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UNITED STATES PATENT OFFICE.

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ELECTRIC POWER-CONTROLLER.

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To all whom it may concern:

Be it known that I, GUSTAVE S. NEU, of the city, county, and State of New York, have invented a certain new and useful Improvement in Electric Power-Controllers, of which the following is a full, clear, and exact description:

This invention relates to an improvement in contrivances for controlling a steam, water, compressed-air, gas, or similar power-supply valve by means of an electric current; and the principal object of the improvement is to insure the proper action of the valve when the electric circuit is made or broken.

The invention comprises, mainly, in connection with a self-acting supply-valve, a catch for restraining the valve, a vibrating hammer for tripping the catch, a vibrating armature for operating the tripping-hammer, an electro-magnet, a battery, and electric connections, whereby the tripping of the catch and consequent automatic action of the valve are assured by the repetition of the blows of the hammer.

The invention also comprises a weighted or spring-actuated arm for working the valve, and a pivotal lever having a fork for engaging said arm and arranged to be automatically locked by the catch before mentioned when the arm is moved to operate the valve.

The invention comprises, in addition, an auxiliary engine connected with the main power-supply for working the main valve in opposition to the weight or spring, a second self-acting valve for controlling the supply of power to said engine, a catch and electric tripping devices for restraining and releasing the said engine-controlling valve, and means, as those hereinafter described, for returning said engine-valve to the restraint of the catch by the action of the main valve.

The invention comprises, further, an electric circuit for starting the main-valve-closing mechanism, another electric circuit for starting the main-valve-opening mechanism, and self-opening circuit-closers in both the valve closing and opening circuits, arranged to be closed by the main valve as the same is respectively opened and closed.

In order that my invention may be fully understood, I will give a detailed description

of the manner in which the same may be practiced.

Reference is to be had to the accompanying drawing, forming part of this specification, in which the figure represents an electric contrivance embodying my improvement arranged to control a power-supply valve—as of a feed-pump—in accordance with the height of water in a tank presumed to be fed thereby.

The valve A, which is preferably a balanced valve, and is arranged in the steam or other power-supply pipe B—assumed in this instance to lead to a pump for feeding a water-tank, C—is provided with an operating-arm, A', heavily weighted or connected with a strong spring, A², which is here shown arranged to close the valve when free. An angle-lever, D, having a short forked arm, D', is so pivoted and arranged as to hang when free, as indicated in dotted lines in the figure, in position to receive within its fork the end of the valve-arm A', when swung in opposition to its spring A² to open the valve, and to be thrown outward by the pressure of the valve-arm against the farther branch of the fork, so as to bring the nearer branch into engagement with the arm, as shown in full lines in the figure. A pivotal spring-actuated catch, E, having a beveled head, is arranged to automatically engage the longer arm of the angle-lever D when thus thrown, and thereby restrain and lock the valve A in its open position.

A spring-hammer, F, is arranged to strike and disengage the catch E, and an electro-magnet, G, having an ordinary vibrating armature, G', (here shown attached to the hammer F,) is adapted, when properly energized, to operate the armature and hammer, so that the latter will strike the catch a swift succession of blows.

The magnet G is connected by a wire, H, with a battery, I, and the intermittent circuit-breaker I' by a wire, I², with one contact of a circuit-closer, J, which is in this instance a float circuit-closer adjusted to make the circuit when the water in the tank C reaches its upper limit. The other contact of the circuit-closer J is here shown connected by a wire, I³, with a yielding contact, K, arranged to be borne upon by the angle-lever D when in its outer position, and the pivot of said angle-le-

ver connected by a wire, I¹, with the other terminal of the battery I.

The contact K and angle-lever D, being properly insulated, form a convenient circuit-closer, by which also, when and only when the angle-lever is released to permit the action of the valve A, the circuit is automatically broken by the fall of the angle-lever. The main supply-pipe B is connected in advance of its controlling-valve A, by a branch pipe, L, with one end of the cylinder M of an engine, having a piston, M', and piston-rod M², and the piston-rod is connected with the valve-arm A', so as to operate the same in opposition to its weight or spring when the steam or other power is admitted into the cylinder M. The farther end of the cylinder is, by preference, provided with a vent-pipe, M³, connected with an exhaust-pipe, M⁴. The branch pipe L is provided with a cut-off valve, L', which is here shown as a three-way valve, the extra way of which is connected by a pipe, L², with the exhaust-pipe M⁴.

