

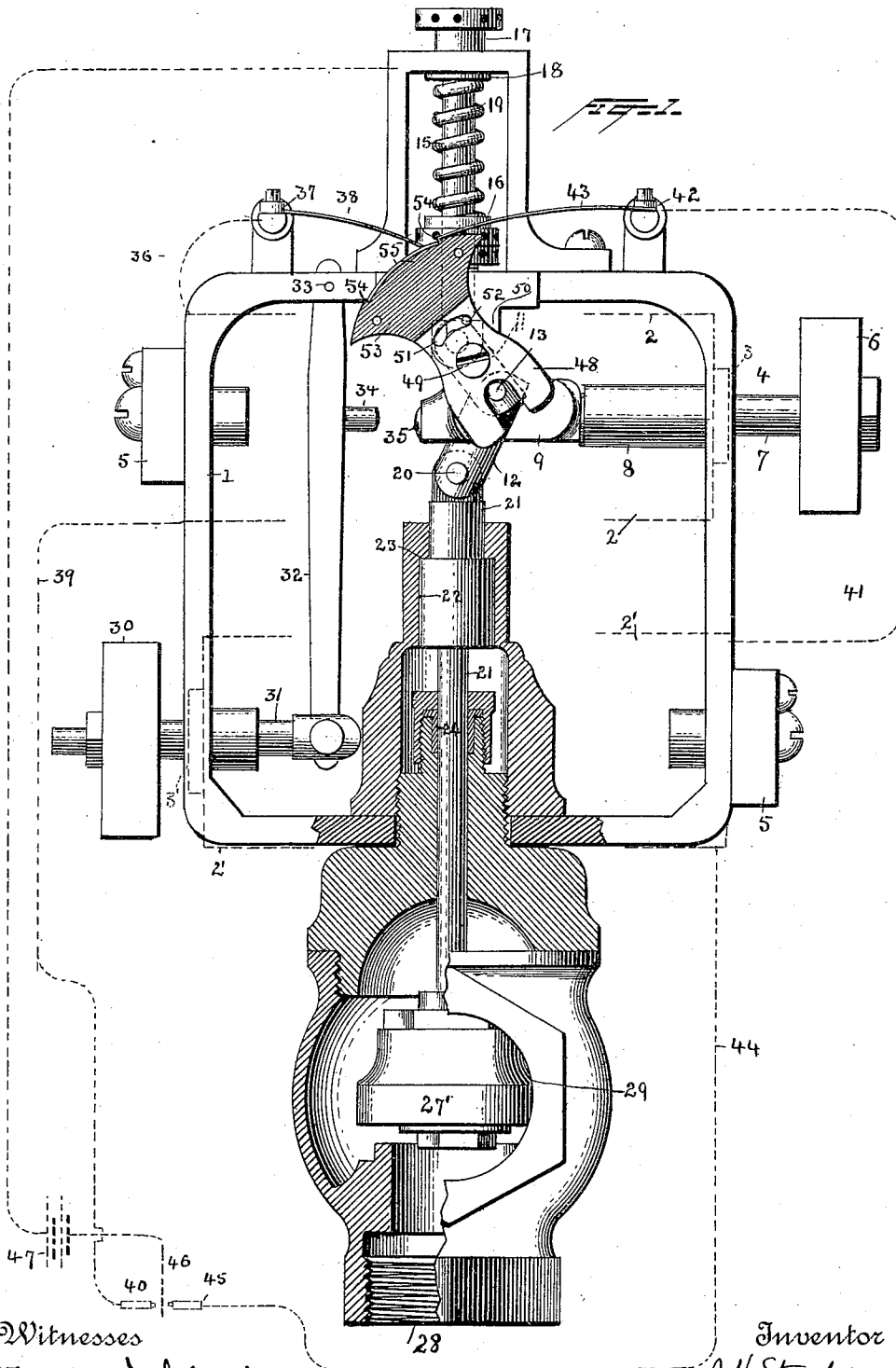
(No Model.)

3 Sheets—Sheet 1.

J. V. STOUT.
ELECTRICAL VALVE CONTROLLER.

No. 461,554.

