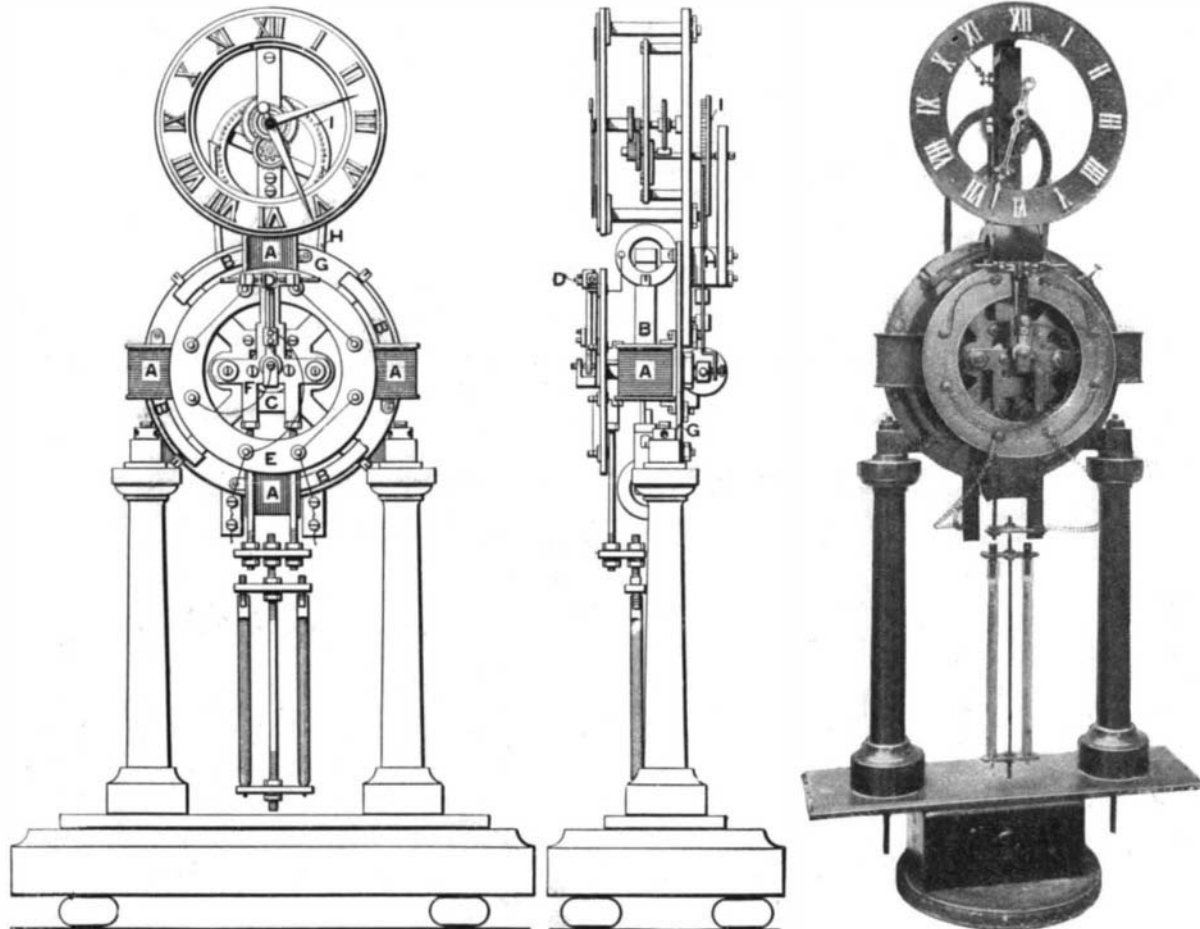
According to the rules, the jury had the right to award the whole of the prize to one person or divide it among several competitors; the awarding of the prize was not obligatory, and it could be withheld for a future competition. As a result of the examination of the different systems, the jury found that the appliances designed by Mr. Leopold Roper, an experienced English naval architect, came the nearest to a satisfactory solution of the problem; as, however, the final solution had not yet been reached, and there was still room for considerable improvement, the jury decided not to award the whole of the prize at the present contest. The sum of \$2,000 and a gold medal was awarded Mr. Roper, as his system was considered by far the best in the present series. A description of these devices will be useful in showing what lines should be followed by inventors who wish to enter the next competition for the prize. These devices include, first, an improved system of life-boats and davits, and second, a life-raft which the committee think is the most valuable.

