a separate exhaust chamber at each end, with slide-valve to each, all of said steam and exhaust valves actuated by one or more eccentric rods, substantially as described. 3rd. The sliding steam valve, with its steam-actuated piston or rod, the trigger hinged to said rod outside the steam chests, a spring by which said trigger is drawn down, an arm projecting from the eccentric rod, so as to engage the depressed end of the trigger, a wedge-shaped foot and a bell-crank lever, whereby the foot is advanced or retracted by the action of the governor, and a wheel or shoe connected with the trigger, so as to move upward on the wedge-shaped foot, and raise the trigger and disengage it from the arm, substantially as described. 4th. The combination, with the steam valve, the reciprocating rod extending outward through the end of the steam-chest, having its inner end formed to be acted upon by steam pressure, a trigger hinged to said rod, and an arm projecting from the eccentric rod, so as to engage said trigger, of a bell crank lever and inclined wedge-shaped foot adapted to ride under a projection on said trigger, whereby the latter is lifted and disengaged from the actuating arm, and the air-cushion chamber, and the piston reciprocating within said chamber, and connected with the steam valve-rod, substantially as described. 5th. The combination, with the sliding steam and exhaust valves, of a reciprocating engine, and an eccentric rod by which they are moved, of a trigger connected with the steam valve stem and actuated by the rod, a governor and intermediate connecting mechanism comprising a wedge-shaped foot and projection on the trigger, whereby the trigger is lifted and disengaged from the actuating rod, and the admission of steam to the cylinder is cut off, substantially as described. 6th. The combination, with the valve-actuating mechanism of the governor, the inclined foot, the bell-crank lever, the rods and levers, as shown, and the spring V, whereby the vibrations of the governor are modified, substantially as described. 7th. The bell crank lever, the inclined tripping foot, the governor and rods connecting it with the bell crank lever, in combination with the cross-bar having the pin *n*, the pulley *k*, the lever *j* and rod *m*, having its lower end slotted, substantially as herein described.

No. 34,932. Water Heater. (*Réchauffeur d'eau.*)

Warden King and Son (assignees of Thomas Joseph Best), Montreal, Que., 1st September, 1890; 5 years.

Claim.—1st. The combination, in a water heater, of the sections A and B, with the separate connections *g* and *h*, and water-jacketed fire pot *a*, the whole substantially as described for the purposes set forth. 2nd. The combination of the sections A, and B, with the connections *g* and *h*, the whole substantially as described for the purposes specified.

No. 34,933. Surface Cattle Guard.

(*Garde-bétail à niveau de chemin de fer.*)

Frank Chickering Balch, Kalamazoo, Mich., U.S.A, 1st September, 1890; 5 years.

Claim.—1st. A surface cattle guard, consisting of sections composed of transverse bars, and longitudinal bars looped around said transverse bars, substantially as set forth. 2nd. A surface cattle guard, consisting of sections composed of transverse bars, and longitudinal bars looped around said transverse bars, said loops being shrunk or cold-pressed thereon, substantially as set forth. 3rd. A surface cattle guard, consisting of transverse bars and longitudinal bars looped around said transverse bars, the lower part of the periphery of the loops in the longitudinal bars resting on the ties of the track, substantially as set forth.

No. 34,934. Exhaust Valve.

(*Soupape d'evacuation.*)

The Bruno Nordberg Company (assignee of Bruno V. Nordberg), Milwaukee, Wis., U.S.A., 1st September, 1890; 5 years.

Claim.—1st. In combination with a cylinder, having an exhaust port, a valve seat located within the bore of the cylinder and intersecting the same, and a valve having its edge curved to conform to the line of intersection. 2nd. In combination, with a cylinder having an exhaust port, a valve seat intersecting the bore of the cylinder, and a valve mounted in the cylinder and forming an outlet of the width of the exhaust port over which it works. 3rd. In combination, with a cylinder having an exhaust port, a valve seat intersecting the bore of the cylinder, and a valve E, having a straight cutting edge *a*, and a curved outer edge *b*, all substantially as shown. 4th. The oscillating valve E, having a straight cutting edge *a*, and a carved outer edge *b*. 5th. In combination, with a cylinder having a valve seat intersecting the bore of the cylinder, a valve mounted in the seat, and constructed substantially as shown, whereby the width of the exhaust passage presented to the flow of exhaust steam is the same at every point of said passage throughout the length of the valve.

No. 34,935. Electric Riveting.

(*Rivetage électrique.*)

Ries and Henderson, (assignees of Elias E. Ries), all of Baltimore, Maryland, U.S.A., 1st September, 1890; 5 years.