Patented Oct. 20, 1891.



Witnesses
Norris A. Clark.
H. F. Oberly

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By his Attorneys
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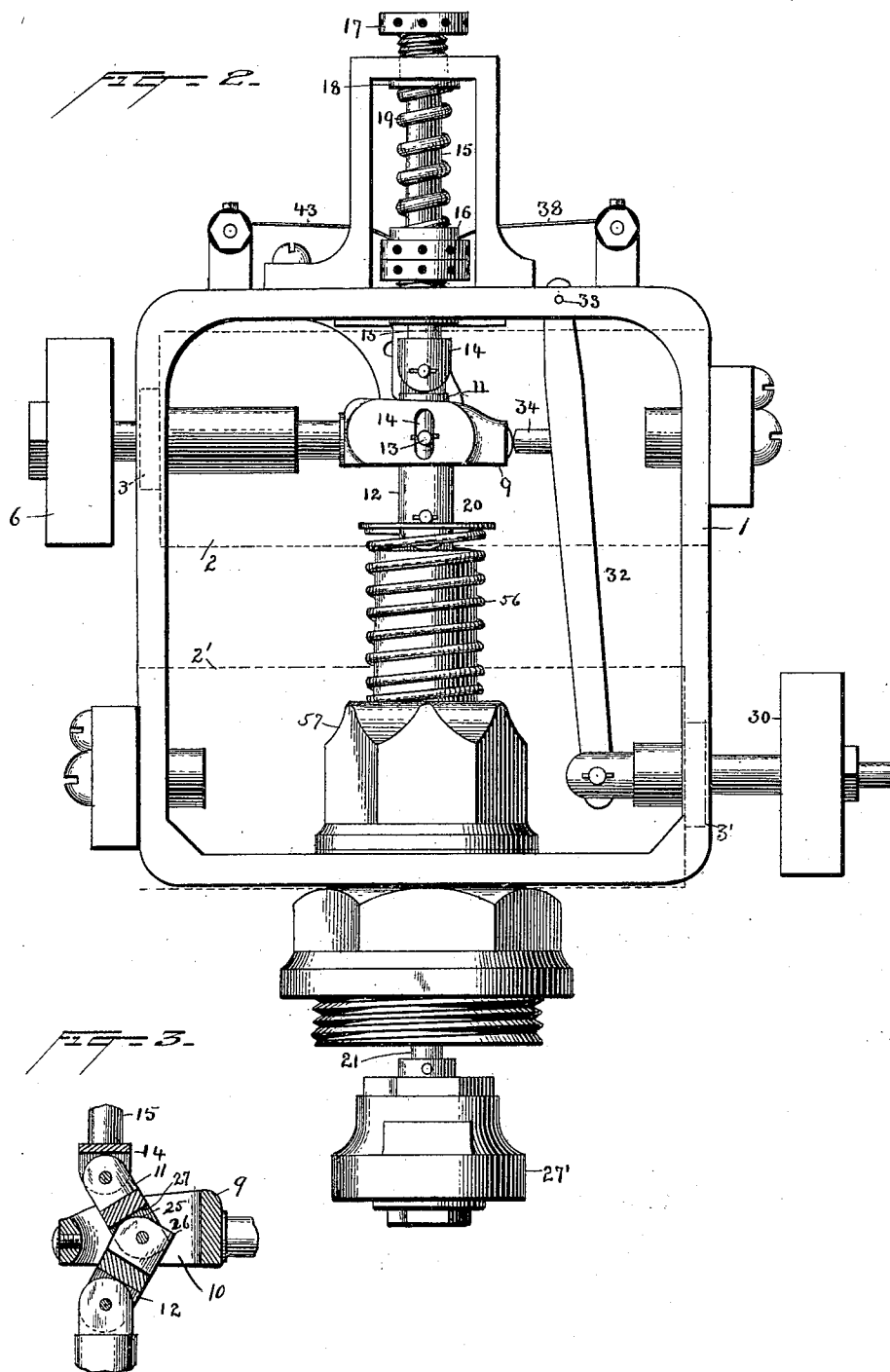
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3 Sheets—Sheet 2.