The system of life-boats will be readily understood by referring to the figures, which represent the working models shown in the section. The first of these shows the boat suspended from the davits in its normal position. The davits are of steel channel and are light and strong; they are pivoted below the deck and carry in the rear a pivotal support which is attached at the level of the deck to a guide-piece which slides back and forth in a hollow deck beam by means of a large screw. This screw is operated by a winch at the side, worked by one man. When the winch is turned, the davits rise, being pushed up by the rear arms. The boat is then ready to be lowered. This is done by a second winch in a corresponding position on the other side, which unwinds the steel rope which supports the boat, and the boat may thus be lowered to either of the decks and to the water in a very short time by the man in charge. The use of a single steel rope is a great improvement over the ordinary block and tackle; when not in use it is for the most part inside the davit, and consequently well protected from the weather, and there is no complicated arrangement of ropes to become tangled up when the boat is released. As both ends are let go at the same time, there is no danger of tipping up the boat and throwing out the occupants, as often happens. The advantages of such a system over the ordinary davit with block and tackle are at once apparent. The boats themselves were also

recommended by the committee. They are built of steel and are lighter and stronger than the present wooden ones, besides not being subject to warping or leaking when exposed to the weather. They are made with double bottom and a series of airtight compartments, and are one-fifth lighter than other boats of the same size. On account of their great buoyancy they may be fully crowded with passengers without danger of sinking. The "Campania," of the Cunard line, has been fitted with twenty boats on this system, and it is of interest to compare the figures with relation to the ordinary boat. On the "Campania" the weight of each boat of the ordinary type is  $3\frac{1}{2}$  tons, making a total of 70 tons. Each boat carries 60 passengers, or in all 1,200 persons are taken. The forty davits each weigh 2,600 pounds, or a total of 52 tons, and the weight of boats and davits is 122 tons. To lower all the boats, allowing 10 men for each, requires 290 men. By Roper's system, each boat weighs  $2\frac{1}{2}$  tons, or 50 tons total; the boats carry 110 persons each, providing for 2,200 passengers. The 40 davits weigh each 1,800 pounds, making 36 tons, or for the whole system, 86 tons. Two men are required to lower the boats, making only 40 men. It will be seen that 2,200 persons are provided for, against 1,200, and the system weighs 86 tons against 122 tons; the greatest advantage is in the small number of men necessary, or 40 against 200 by the old system. For these reasons the committee consider that this system of life-boats is a great advance upon the present system and recommend its adoption; it is, however, the life-raft de-

signed by Roper which is considered to be a step in the right direction toward solving the problem.

Our second engraving shows the appearance of this raft, which is large enough to carry 600 persons. It is built of steel, with double bottom, and divided into compartments forming air chambers; in some of these supplies of water, provisions, etc., are carried. The raft is supported normally above the deck and serves the purpose of the captain's bridge, it thus does not take away any extra room, and costs but little more than the ordinary form of bridge, this being estimated at \$2,000. The raft is supported on each side by a heavy angle-piece, serving as a guide, in which it may slide back and forth by sets of rollers placed at intervals along the bottoms and sides. These cross-pieces are supported at each end by solid uprights, which are firmly secured to the deck; the cross-pieces are held in place by a simple clamp device, which may be instantly released by moving a lever. In case of shipwreck the raft is loaded with passengers, and a man at each side releases the clamp, thus lowering the guide-pieces at that end, and the boat rolls out by its own weight to the water's edge. This movement is shown in our engraving, where the oblique position of the guides will be observed, also a second guide-piece in front, which normally forms part of the upright support, but is now lowered, and serves to guide the boat into the water. As will be seen, the whole arrangement is one of great simplicity and not likely to get out of order, and can be operated by a few men. In the compartments may be placed provisions for six days, besides sails and tackle, etc. The buoyancy of the raft is



FRONT AND SIDE ELEVATIONS OF ELECTRIC CLOCK.

