Jan. 12, 1926. 1,569,485

A. F. E. HANSON

COCK PROVIDED WITH ELECTRIC LIQUID HEATING MEANS

Filed March 13, 1925

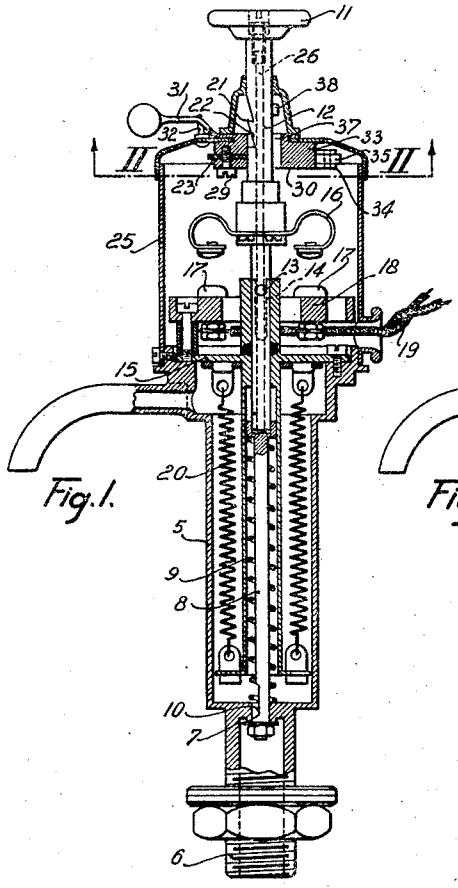


Fig. 1.

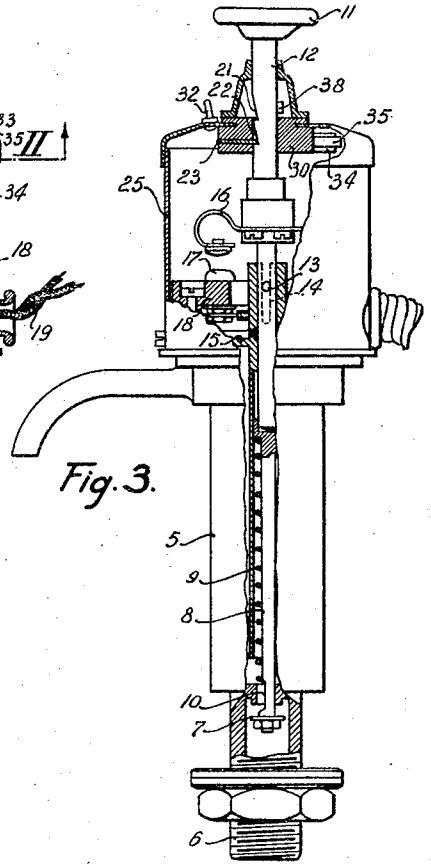


Fig. 3.

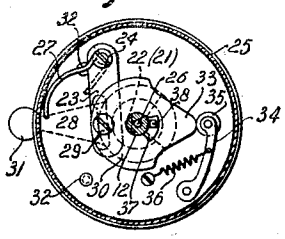


Fig. 2.

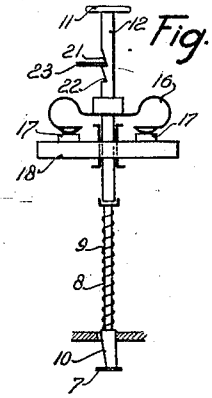


Fig. 4.

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UNITED STATES PATENT OFFICE.

ANTON FRANS EDUARD HANSON, OF AMSTERDAM, NETHERLANDS, ASSIGNOR TO N. V. FABRIEK VAN INSTRUMENTEN EN ELECTRISCHE APPARATEN INVENTUM, OF BILTHOVEN, NETHERLANDS.

COCK PROVIDED WITH ELECTRIC LIQUID-HEATING MEANS.