J. V. STOUT.
ELECTRICAL VALVE CONTROLLER.

No. 461,554.

Patented Oct. 20, 1891.



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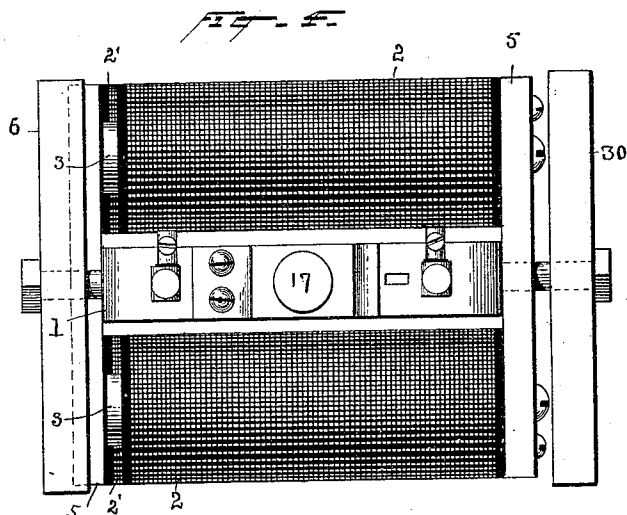
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UNITED STATES PATENT OFFICE.

JOHN V. STOUT, OF EASTON, PENNSYLVANIA.

ELECTRICAL VALVE-CONTROLLER.

SPECIFICATION forming part of Letters Patent No. 461,554, dated October 20, 1891.

Application filed March 26, 1891. Serial No. 386,544. (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, State of Pennsylvania, have invented a certain new and useful Improvement in Electrical Valve-Controllers, of which the following is a specification.

The present invention relates to that class of valve-controllers which are opened and closed by electro-magnets, said magnets being preferably in circuits made and broken by a thermostatic circuit-controller.

The object of the invention is to provide a valve which can be operated by direct magnet power with a minimum amount of battery or other source of electrical energy, which shall be adjustable, so as to be tight against any pressure, which shall be operated without using what is known as a balance-valve or without the aid of any other force, such as air-pressure, and which shall possess certain other advantages, hereinafter set forth.

In the accompanying drawings, Figure 1 is a view of the valve apparatus, partly in section, the position of the magnets being indicated in dotted lines, and the circuits leading from the magnets to a distant thermostat being also indicated in dotted lines. Fig. 2 is a side view of the valve apparatus on the opposite side from that shown in Fig. 1, the valve being in the closed instead of the opened position, as in Fig. 1; and Fig. 3 is a detail view of the toggle joint or lever for moving the valve-stem and valve. Fig. 4 is a plan view of Fig. 2 on a somewhat smaller scale and certain of the details of construction being omitted.

Referring first to Figs. 1 and 2, 1 is a frame, substantially rectangular, for supporting the several parts of the valve-controlling mechanism. Within this frame are supported two magnets 2 2', the former having pole-pieces 3 at the right of the frame, as shown most clearly in Fig. 4. The magnet 2' has a pole-piece 3' at the opposite side of the frame.

5 5 are yoke-pieces connecting the two limbs of each magnet and connected to the frame by screws.

6 is an armature for the upper magnet, supported on a rod 7, adapted to slide in the sleeve 8, which projects inward from the

frame. At the inner end of said rod is a block or cross-head 9, having a recess 10, Fig. 3, in which the two parts 11 12 of a toggle-joint are supported and pivoted together by means of a pin 13, which passes through said parts and through a slot 14 in the head 9. It is evident that the cross-head is not essential. The armature-rod may act directly against the toggle, or any other suitable operative connection may be used. The upper part of the toggle is pivoted to the head 14 of a pin 15, which extends up above the top of the frame and which is adjustable by means of suitable screws and nuts and which forms an abutment or fulcrum against which the toggle presses.

16 is a collar rigidly connected to pin 15.