ELECTRIC CLOCK RUN BY EARTH PLATES.

amply sufficient to keep it afloat even if some of the compartments should become damaged. It may be remarked that the raft may be utilized under ordinary circumstances for landing troops, horses, etc., and can give good services in this way. This system of life-rafts has been tested practically upon H. M. S. "Polyphemus," which was provided with two of these rafts, of practically the same design as shown in the present model; the trials showed that they fulfilled all that was claimed for them, as each raft contained 200 men with supplies, etc., and the launching was carried out in about 45 seconds.

The committee are decidedly in favor of life-saving en masse, and for this reason have approved Mr. Roper's life-raft as the only device in the present competition which answers to this idea in a practical manner. Most of the inventions, outside of individual life preservers, seem to have been made by persons who had but little practical knowledge of the conditions to be met with. It should be observed that all appliances which require skill in putting together at the moment of shipwreck are almost valueless, as there is generally not sufficient time to manipulate such devices, and the crew of a transatlantic liner, composed as it is of untrained men, many of whom may have been taken on board at the moment of starting, cannot be depended upon for any great service in this connection; devices must be looked for which take only a few men to operate for the saving of a great number of passengers, such as the large life-raft. The type designed by Roper is, however, somewhat large, as a heavy raft for 600 persons

might cause some trouble in getting started; by using a small-sized raft and increasing the number, a more satisfactory result would, no doubt, be obtained. The committee do not favor the system of water-tight compartments for vessels, on account of the cost and diminution of the capacity of the vessel; in a severe collision, such as that of the "Bourgoigne," the system would not have availed much. Another point that should not be overlooked is that a vessel sinks end first, and accordingly many of the detachable deck-houses and other similar devices would fail to work. As it was not to be supposed that a first competition would be entirely successful, it has been decided to hold a second in the autumn of 1901, and a circular to that effect will be issued probably before the end of this year; it may be held at some point on the English Channel, as this will give a favorable opportunity to try some of the devices in actual practice.

Out of the great number of devices a few have been selected for illustration as showing the general character of the exhibit.

One of the views shows some of the American inventions. To the right are two systems of improved davits and life-boats, and in the center is a model of a "marine brake," consisting of a large plate which is pivoted against the side of the vessel and may be swung out at will, thus slowing up the vessel by the resistance-surface it offers. Of the two larger models below, that to the left shows a type of inclosed life boat for a great number of persons, built of copper, and the second model represents a method of lessening the effect of collisions by surrounding the vessel with a series of

rubber buffers. On the wall are several rubber garments which are inflated with air, etc. A great part of the exhibit is made up of individual life-saving devices, which are inflated or made of cork, air cylinders, etc. One view shows a number of these devices. The figure on the left has garments which may be inflated, also a rubber air belt, and next it is a vest made of cork and chamois skin. The two figures in the center carry a kind of long life-belt made of a number of sections of impervious material stuffed with a mixture of lamp-black and cork, and near it is a belt made up of semi-cylindrical air-chambers of waterproofed leather.

Two English systems of water-tight doors for the compartments of vessels are shown. The door seen on the left is normally held open by a catch which is released at will by an electro-magnet or a hydraulic cylinder and the door swings shut and is locked automatically. In the second system the doors slide into place, forming a water-tight joint, and all the

doors of the vessel are controlled from a central point. Either hydraulic pressure or electric motors are used for the closing. The motor on the left pushes the door into place by means of a long screw, which is turned by gearing and works in a nut on the door. On the right is a hydraulic system for accomplishing the same movement; above and below are the cylinders whose pistons act upon the door, and it is closed or opened by sending the pressure into the forward or rear pipe. Both systems are worked from a central point either by a series of valves or electric switches.

#### ELECTRIC CLOCK RUN BY EARTH PLATES.

Our occasional contributor Mr. N. Monroe Hopkins has prepared with a great deal of care an article on a new electric clock of his devising, which is well-nigh perpetual in its action, besides being accurate and practically noiseless.

The general appearance of this clock is shown in the perspective view, and much of the detail is given in the outline side and front elevations. The design and its carrying out are so novel and attractive that we have given in the current SUPPLEMENT the author's article in full, with many additional illustrations, the whole being sufficiently explicit to enable a careful workman to make it. The clock shown in the perspective view was mounted on a suitable base and inclosed in glass.