The valve L' is provided with a spring-actuated or weighted arm, L³, in this instance to when free open the valve for admission and close the exhaust, so that the steam or other power entering the cylinder M will drive the piston and throw the arm A' of the main valve outward into the locking restraint of the catch E, as before described.

A second forked angle-lever, N, spring-catch N', vibrating hammer N², vibrating armature N³, and electro-magnet N⁴ are arranged substantially as those in connection with the main-valve arm A', so as to engage and restrain the auxiliary-valve arm L³ when operated in opposition to its weight or spring to close the valve L' for admission and connect the cylinder M with the exhaust, so as to leave the piston and main-valve arm free to fall, and to trip the catch and permit the auxiliary valve L³ to open, as before, when the magnet is energized.

The auxiliary angle-lever N is also arranged to act, in conjunction with a second yielding contact, O, as a circuit-closer. The auxiliary magnet N⁴ and contact O are, by preference, connected by wires O' and O², respectively, with the battery I, and the angle-lever N and intermittent circuit-breaker P of the magnet N⁴ by wires O³ and O⁴, respectively, with the contacts of, in this instance, a second float circuit-closer, Q, which is arranged at the tank B to complete the circuit when the water falls too low, as the other float circuit-closer does when the water rises too high.

In the wire O³, connecting the angle-lever N with the low-water circuit-closer Q, is interposed a self-opening circuit-closer, R, arranged to be closed by the arm of the main valve A in operating as permitted by the action of the current in the main circuit, or, in this instance, closing, so that while breaking the main circuit by the throw of the angle-lever D, the action of the main valve A at the same

time prepares the auxiliary circuit for completion by the float circuit-closer Q. On the other hand, the main valve, through the arm A', when worked by the auxiliary or engine circuit, will leave the circuit-closer R free to break the auxiliary circuit, and will close the main circuit through its action on the angle-lever D.

For working the auxiliary valve L' in opposition to its spring or weight and throwing it under the restraint of the auxiliary catch N', novel devices are provided, arranged to be operated from the motion of the main valve. The operating devices here shown comprise a push-rod, S, connected to an arm, S', attached to the auxiliary valve L', a weighted hammer, T, pivoted to the side of the main-valve arm A', a spring-catch, T', also pivoted to the arm A' and arranged to engage and lock the hammer T to said arm, and a tripper, T², adjusted to disengage the catch T' from the hammer and allow the same to drop on the valve push-rod S as the valve-arm A' comes under the restraint of its catch E. The weight of the falling hammer T, bearing on the push-rod S, serves to open the auxiliary valve and lock the same by means of its catch N'.

The auxiliary-valve-operating devices also comprise a fixed fulcrum, U, on which the hammer T rests at or about its middle when in its lowest position, as shown in full lines in the figure, so that when the valve-arm A', which is considerably heavier than the hammer, falls, it causes the hammer to rise to the position shown in dotted lines, thereby leaving the push-rod S and auxiliary-valve arm S' free to rise and the auxiliary valve to open when its weighted arm L³ is released.

The weight of the hammer T must, of course, be such as to overcome the weight of the arm L³.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In an electric power-controller, the combination, with a self-acting supply-valve and a catch for restraining the valve, of a vibrating hammer for tripping the catch, a vibrating armature for operating the hammer, an electro-magnet, and electric connections, substantially as described.

2. In a power-controller, the combination, with a supply-valve having a weighted or spring-actuated arm, of a pivotal lever having a fork to engage the arm, a catch for the lever, and tripping devices, substantially as described.

3. In an electric power-controller, the combination, with a supply-valve, of an auxiliary power-engine for working the same, a self-acting valve for controlling the engine power-supply, a catch for restraining the latter valve, electric tripping devices, and auxiliary-valve-working mechanism arranged to be operated by the main-valve-working engine, so that the auxiliary valve will be returned to the restraint of its catch with the action of the main valve, substantially as described.

4. In an electric power-controller, the combination, with a supply-valve, operating mechanism, and an electric circuit for closing the valve, separate operating mechanism, and a
5 separate electric circuit for opening the valve, of self-opening circuit-closers in both the valve-closing and valve-opening circuits arranged

to close by the action of the main valve as the same is respectively opened and closed, substantially as described.

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Witnesses:

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