17 is a screw-threaded sleeve having means to turn it and carrying or pressing against a collar or disk 18 and in which the rod 15 can slide. Between the collars 16 and 18 is a spring 19, of such strength that it can withstand the fluid-pressure in the system against the valve, but which will yield slightly to allow the toggle to assume a straight position, or, preferably, to pass over the center far enough to lock the valve and prevent its being opened by any sudden jar or jolt. In these specifications, claims, and drawings, however, for convenience of description it is shown and described as straight. It will be evident that when the screw 17 is turned in the direction to move 18 downward the tension of the spring and consequent downward pressure on the rod 15 will be increased. This arrangement for allowing the fulcrum to yield is not essential, since there may be sufficient yielding in the cross-piece of the frame itself or in the joints of the toggle; but the first construction is preferred, since it provides for adjustment, and the adjustment or pressure on the valve will not be materially affected by expansion of the parts due to heat. The lower member of the toggle is connected by a pivot 20 to the valve rod or stem 21. The upper portion of this valve-rod fits snugly in the socket 22 and when elevated, as shown in Fig. 1, rests against the shoulder 23, forming a tight joint and acting as a stop for the valve.

24 is a packing around the rod to prevent passage of steam.

The meeting ends of the two members of the toggle-joint are formed as shown in Fig. 3, one corner of one member or of both members being rounded, as indicated at 25, and the opposite corner being preferably square, as indicated at 26. When the toggle is straightened or when it passes slightly by the vertical position, as it is preferably formed to do, the angular corner 26 on one member will bear against the face 27 on the other member, the effect of which is to prevent the toggle moving farther than the point to which it is adjusted. The effect of this movement is to lock the valve, so that it will not be opened by accidental jars; but the toggle can be easily bent back by the magnet and armature. The lower end of the valve-rod carries a valve 27', which when it is elevated, as shown in Fig. 1, puts passage 28 into communication with passage 29, thereby allowing steam or other fluid to flow from one passage to the other, and which, when down in the position shown in Fig. 2, closes such communication.

30 is an armature for the lower magnet, and is carried by a sliding rod 31, pivoted to lever 32, which in turn is pivoted at 33, and which carries a projection 34, adapted to strike the end 35 of the head 9.

The magnet 2 is connected by wire 36 to post 37, which carries a contact-spring 38. The opposite terminal of this magnet is connected by wire 39 to one terminal 40 of a thermostatic circuit-controller. One terminal of the lower magnet is connected by wire 41 to post 42, which carries a contact-spring 43. The opposite terminal of this magnet is connected by wire 44 to the second terminal 45 of the thermostat. The expansible bar 46 of the thermostat is connected through battery 47 to the frame of the mechanism.

48 is a metal plate, pivoted at 49 to an arm 50, projecting down from the cross-piece of the frame and having a slot or notch in the lower end fitting over pin 13, which projects forward from the head 9. The plate also has a slot 51, into which projects a guide-pin 52, supported by arm 50. At the upper end of plate 48, which is in the form of an arc of a circle, is an insulating block or plate 53, the upper edge of which is in the form of the arc of a circle corresponding to the edge of plate 48. The insulating-plate, however, projects at each side, as indicated at 54, above the edge 55 of said plate 48, so that when the plate is in the position shown in Fig. 1 spring 43 will rest on the insulating-block, while 38 will rest on the metal plate. When said plate has been turned to close the valve, however, the spring 38 will rest on the insulating-block at the opposite side and the spring 43 will rest on the metal plate. For a moment while the plate is moving from one position to the other both springs will simultaneously rest on the metal plate.

56 is a stiff spring between a shoulder on the piece 57 and lower pivot-pin of the toggle

and pressing upon the latter. This is especially useful in hot-water systems or other low-pressure systems, since it furnishes power for completing the throw of the valve after the toggle has been slightly bent by the magnet and armature. In high-pressure systems this is done direct by the pressure of the fluid in the system.