The back plate, G, which supports the entire mechanism, is secured to the caps of the pillars, and has, at its center, the knife-edge bearing of the pendulum. To this back plate are secured four magnetic spools, A;

at equidistant points, and a brass spider, to which all the parts of the pendulum are attached, has a knife edge which rests in the groove in the support projecting from the back plate, G. The knife edge and its support are hardened in cooled mercury, thus rendering them practically indestructible by wear. To the arms of the spider are attached four curved bars of soft iron, which in the regular operation of the clock are drawn into the magnetic spool and released once every second. To the front of the spider is secured a frame, F, from which is suspended the pendulum weight. The weight in this case consists of a rod and two cross-arms, and two tubes filled with mercury which rest on the lower cross-arms, the upper ends of the tubes being supported by screws passing through the upper cross-arms into the tubes.

The frame, F, has an arm which extends upwardly and carries two screws, the one on the left being platinum-pointed. The arm of the hard rubber hammer, D, is pivoted to the frame, F, at the center of oscillation and carries a platinum point capable of making an electrical connection as the hammer, D, swings over and carries it against the platinum-pointed screw. The magnetizing coils are connected in series and the terminal wires are connected one with the arm of the hammer, the other with the platinum-pointed screw.

Above the pendulum, and behind the dial, is supported a train of gears which moves the hands and is moved by the large pin wheel, which takes its motion from a pawl vibrated by the pendulum. A second pawl prevents the pin wheel from moving when the actuating pawl is drawn down for a new movement.

The clock receives its current from an earth battery consisting of ten pairs of zinc and copper plates, each twelve by eighteen inches, buried in earth at a sufficient depth to be kept constantly moist, and connected with the clock by rubber-covered wires. With a battery of this kind the clock will run until the plates are destroyed. If desired, it may be operated with four to six cells of gravity battery.

The various parts of this clock must be perfectly balanced, and the regulation by changing the length of the pendulum must be done with considerable care.

Notes on the National Academy of Sciences Meeting.  
BY WILLIAM H. HALE.

Many pictures were shown of the forms of cephalopods from their first appearance, which was probably in the Potsdam, certainly in the Quebec group, below the Chazy, which is the base of the Ordovician, down to the present time. Also pictures of the development of individuals from embryonic to senile stages.

Also the development of many morphological characters was shown in a sequence of formulas as a mathematical statement. The development of these animals, both secular and individual, was shown to be a harmonious chapter of the grand evolution of life, precisely parallel to what Cope has shown for vertebrates and Beecher for branchiostomidæ. Space limits me to mention a single cycle, the change of form. Beginning with straight shell, curled forms follow. Very late, they straighten out again. This connects ammonites with the young of orthoceras. Every bilateral part of the shell is affected by this coiling and uncoiling, whereas the median line is not.

Forms acquired late in life appear earlier and earlier in the embryo, till finally they disappear, owing to the superior power of the embryo. This is called tachygenesis.

The embryo of straight form is coiled, recalling the adult form of its ancestors. In old age there is a gradual decrease of acquired characteristics.

When a new form is developed late in life, it goes through the same series of changes as the embryo.

It is not till many phases of evolution have occurred that old age shows any distinctive characteristics. Thus in the Silurian it is difficult to find any animal which shows any effect of old age.

After certain forms have developed there is a reversion to simpler forms. Just as old age becomes a second childhood, so forms of earlier geologic age reappear today. The life cycle of the middle group corresponds to the secular cycle of the entire group.

It seems impossible, when electric traction has so firmly established its superiority over any other means

of power for the propulsion of street cars and light railways, that the obsolete cable system should be decided upon in a large city like Edinburgh (Scotland). At a recent meeting of the Municipal Council of that city the question of erecting a new cable power station for a section of the tramway was discussed. One councilor, who is a firm advocate of the cable system, emphatically averred that Edinburgh possessed the finest tramway system in the world, and by dint of persuasive eloquence succeeded in carrying the vote favoring the erection of the cable station. This will involve an outlay of \$100,000, a sum sufficient, as another councilor remarked; to convert the whole section for which the station is being erected to the overhead trolley system.

The Current Supplement.

The current SUPPLEMENT is No. 1300, the first number having been issued January 1, 1876, and as the paging has been consecutive throughout this long period, the last one bears the number 20846. The front-page engraving is an excellent portrait of Giuseppe Verdi. "High Water Protection Methods of the Lower Mississippi River" is by William Joseph Hardee. "A Graphic Description of the Efficiency of Naval Guns" is a most important technical article. "Salt Water Aquarium at the Paris Exposition" illustrates the most modern type of aquarium. "An 'Electric Earth Clock' and Its Construction" is by N. Monroe Hopkins, and is accompanied by working drawings.