Application filed March 13, 1925. Serial No. 15,419.

To all whom it may concern:

Be it known that I, ANTON FRANS EDUARD HANSON, a subject of the Queen of the Netherlands, residing at Amsterdam, Netherlands, have invented certain new and useful Improvements in and Relating to Cocks Provided with Electric Liquid-Heating Means (for which I filed an application in Holland, March 16, 1923), of which the following is a specification.

The obtainable rate of the electric heating of liquid (for the sake of simplicity hereinafter called "water") in a draw-off or tap cock is mainly determined by the available amount of electric energy. Technically spoken, the voltage and the strength of the current are constant and limited, for instance, to 2 kilowatts; the amount of hot water that can be drawn from the cock is proportional thereto and small relative to the domestic consumption of cold water. It is, therefore, necessary to provide an ordinary cold water cock in addition to the hot water cock.

The principal object of the invention is a cock capable of supplying a satisfactory amount of hot water and a larger amount of cold water. Another object is a cock which permits of instantaneously drawing off either hot or cold water, as distinguished from known electric hot water cocks provided with a turn switch secured to the water cock. With the latter type of cocks it is necessary for the switch to be turned through a position which does not respond to what is wanted (hot or cold) and it repeatedly occurs that the operator makes a mistake and, while waiting for the discharge of hot water, only draws off cold water, and vice versa.

The invention is based upon the use of a press switch associated with the cock valve, and it will best be understood from the description of a practical embodiment. Also certain details, which should be viewed as sub-inventions can, as far as their principles are concerned, best be discussed after said embodiment will have been described.

Fig. 1 is a vertical sectional elevation of the said embodiment.

Fig. 2 is a cross sectional view along the line II—II in Fig. 1.

Fig. 3 is a vertical sectional elevation as in Fig. 1, but showing the different parts in the positions for drawing off cold water.

Fig. 4 is a diagrammatic view showing another position of the parts (drawing off hot water).

The casing 5 of the cock is provided with a screw coupling 6 for its connection to a water main. The cock valve 7 is secured to the valve stem 8 and is loaded by the spring 9. Immediately above the valve 7 the valve stem has a bevelled recessed portion 10 which, when the valve is opened, acts as a cone to control the width of the passage for the water. A press button 11 acts through a rod 12 and an adjusting screw 26 on the valve stem 8. The button rod 12 is provided with projections 13 guided in slots 14 of a sleeve integral with the top cover plate 15 of the water space of the cock.

Secured to the button rod is a contact spring 16, the contact pieces of which are adapted to engage contact pieces 17 on a disc 18 of insulating material. The one contact piece 17 is connected with one conductor of the flexible cord 19, the other with one end of the heating wire 20. The second conductor of the cord 19 is connected with the other end of the heating wire. These connections have nothing extraordinary and are, therefore, not shown.

The button rod is provided with two notches 21 and 22 adapted to cooperate with a pawl 23. The pawl 23 is pivoted as at 24 (Fig. 2) to the cap 25 and a spring 27 tends to force it towards the button rod. A slot 28 in the pawl receives a pin (screw) 29, which is secured to a piece 30 centrally disposed with respect to the button rod and rotatable in the cap 25. Said rotary piece 30 is further provided with a lever 31 movable between two abutments in the form of pins 32 on the cap 25, and inside the cap

the rotary piece has a central cam 33 coacting with the antifriction roller 35 of a snap lever 34 loaded by a spring 36. The slot 28 in the pawl is so formed that the pin 29 allows the pawl to enter into the notches 21 and 22 of the button rod when the lever 31 assumes its extreme positions, but when the lever 31 is kept in a position centrally between the abutments 32 the pin 29, which projects into the slot 28, causes the pawl to clear the button rod. This position of the rotary piece, however, is unstable owing to the action of the antifriction roller 35 on the nose of the central cam 33.

