

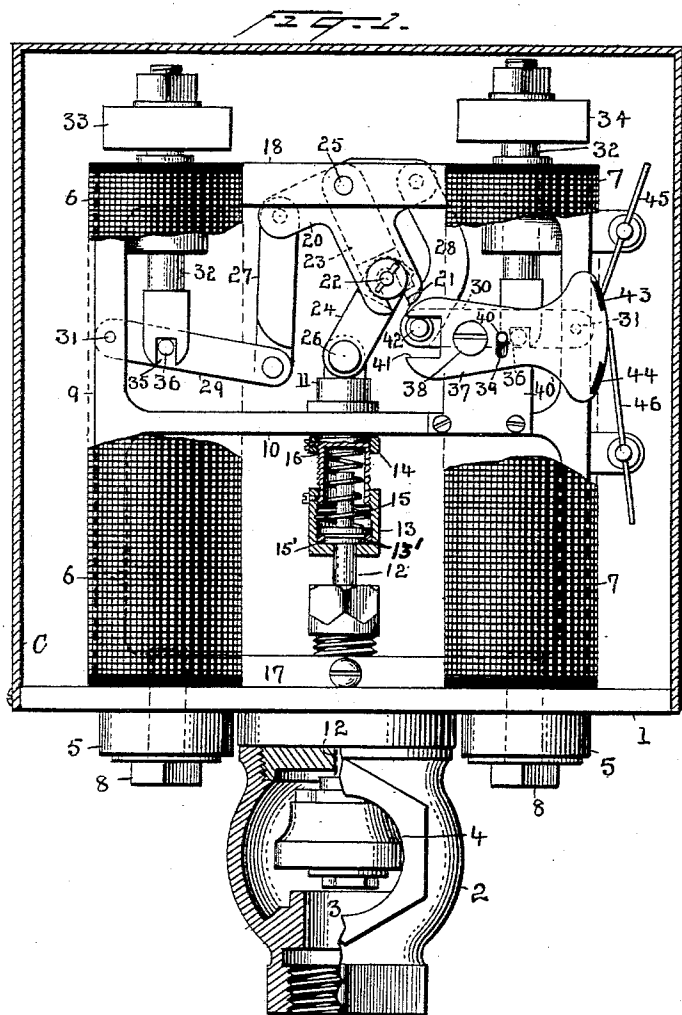
(No Model.)

2 Sheets—Sheet 1.

J. V. STOUT.
ELECTRICAL VALVE CONTROLLER.

No. 476,573.

Patented June 7, 1892.



Witnesses
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(No Model.)

2 Sheets—Sheet 2.

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Fig. 2.

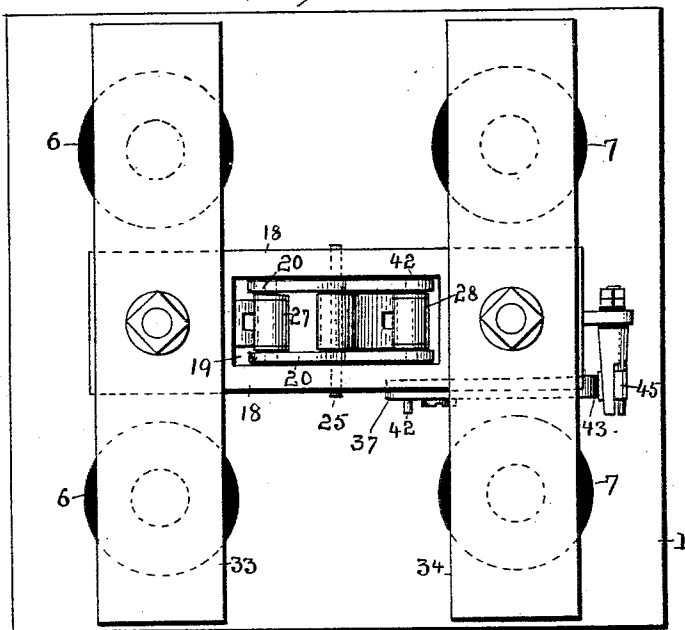


Fig. 3.