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RECENTLY PATENTED INVENTIONS.

Agricultural Implements.

**CULTIVATOR.**—FERGUSON G. BRIGHT, Commerce, Mo. The cultivator has two shovel-beams sustained at their front ends. A rod extends rigidly between the rear portions of the shovel-beams. On the front portions of the shovel-beams a foot lever is mounted, each having a return bend permitting the rod to pass beyond each side of the longitudinal line of the foot-lever. Chains or other flexible connections pass between the foot-lever and the shovel-beams and run over the axle of the machine. The chains serve to limit the downward movement of the beams, and consequently the depth at which the shovels enter the ground. The foot-levers, when pressed down, will throw the beam up and disengage the shovels from the ground.

**HORSE-HOE AND CULTIVATOR.**—EDWARD J. BRYAN, 1504 Twentieth Street, South Highlands, Birmingham, Ala. The inventor provides an improved mechanism by the use of which he is able to bar off or scrape to narrow ridges the beds forming the row; to chop or hoe the desired space out of the row of plants; to dirt the plant after hoeing, means being provided to prevent the covering of the plant; and to plow, pulverize, cultivate, or rake the full width of the row.

**PROCESS OF AN APPARATUS FOR PROTECTING TREES OR VEGETATION AGAINST COLD.**—JAMES F. TUCKER, United States Department of Labor, Washington, D. C. The inventor has observed that tender vegetation on the south shore of a body of water usually escapes the blighting effect of frost. In Florida the deep-water rivers and lakes are fed by springs which contribute to the heat treasured up from the long summer months, so that during a cold spell, the air is brought in contact with a body of water at a relatively high temperature. A cloud of fog or vapor is thus produced, completely enveloping the locality to the south and east and protecting the vegetation. The present invention comprises means for making an artificial fog in the orchard or over the ground to be protected. The essentials are heat and moisture applied in such a way as to make sensible the latent heat as an adjunct to the heat actually supplied.

Electrical Apparatus.

**BARBER'S ELECTRICAL APPLIANCE.**—MARTIN SCHUPNER, Nyack, N. Y. Mr. Schupner has devised an improved electrical apparatus arranged to permit a barber or other operator to apply a current of electricity of desired intensity to the human body, mainly, however, to treat the scalp for strengthening, drying, or assisting the growth of the hair.

Engineering Improvements.

**STEAM-TRAP.**—GEORGE H. GROE, St. Louis, Mo. The object of the invention is to provide a steam-trap with a simple means for regulating the tension-spring, whereby it is made unnecessary to shut off or take the trap apart to adjust the spring, thus saving time and expense. A diaphragm divides the trap-casing into upper and lower chambers. The inflow of water acts upon the diaphragm in order to operate a valve, so that the proper level may be attained. The action is entirely automatic.

Mechanical Devices.

**GAS-PRESSURE REGULATOR.**—THEODORE HAEN, Kötzenbroda, Saxony, Germany. The use of gas-engines with an intermittent gas-supply is accompanied by the disadvantage that in the gas-main variations in pressure are perceptible. Ordinary gas-governors imperfectly overcome the difficulty, for the reason that only

a single gasometer-hood is employed. According to the present invention the gas, before passing into the gasometer-hood which controls a gas-supply valve, passes through a special pressure-regulator loaded in conformity with the friction of the gasometer-hood and in such a manner that the gas can pass into the gasometer-hood without perceptible impulses occurring in the regulator and gas-main.

**ROLLER-BEARING.**—JOHN S. GODFREY, Harrington, Wash. A casing has the ends of its inner wall curved inwardly. Guide-rollers extended through the casing are supported by a cage. The ends of the guide-rollers are rounded. Antifriction-rollers are supported by the guide-rollers and have rounded ends. The rounded ends cause very little friction.

**TYPE-WRITER.**—MANUEL S. CARMONA, Mexico, Mexico. The type-writer is an improvement on Mr. Carmona's previous inventions in machines in which a small number of keys is employed which either singly or in combination govern the action of a type-locating mechanism and of a printing device. The present invention provides means for locating the type, which means are positive in action and are not liable to deteriorate by wear. The arrangement of parts is so simplified that the movement of the carriage will be relatively slight. An improved mechanism is furnished for effecting the impression.