The rotary piece 30 is provided with a segmental recess 37 for the passage of a lateral projection 38 of the button rod 12, but said recess is so located as to register with the projection 38 only when the lever 31 assumes one extreme position (the position shown in Fig. 4) or its central position. When the lever is in its other extreme position (Fig. 3), however, the recess of the rotary piece 30 is out of register with the projection 38.

The operation of the cock will now easily be understood.

In the position of the parts as illustrated in Fig. 1 the valve 7 is closed and the contact pieces of the spring 16 are located at a comparatively great distance from the contact pieces 17.

According to Fig. 3, the lever 31 and the rotary piece 30 are so positioned that the segmental recess 37 is out of register with the projection 38. Therefore, when the button 11 was pressed down (Fig. 3), the projection 38 abutted against the rotary piece. Said depression, however, was deep enough to allow the pawl 23 to enter into the lowermost notch 22 of the button rod. In this position of the rotary piece the coacting pin 29 and slot 28 allow the pawl to enter the lowermost notch 22 of the button rod but owing to the projection 38 the button rod cannot be further depressed. In this position (Fig. 3) the water valve is open and seeing that the deepest portion of the bevelled recess 10 is located inside the valve seat, a considerable quantity of water can flow from the main. In said position of the parts the electric contacts are not closed and they cannot be closed because the rotary piece prevents the button rod from being further pressed down.

If now the lever 31 is swung to its other extreme position, it must move through its central position, owing to which the pin 29 retracts the pawl 23 from the notch 22 and spring 9 instantaneously closes the valve 7. When the lever 31 has reached its other extreme position, the segmental recess 37 registers with the projection 38 (Fig. 4). The button 11 is now free to be fully depressed so as to close the electric contacts. The pawl 23 has again freedom of oscillatory motion and engages the uppermost notch 21 of the button rod. Though the valve 7 has now moved further away from its seat, its bevelled recess inside the seat reduces the cross sectional area of the passage to a greater extent than in the position shown in Fig. 3, the consequence being that the water flows along the current-carrying wire 20 at such a rate as to be discharged with the required temperature. When the lever 31 is moved into its central position the pawl 23 is as a consequence retracted and the spring 9 causes the electric circuit to be interrupted and the water valve to be closed.

Owing to the rotary piece 30 having an unstable central position the button cannot easily be pressed down without the pawl 23 being in frictional engagement with the button rod. A free depression of the button would be objectionable because the operator would then be obliged to exert pressure on the button as long as water is to be discharged and because thereafter, the electric contacts would be likely to be opened too slowly.

As the pressure in the water main is not constant throughout its length and in view of the fact that the temperature of the water in the main varies with the seasons whereas the available electric energy is practically invariable, it is essential for the cross sectional area of the hot water passage to be adjustable. It is clear that in a lower position of the adjusting screw 26 the bevelled face 10 of the valve stem will, the moment wherein the electric circuit is closed, have moved further into the valve seat and, in consequence, have reduced the passage to a greater extent.

When the described arrangement is now more broadly viewed, it will be found that the principle of the invention is embodied in a cock having a press button both for a press switch and for the liquid. Even when the remaining parts are abstracted, such a cock obviously has certain advantages. It is easier to operate than a cock provided with a turn switch. The water pressure assists in cutting off the water supply and also in breaking the electric circuit. The reciprocatory motion here is natural, whereas with a turn switch reverse rotation would be against the standard practice and would cause confusion. When depressing the button it is easy to find by the touch two positions, the first corresponding with the opening of the water valve and the next with the closure of the electric circuit, the said closure manifesting itself by increased yielding resistance. Seeing that it is preferable for the first named position to correspond with the discharge of cold water, the construction may be developed by making the width of

the water passage responsive to the rate of depression. This, however, is not strictly necessary. The construction could be such that the electric contacts first engage and then disengage each other during the depression and that the supply of water is maximum when the button is fully depressed and the electric circuit (after the passage of the contacts) interrupted.