Assuming now that the passage 28 leads to a supply of hot steam, that passage 29 leads to a steam-radiator, and that the thermostat is in the same room with the radiator, the operation will be as follows: The valve being open, steam is passing to the radiator and the room is becoming warmer. At a certain temperature the thermostatic bar 46 will move against the contact 40 of the thermostat, closing the following circuit: from battery 47 to the frame of the mechanism to plate 48, spring 38, wire 36, upper magnet-wire 39, contact 40, bar 46, and to the second pole of the battery. This circuit energizes said upper magnet, attracting its armature, which, through the rod 7, straightens the toggle-lever and moves the valve down against its seat. When the steam is admitted to the system, the pressure is uniform throughout and the valves require little force to move them, being nearly balanced. When the valve first begins to move down very little force is required to move it, since the steam can readily escape through the comparatively large space around the valve, and when the valve is nearly closed and the steam acts with greater force against it to prevent its movement the armature is near the magnet-pole, so that a greater force is exerted by it, and the toggle-joint is nearly straight, in which position the force applied to it is most effective. This arrangement, therefore, is exceedingly effective and economical. The movement just described at the same time turns plate 48 on its pivot, opening the circuit through the upper magnet (the magnet last energized) by bringing the insulating-block under the end of spring 38, and at the same time making contact between spring 43 and plate 48. In this condition the steam is cut off from the radiator and the room will begin to grow cool. The thermostatic bar may, however, stay in contact with 40 for several minutes; but since the connection between 40 and the frame of the mechanism has been interrupted the battery is not left on short-circuit. When the temperature has fallen to a certain point, the bar 46 will move against contact 45, closing the following circuit: Battery 47, frame of the mechanism, plate 48, spring 43, wire 41, lower magnet to terminal 45, bar 46 to the opposite pole of the battery. This energizes the lower magnet-attracting armature 30, moving it inward by means of lever 32 and extension 34, pressing head 9 toward the left, (see Fig. 2,) thereby moving the members of the toggle-joint out of the straight lines in which they were placed by the previous operation. It is evident that as soon

as this movement is begun the upward pressure of the steam below the valve tends to complete its throw. By increasing the distance between pivot 33 and pin 34 said pin may be given sufficient throw to move the knuckle through the whole distance which it is required to travel to open the valve. In this case the valve can be opened without the spring.

It is not essential that the fluid-passages be so arranged that the pressure is on the lower side of the valve, nor is it always essential to use the spring 56; but it is preferred to arrange the several parts as shown and described.

Having thus described the invention, what I claim is—

1. The combination of a valve, a toggle-joint connected to the valve and to a fulcrum, a magnet and armature, and an operative connection between said armature and the knuckle of the joint for moving it and the valve, substantially as described.

2. The combination of a valve and valve-stem, a toggle-joint connected to the valve-stem and to a fulcrum, a magnet and armature, a sliding rod terminating in a head, in which the knuckle of the toggle is held, the pivoted pin of the knuckle passing through said head, substantially as described.

3. The combination of a valve adapted to open or close communication between two pipes or passages, a valve-stem, a toggle pivoted to said stem and to a fulcrum, a sliding rod connected to the knuckle of the lever, a magnet and armature for moving said rod to straighten the toggle, thereby closing the valve, a second magnet and armature for bending said toggle to open the valve, substantially as described.

4. The combination of a frame, two magnets mounted thereon and having their poles facing in opposite directions, armatures for the magnets, a valve having a stem supported in said frame, a toggle-joint connected to said stem and to a fulcrum, and an operative connection between one of said armatures and the toggle for closing the valve and between the other armature and the toggle for opening the valve, substantially as described.

5. The combination of a frame, two magnets mounted thereon and having their poles facing in opposite directions, armatures for the magnets, a valve having a stem supported in said frame, a toggle-joint connected to said stem and to a fulcrum, a sliding rod connected to one of said armatures and to the knuckle of the toggle-joint, and means moved by the second armature to bend the toggle, substantially as described.

6. The combination of a rectangular frame, two magnets mounted thereon and having their poles facing in opposite directions, armatures for the magnets, a valve having a stem supported in said frame, a toggle-joint connected to said stem and to a fulcrum, a sliding rod connected to one of said arma-

tures and to the knuckle of the toggle, and a sliding rod connected to the second armature and to a pivoted lever, adapted to bend said toggle, substantially as described.