**SAW-FILING MACHINE.**—GRANVILLE BARTLETT, 347 Trumbull Avenue, Detroit, Mich. The machine is of that form in which a pair of clamp-bars hold the saw-blade with its teeth uppermost and a sliding carriage or guide frame for the file-holder is arranged to be moved longitudinally along the clamp-bars and has guide-seats to receive the file-holder in its reciprocating movement across the saw. The present invention consists in the peculiar construction of the saw-clamp; the peculiar construction of the file-holder guide or carriage; and in the peculiar means for adjusting the angular position of the file in regulating the inclination of the teeth to be cut.

**PHOTOGRAPHIC SHUTTER.**—JOHN V. COATS, Saratoga Springs, N. Y. This spring actuated shutter can be regulated for time and instantaneous exposures. The winding mechanism is so controlled that the spring will be equal in action at all times and at no time fully exhausted. The camera-shutter is turned by the spring. Check-arms are carried by a trip-lever for engaging and stopping the shutter at the proper point in its revolution and for releasing the shutter.

**MACHINE FOR MAKING SHOVEL-HANDLES.**—AUGUSTUS R. FEISTEL, Philadelphus, Penn. This invention is a machine for cutting the D-holes in the blanks of shovel and fork handles. A handle-blank is clamped in a vertically tiltable holder pivoted in a horizontally-slidable carrier, by which it is fed to a rotatable cutter-head. The holder is tilted in vertical position while the cutter is forming the D-hole and is thrown back to a horizontal position as the carriage recedes. The blank is then reversed in the holder and the operation is repeated. The inventor assures us that a machine has been constructed and is now in successful operation.

**DRAG-SAW.**—JAMES H. PERKINS, Seattle, Wash. A very compact and serviceable machine is provided by the present invention. All the parts are carried snugly on the bed or framing in position to be easily reached for operation. On a framing a bracket is mounted to move, carrying a wrist-pin to which a connecting-rod is attached as well as a saw-beam. A tower is mounted on the frame. In the tower a movable sling is carried, which sustains the free end of the saw-beam. The sling is moved by winding devices at the top of the tower.

Railway Appliances.

**VEGETATION-BURNER FOR RAILROAD-TRACKS.**—CORNELIUS BURKE and JOHN TOOLE, Monroe, La. The invention provides a new and improved vegetation-burner for railroad-tracks, which burner is especially designed for use on a push or flat car. On a truck, levers are fulcrumed, extending rearwardly beyond the truck. These levers are provided with nuts between their ends, which nuts engage screw-rods on the truck. The outer ends of the levers carry a tube from which burner-pipes depend. A transverse sheet of flame is produced, which can be raised or lowered so that high or low weeds or grass can be readily destroyed.

Miscellaneous Inventions.

**SAD-IRON.**—IVER WICKLAND, South Superior, Wis. The sad-iron is heated by gas or vapor supplied from oil in a tank carried by the sad-iron. A box is fitted in the front portion of the sad-iron body and forms an oil-cup, the box being in communication with the oil-supply. A retort communicates with the box and a burner is situated rearwardly of the box.

**BRIDLE BLIND.**—FRANK MACK, Manhattan, New York city. Mr. Mack has devised blinkers or blinders which can be made completely to blind a horse and thereby to stop him. Each blinker comprises a pivotally-mounted shade movable on its pivot to cover or uncover the eyes of the horse, and a wheel with two cams to actuate the shade.

**FOLDING FLASH-LIGHT BRACKET.**—OTTO C. BOTZ, Sedalia, Mo. The bracket has a supporting-bar for attachment to a socket in the camera. An extension-rod is fulcrumed on the supporting-bar. Pivotaly connected with the extension-rod is an extension-upright consisting of telescopic sections for carrying the flash-light material. A spring holds the sections as adjusted.

**MAIL-BOX.**—WILLIAM J. WEAVER, Leetonia, Ohio. This invention relates to mail boxes particularly adapted for use on railroad mail-routes. The box is of simple construction and may be opened by a man riding on a horse or sitting in a carriage. A signal is provided for the box, which signal indicates whether the box contains mail for collection.