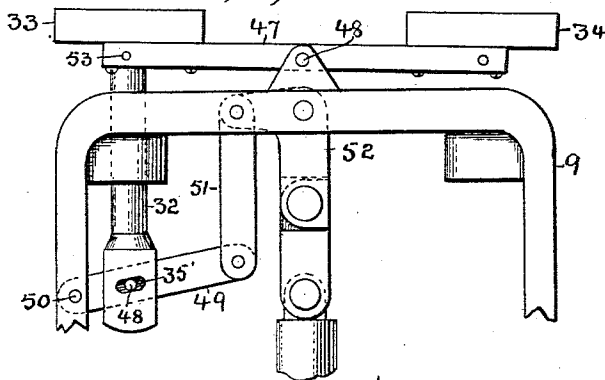


Fig. 4.

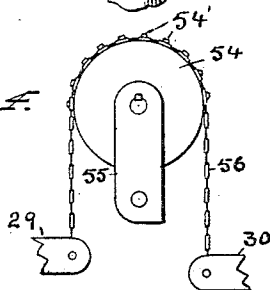
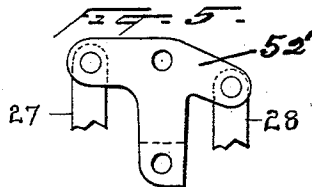


Fig. 5.



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UNITED STATES PATENT OFFICE.

JOHN V. STOUT, OF EASTON, PENNSYLVANIA.

ELECTRICAL VALVE-CONTROLLER.

SPECIFICATION forming part of Letters Patent No. 476,573, dated June 7, 1892.

Application filed December 22, 1891. Serial No. 415,905. (No model.)

To all whom it may concern:

Be it known that I, JOHN V. STOUT, a citizen of the United States, residing at Easton, in the county of Northampton and State of Pennsylvania, have invented a certain new and useful Improvement in Electric Valve-Controllers, (Case G,) of which the following is a specification.

The present invention relates to mechanism for opening and closing valves, and especially valves which are employed for controlling steam or water pipes in heating systems.

In my patent, No. 461,554, dated October 20, 1891, I have shown and described such a valve having an arrangement of toggle-levers, magnets, and armatures for opening and closing the same. In the construction shown in the patent the magnets are mounted on a suitable frame and lie in planes at right angles to the valve-rod. The armatures of the magnets are mounted on sliding rods also at right angles to the valve-stem, and said sliding rods operate on the toggle at the central pivot directly or by means of levers. The present invention constitutes an improvement on this valve mechanism; and the invention consists in the several new combinations and new features of construction hereinafter described, whereby friction is reduced and the toggle is operated in a more efficient manner.

In the accompanying drawings, Figure 1 is a side view, partly in section, of the valve mechanism. Fig. 2 is a plan view of the same, and Figs. 3, 4, and 5 are modifications to be described.

In Fig. 1, 1 is a cast-metal rectangular plate, below which the valve-box 2, having an inlet-port 3 and an outlet-port 4, is mounted. Said plate is cast with two transverse ribs 5, which form the yokes of two electro-magnets 6 7, the two limbs of each magnet being connected to the plate 1 and the yokes 5 by suitable bolts 8. These magnets stand in planes parallel with the valve-rod, and their armatures also move in such planes, or substantially so. Above the plate 1 is a cast-brass or other metal frame 9, which is substantially rectangular and is provided with a central cross-bar 10, at the center of which is an opening in which the plunger 11, which is connected to the valve-rod 12, can slide, such connection being made by means of the spring 15 within the hollow

lower portion of plunger 11, said spring pressing at its lower end on the nut 13 through ring 13' and at its upper end pressing upward against the plunger at 16. The nut 13, which may be adjusted for valve-rods of different lengths, is screwed onto the lower end of the plunger 11, and the rod 12 passes loosely through the nut. The spring when the valve is open does not bear on the valve-rod; but when the valve is moved onto its seat it is raised so that disk 15' on the rod presses against the spring, the strength of which will depend on the nature of the system to be controlled. The ring 14 can be set at any desired position on the part 11 to limit its upward movement. This not only limits movement of the valve, but prevents the toggle being moved so far as to become locked against return movement. In the lower side 17 of the rectangular frame is an opening through which the valve rod or stem passes. In the upper cross-bar 18 is a rectangular slot or opening 19, in which is pivoted a swinging T-frame or T-lever, the construction of which will be clear from the side view shown in Fig. 1 and the plan view shown in Fig. 2. In the preferred form this element of the mechanism consists of two side T-pieces 20, having at their lower ends notches 21, which receive the pin 22, which is the pivot-pin at the knuckle of a knuckle or toggle lever having two arms 23 24, the former of which is centered loosely on the pivot-pin 25 of the T-frame and which constitutes the fulcrum of the toggle and the second of which is pivoted to the plunger 11 at 26. It will be evident that both of these T-pieces 20 will not always be necessary. At the opposite ends of the head of the T-frame the arms 27 28 are pivoted, and the lower ends of these arms are pivoted, respectively, to the arms 29 30, which are pivoted in the side bars of the rectangular frame at 31. The arm 28, which is on the side toward which the toggle-lever bends, is curved, as shown, to give space for said movement. Motion is given to the arms 29 30 by means of the reciprocating rods 32, which are connected to the balance-armatures 33 34 of the two magnets, the lower ends of said rods having heads provided with notches 35, which fit over pins 36, carried by the arms. The parts are so adjusted that when the valve is