7. The combination of a valve adapted to open or close communication between two pipes or passages, a valve-stem, a toggle pivoted to said stem and to a fulcrum, a sliding rod connected to the knuckle of the lever, a magnet and armature for moving said rod to straighten the toggle, thereby closing the valve, a second magnet and armature for bending said toggle to open the valve, and a switch moving with the valve mechanism and controlling the circuit through said two magnets, substantially as described.

8. The combination of a valve adapted to open or close communication between two pipes or passages, a valve-stem, a toggle pivoted to said stem and to a fulcrum, a sliding rod connected to the knuckle of the toggle, a magnet and armature for moving said rod to straighten the toggle, thereby closing the valve, a second magnet and armature for bending said toggle to open the valve, the circuit of one magnet being open and the other closed, and a switch moving with the valve mechanism and opening the circuit through the magnet last energized and closing the circuit through the other magnet, substantially as described.

9. The combination of a valve adapted to open or close communication between two pipes or passages, a valve-stem, a toggle pivoted to said stem and to a fulcrum, a sliding rod connected to the knuckle of the toggle, a magnet and armature for moving said rod to straighten the toggle, thereby closing the valve, a second magnet and armature for bending said toggle to open the valve, and a switch consisting of a pivoted plate, a connection between said plate and the toggle, and contact-springs or terminals co-operating with said plate, substantially as described.

10. The combination of a valve adapted to open or close communication between two pipes or passages, a valve-stem, a toggle pivoted to said stem and to a fulcrum, a sliding rod connected to the knuckle of the toggle, a magnet and armature for moving said rod to straighten the toggle, thereby closing the valve, a second magnet and armature for bending said toggle to open the valve, and a pivoted conducting switch-plate having connection with the toggle, so that it is turned on its pivot as the toggle is bent or straightened, two springs adapted to ride over the plate, and means for insulating one spring from the plate while the other is at rest on it, substantially as described.

11. The combination, with an electric circuit and a thermostatic or other suitable circuit-controller, of a valve adapted to open or close communication between two pipes or passages, a valve-stem, a toggle pivoted to said stem and to a fulcrum, a sliding rod connected to the knuckle of the toggle, a magnet

and armature for moving said rod to straighten the toggle, thereby closing the valve, a second magnet and armature for bending said toggle to open the valve, a pivoted conducting switch-plate having connection with the toggle, so that it is turned on its pivot as the toggle is bent or straightened, two springs, one connected to one of the magnets and thence to one terminal of the thermostatic circuit-controller and the other connected to the other magnet and thence to the other terminal of the thermostatic circuit-controller, said springs being adapted to ride over the plate, and means for insulating one spring from the plate while the other rests thereon, substantially as described.

12. The combination of a valve, a toggle-joint for moving the valve, and a fulcrum to which the toggle is pivoted, consisting of a spring-pressed rod, substantially as described.

13. The combination of a valve and valve-stem, a toggle, a fulcrum to which the toggle is pivoted, consisting of a rod adapted to move in line with the valve-stem, and a spring pressing said rod forward, having sufficient strength to withstand the pressure of the fluid in the system, substantially as described.

14. The combination of a valve and valve-stem, a toggle pivoted to the stem and to a fulcrum, one end of a member of the toggle having an angular shoulder adapted to bear against a face of the other member to prevent the lever being moved by the point to which it has been adjusted, substantially as described.

15. The combination of a valve, a toggle-joint connected therewith for moving it, the valve being closed when the joint is straight, a magnet and armature for slightly bending the toggle, whereby the pressure on the valve controls the movement independently of the magnet, substantially as described.

16. The combination of a valve, a toggle-joint connected therewith for moving it, the valve being closed when the joint is straight, a magnet for slightly bending the toggle, and a spring acting on the valve in the direction to open it, substantially as described.

This specification signed and witnessed this 24th day of March, 1891.

JOHN V. STOUT.

Witnesses:

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J. A. YOUNG.