**BRUSH.**—MAURICE ROSENTHAL, Manhattan, New York city. Paint, varnish and calcimining brushes require bridling to enable the bristles to be properly controlled. This is generally done by tying a string around the bristles just below the ferrule. Brushes are best when the bristles are long, thus giving elasticity, or, as painters call it, "life," to the brush. The inventor attains these ends by fastening a flexible center-piece to the brush within the mass of bristles and tying the bristles snugly around the center-piece.

**BEDSTEAD FASTENING.**—FRED C. F. PETERS, Monroe, La. The purpose of the invention is to provide a bedstead-fastening which will securely bind the parts of a bed together and prevent them from becoming detached by breakage or movement. The fastening comprises two sections, the first of which has a flat outstanding part and the second of which has two flat outstanding parts lying in parallel planes and receiving the outstanding part of the first section between them. A pin is carried by the first section and is disposed transversely to the corresponding outstanding part. The second section has a recess in one of its outstanding parts to receive the pin.

**FITTING.**—JOHN R. MOODY, Perry, Iowa. The fitting is designed for repairing broken pipes, and for connecting pipes with one another, with elbows, reducers, tees, valves, without the necessity of threading the pipe or the device with which the pipe is connected. The pipe-fitting has external threads and is adapted to receive the

ends of a pipe. A collar is fitted on the pipe end, is removably secured, but is held against longitudinal movement. The collar abuts on the end of the fitting. A coupling is slipped over the pipe and screws on the threads of the fitting. A packing in the coupling is adapted to be compressed against the collar.

**WASHBOILER.**—HIRAM H. TUTTLE, 1210 Vine Street, Philadelphia, Penn. When heat is applied to the boiler, the water begins to boil; and a circulation is established downward along the sides and ends of the boiler. The water is forced up through lines of tubes from the bottom with a direct force and discharged by such direct force below the clothing to be washed. The clothing is thereby opened up and subjected to the action of the circulating water.

**STAGE-ILLUSION APPARATUS.**—MORGAN A. SHERWOOD, National Theater, Washington, D. C. The invention provides an apparatus for producing a scenic representation of the burning of a person at the stake, with wonderfully realistic and startling effect, and also means for producing fire and flame effects in connection with representation in general.

**METALLIC PACKING.**—WILLIAM H. PRENDERGAST, Savannah, Ga. The packing is designed to be used on piston-rods and in air-pumps and is composed of packing ring sections over which lies an equalizing plate having pocket-like seats at its ends. A spring fits over the equalizing-plate and is engaged at its ends.

**MOTOR-VEHICLE.**—AVON M. COBURN, Daunt, Cal. The inventor mounts his engine horizontally and causes it to drive a power-shaft journaled in the middle of the vehicle below the seat. The power is transmitted by a friction-pulley to an intermediate shaft and then by sprocket and chain to the rear axle. By this arrangement power is transmitted without jerk or jar to the driving-wheel.

Designs.

**BARREL.**—GORDON D. CANFIELD, Washington, N. C. The barrel has a central row of diamond-shaped openings which alternate in the direction of length of the barrel with tapered openings lying nearer the ends of the barrel and giving the latter a novel appearance.

NOTE.—Copies of any of these patents can be furnished by Munn & Co. for ten cents each. Please state the name of the patentee, title of the invention, and date of this paper.

NEW BOOKS, ETC.

**MOTOR VEHICLES AND MOTORS: THEIR DESIGN, CONSTRUCTION AND WORKING BY STEAM, OIL AND ELECTRICITY.** By W. Woleley Beaumont. London: Archibald Constable & Company. Philadelphia: J. B. Lippincott Company. 1900. 4to. Pp. 636. Price \$10.

Mr. Beaumont has the unique distinction of furnishing to the automobile world the most important contribution ever made to the subject. We cannot speak in too high terms of the style in which the work is gotten up; it is splendidly printed, with rubricated paragraph indexes on the margin. The illustrations, which number 450, are well executed and are on a liberal scale, there being many folding plates. On the whole the book may be regarded as a model piece of technical bookmaking. The subject is treated in a remarkably thorough manner, and no phase of it seems to have been neglected. About the only criticism which can be made is that American practice is not as well represented as it should be. It is an indispensable book for every constructing engineer.