open, as shown in Fig. 1, the armature 33 is touching or nearly touching the poles of its magnet, while the armature 34 is, say, a sixteenth of an inch, or a little more, from its poles, and the leverage is such that movement of the magnet 34 through the short distance which it moves will give the valve a movement somewhat longer—say a movement of half an inch. This enables me to get a long movement of the valve and still to keep the armature within a short and effective distance from the poles.

37 is a plate pivoted at 38 and having a slot 39, through which projects a stationary guide and limiting pin 40 on the plate 40', which plate also supports the pivot 38. At the inner end of this plate is a notch 41, through which projects a pin 42, which is the pivot-pin between arms 28 and 30, extended in the direction of said plate 37. At the opposite end this plate is provided with two insulating-segments 43 44, on which brushes 45 46 bear, respectively, at suitable times.

It is considered unnecessary to show and describe the circuit connections through the magnets and circuit-controllers, since they may be identical with those shown in the patent above referred to. I prefer, however, in connection with this improved valve to apply the shunt-magnets and parts operated thereby shown and described in my patent, No. 461,555, dated October 20, 1891, since this still further saves battery and adds to the economy and efficiency of the system. The arrangement of parts described is very compact, strong, and free from danger of disarrangement. I prefer to cover the operating mechanism by a thin metal cover C, which may be screwed to the plate 1.

The operation of this apparatus, briefly, is as follows: When magnet 7 is energized, its armature is moved downward, the head at the lower end of rod 32 pushing on pin 36, thus through the arms 30 and 28 pulling down on the right arm of the T-frame, applying power positively at the fulcrum and carrying the pivot 22 of the toggle toward the left, straightening the toggle, and closing the valve. I find that with the arrangement of parts which I have described this movement of the valve can be effected with a much smaller battery than in my patented apparatus. This is because there is practically no friction opposing the movement of the armatures, since their rods are not caused to bind by the weight of the armatures and the armatures are balanced one by the other and because motion is transferred from the armatures to the toggle in a more direct and positive manner. It will be seen that the cross-arms of the T-frame are not perfectly straight, but that the pivot at one end is below or out of line with the other, the construction being such that when the left arm is in its lowest position, as shown, the pivot at the right will be in the same horizontal line with the pivot 25, so that when the armature first begins to move, it being then

farthest from the magnet, and consequently in its position of smallest efficiency, it shall have the best possible leverage, since after the toggle has been moved so that it is nearly straight, while the power necessary to complete the movement is greater than the power necessary to start it, the armature is so near the magnet that its power is ample to do the work required. When the valve is fully closed, the pivot at the left will be in the same horizontal line with pivot 25 for the same reason. The purpose and operation of the spring 15 need not be set forth in full. It is the same as the spring 56 in my patent first above mentioned, the only difference being that its position is changed.