Claim.—1st. The method, or process, of riveting, which consists in first, interposing insulating material between the rivet and the articles to be riveted, then inserting the rivet into the rivet hole or holes, then heating the rivet, by the passage through the same of an electric current of comparatively great quantity and low tension, and then heading the rivet, substantially as described. 2nd. The method, or process, of riveting, which consists in interposing insulating material between the rivet and articles to be riveted, then heating the rivet to the required degree of incandescense, by the passage through the same of an electric current of suitable quantity and tension, then heading the rivet, and maintaining, the same in the desired state of incandescence by suitably regulating the current during the heading operation, substantially as described. 3rd. The method or process of riveting, which consists in, first, interposing insulating material between the rivet and articles to be riveted, then inserting the rivet into the rivet hole or holes, then passing an electric current of comparatively great quantity and low tension, through the rivet until the latter is heated to the desired degree of incandescence, then heading the rivet and at the same time maintaining the incandescence of the same by the continued flow of current, and finally gradually reducing and cutting off the current while the heading is completed, substantially as described. 4th. The method, or process, of riveting metal structures together, which consists in, first, inserting a metal rivet, having an insulated shank and bare conducting ends into the rivet hole, then connecting the bare ends of the rivet with the terminals of an electric circuit, then charging said circuit with an electric current or currents of proper heating effect until the rivet is heated to the desired degree of incandescence, and then heading the rivet, substantially as described. 5th. The method or process of riveting metal structures together, which consists in first inserting a metal rivet having an insulated shank and bare conducting ends into the rivet hole, then connecting the bare ends of the rivet with the terminals of an electric circuit, then charging said circuit with an electric current, or electric currents until the rivet is heated to the desired degree of incandescence, then heading the rivet while the heating current is maintained, but gradually diminished, and finally breaking the circuit, substantially as described. 6th. The method, or process, of riveting metal structures together, which consists in, first, interposing insulating material between the rivet and the articles to be riveted, then making electrical contact between the ends of the rivet and an anvil and a heading die, respectively, which constitute the terminals of an electric circuit, then charging said circuit with an electric current, or currents, until the rivet is heated to the desired degree of incandescence, and then forcing the heading die upon the rivet until the heading operation is completed, substantially as described. 7th. The method, or process, of riveting, which consists in interposing between the rivet and the articles to be riveted a coating of insulating material, then passing an electric current of the requisite volume through said rivet to raise it to the required temperature, and then heading or upsetting the rivet, substantially as described. 8th. The method or process of riveting, which consists in interposing between the rivet and the articles to be riveted, a temporary coating of non-conducting insulating material, then passing an electric current through said rivet of a volume sufficient to heat the same to incandescence, and to convert or drive off the said coating, and then heading or upsetting the rivet, substantially as described. 9th. The method, or process, of riveting, which consists in interposing between the rivet and the articles to be riveted, a film or coating of an insulating flux, then passing an electric current of the requisite volume through said rivet to raise it to the required temperature, and then upsetting the rivet, substantially as described. 10th. The method, or process, of riveting metal structures together, which consists in interposing between the rivet and the metals to be riveted a coating of an insulating flux, then passing an electric current through said rivet of a volume sufficient to heat the same to incandescence, and to convert or destroy the insulating properties of said flux, then further heating the rivet and the adjacent portions of the metals through which it passes to a welding heat, and then applying pressure to unite the heated metals, and to head or upset the rivet, substantially as described. 11th. The method, or process, of riveting metal structures together electrically, which consists in confining the electric heating current to the rivet or rivet blank until it has reached the desired temperature or degree of incandescence for riveting, and then heading or upsetting the heated rivet on one or both sides of the metals to be united. 12th. The method, or process, of electric riveting, which consists in heating the rivet while in place by the passage of an electric current of the required volume through the same, and localizing or confining the heat produced by the passage of the said current to the said rivet, until the latter has reached the desired temperature for riveting, then heading or upsetting the rivet, and permitting it to cool and contract. 13th. The method, or process, of electric riveting, which consists in confining the electric heating current to the rivet or rivet-blank until the latter has been heated to incandescence, then further electrically heating both the rivet blank and the surfaces of the metals threaded by or in contact, with it until the same have reached a welding temperature, then exerting pressure between the rivet and the said surfaces to weld, and unite the same, and simultaneously therewith heading or upsetting the rivet. 14th. The method, or process, of electric riveting, which consists in coating the rivet or rivet blank with a film or layer of oxide or other insulating material, removing the film or layer from the ends of said rivet or blank, so as to leave its body portion coated, passing an electric heating current through the cleaned ends of the rivet or blank while the latter is in place, of a volume sufficient to raise it to the desired temperature, and then heading or upsetting the rivet.

No. 34,936. Pile Covering. (*Couverture de pieu.*)

Robert James Davis, San Francisco, California, (assignee of Almon Ames, Berkeley, California,) U. S. A., 1st September, 1890; 5 years.

Claim.—1st. A pile covering, consisting of sheets of metal wrapped around the pile, and having their meeting edges united, so as to form a single longitudinal joint, in combination with rings or bands which fit over the adjacent meeting ends of said sections and the joints, substantially as herein described. 2nd. A pile covering, consisting of the sections formed of single sheets of metal having their edges united, so as to form a single longitudinal joint, and fixed successively upon the pile, so that their adjacent ends abut together, supplemental strips riveted upon the sections, so as to cover the longitudinal joint, and rings or collars having channels or depressions adapted to fit the supplemental strips when the rings are driven or forced upon the sections, so as to cover the meeting ends thereof, substantially as herein described. 3rd. A pile covering, consisting of sections formed of single sheets of metal having their meeting edges joined together, a supplemental re-enforcing strip