In the construction shown in Fig. 3 the two armatures 33 34 are mounted on a lever 47, pivoted at 48. To this lever is connected a single reciprocating rod 32, having at its lower end a head having a closed slot 35' instead of the open notch 35 of Fig. 1, in which stands a pin 48 on the arm 49, which is pivoted at 50 to the fulcrum and at the opposite end to the arm 51, which corresponds to arm 28 of Fig. 1. The upper end of this arm is pivoted to the angle-lever 52, forming one member of the toggle, the lower member of the toggle being connected to the valve-rod, as before described. With this construction when the armature 34 is moved downward the arm 51 pulls downward on the angle-lever, opening the valve, and when armature 33 is pulled down said arm 51 will push upward on said angle-lever, closing the valve. In this modification the motion is transferred from the armatures to the toggle-lever by providing one member of the toggle with an angle-arm and applying the power directly to it. The armatures 33 34 balance each other and are moved with great ease. The passage through which the rod 32 passes in the frame 9 may be a little larger than the rod, so that the rod will not bind on account of the angular movement of the pivot 53. Instead of using the angle-lever 52 to form the upper member of the toggle the T-lever 52', Fig. 5, may be employed, the arms 27 28 being connected thereto in the same manner as they are connected to T-pieces 20 in Fig. 1. The armatures of the operating-magnets may be mounted as in Fig. 1 or as in Fig. 3.

In the modification shown in Fig. 4 I substitute for the T or angle lever forming the upper member of the toggle the wheel 54, with one or more teeth 54', and the arm 55, the lower end of which is pivoted to the other toggle member, as heretofore described, said wheel and arm being rigidly connected. 56 is a chain passing over this wheel and engaging with its teeth, the opposite ends being connected to the two levers 29 30. The radii of wheel 54, on which the chain acts, are equivalent to the two arms projecting in opposite directions from the fulcrum 25 in Fig. 1 and of the single arm projecting from the corresponding fulcrum in Fig. 3. The opera-

tion of this form will be the same as that of the form shown in Fig. 1. In each of the modifications power is applied at the end of a lever pivoted at the fulcrum of the toggle. In the first case the lever is separate from the upper member of the toggle, and in the other forms it is a part thereof.

Without limiting myself to just the forms described, what I claim is—

1. The combination of a valve, a toggle-joint connected thereto, a fulcrum for said toggle and means for applying power to the toggle, comprising a lever pivoted at said fulcrum, an armature connected to said lever, and a magnet adapted to move said armature, substantially as described.

2. The combination of a valve and valve rod or stem, a toggle-joint connected thereto, a fulcrum for said toggle, a lever pivoted at said fulcrum and connected to the toggle-joint for applying power thereto, two magnets and armatures, and power-transmitting devices between said armatures and toggle-lever, substantially as described.

3. The combination of a valve and valve-stem, a toggle-joint connected at one end to said stem and at the other end to a fulcrum, one or more arms connected to the upper member of the toggle and projecting from the fulcrum, and means consisting of magnets and armatures suitably connected thereto for applying power at the end of said arm or arms to bend or straighten the toggle, thereby opening or closing the valve, substantially as described.

4. The combination, in a valve-controller, of a valve and valve-stem, a toggle-joint connected at one end to said stem and at the other end to a fulcrum, one or more arms connected to the upper member of the toggle and projecting from the fulcrum, and means consisting of magnets and armatures and power-transmitting connections between said armatures and projecting arms for applying power to said arm or arms to bend or straighten the toggle, thereby opening or closing the valve, substantially as described.

5. The combination of a valve and valve-rod, a toggle-joint, one end of which is connected to said rod and the other end of which is connected to a fulcrum, magnets and armatures, and power-transmitting devices between said armatures and toggle-joint for operating the latter to open or close the valve, said armatures being movable in lines substantially parallel with the direction of movement of the valve, substantially as described.

6. The combination of a valve and valve-rod, a toggle comprising two levers, suitably pivoted, the T piece or pieces centered on the fulcrum and engaging with the knuckle-pin of the toggle, and means for applying power to the cross-head of said T-pieces, substantially as described.

7. The combination of a valve and valve-rod, a toggle, one end of which is connected to the valve-rod, the other end of which is connected to a fulcrum, two magnets and armatures, and power-transmitting mechanism between the armatures and toggle for bending and straightening the same to open and close the valve, said armatures being balanced, whereby the power required to move them is reduced, substantially as described.

8. The combination, with the base-plate, having one or more ribs formed integral therewith and constituting the yoke or yokes of a magnet or of magnets, of magnet poles and coils secured to said base-plate over the rib or ribs, substantially as described.

9. The combination of the valve supported outside of the base-plate, the valve-rod and operating toggle, the magnets, and the armatures connected to the toggle for operating it, the yokes of said magnets being composed of ribs integral with the base-plate, substantially as described.

This specification signed and witnessed this 18th day of December, 1891.

JOHN V. STOUT.

Witnesses:

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GEO. W. BARNETT.