Much better is the principle embodied in the illustrated apparatus, which is provided with a locking device adapted to hold the button actuated mechanism in a predetermined position. Manual release of the locking device causes the electric circuit to be broken momentarily, another convenient feature being that the cock remains opened without pressure being exerted on the button.

The locking device could, for instance, comprise a sliding bolt which is shot by the operator when the button assumes the required position and retracted as soon as a sufficient quantity of hot or cold water has been drawn off, but the actuation of the spring loaded pawl by means of a lever (which, besides, can indicate the "hot" and "cold" positions) has the advantage that the operation requires hardly any attention or skill. The actuation of the lever can, the same as the depression of the button, be effected by one finger and is, therefore, easier than that of a turn switch. In this embodiment of the invention the lever can also serve to prevent the electric circuit from being unduly and temporarily closed.

A mechanism (called "snap mechanism"), which always tends to return the locking device into a position ready for locking the press button controls the manipulation and simplifies the operation. If the cock is mainly used for hot water, the operator, after having released the button, swings the lever back into its "hot" position, when the cock is ready for supplying hot water on the button being fully depressed.

A further perfection, which is embodied in the mechanism for adjusting the water supply, could also be realized by the provision or removal of small distance discs between the button rod and the valve stem. An adjusting screw, however, enables this adjustment to be effected in a more simple manner. Especially with a press button mechanism such a screw adjustment can be realized in a very simple way.

What I claim is:—

1. A fluid cock of the class described, including a sliding reciprocatory spring tensioned stem, having a valve head at its lower end adapted to cooperate with a seat in the casing of the cock to provide a fluid control valve, switch terminals carried by said sliding reciprocatory stem, line wire terminals located in the path of movement of said switch terminals, and a manually releasable locking element adapted to lock the stem after it has made a partial movement without closing the switch to permit the flow of cold water and adapted also to lock the stem after further movement to close the switch.

2. A fluid cock of the class described including a fluid inlet opening and a discharge port, a reciprocatory valve stem slidably mounted in the casing of the cock, a spring for maintaining the valve stem in its normal position, a valve head carried by the stem adapted to normally close said inlet opening and the said stem having a beveled recessed portion adjacent the head, switch contacts carried by the stem, line wire terminal contacts located in the path of movement of the switch contacts on the stem, electrical heating elements in circuit with the line wire terminals, and means for holding said stem partially depressed against the tension of the spring to move the valve head from the inlet opening and permit the flow of fluid therethrough without bringing the switch contacts into engagement with the line wire contacts, said means also being adapted to hold the stem down against the tension of the spring at a further point of its movement to bring the switch contacts into engagement with the line wire contacts thereby to close the circuit to the heating elements and also bring the beveled recessed portion of the stem into throttling relation to the inlet opening.

3. A cock of the class described including an electrical press switch, a liquid valve, and a press button including a stem, a manually releasable locking device adapted to lock the said stem in one of two positions, and a snap mechanism for controlling the locking device.

4. A cock of the class described including an electrical press switch, a liquid valve, a stem having a press button thereon and controlling the operation of the switch and liquid valve, a manually releasable locking device adapted to lock the stem in different positions, said locking device comprising a pawl, a lever controlling the pawl and which in its extreme positions does not interfere with the action of the pawl, and said lever having means whereby when it is in an intermediate position it renders the said pawl inoperative, and an abutment on the lever which in one extreme position of the latter prevents the stem from being depressed beyond its first position.

5. A cock of the class described including a casing having a pipe attaching portion at one end and an outlet spout at the other end, a spring pressed stem having a valve at its lower end for controlling communication between the attaching end of the

casing and the interior thereof, a button on the exposed end of the stem, a switch device mounted on top of the casing, a cap mounted on top of the casing for housing the switch mechanism, contact members carried by the stem, electrical heating elements arranged within the casing and connected to the switch terminals, and means for controlling the depression of the stem to different elevations thereby to cause hot or cold water to issue from the spout according to the position of the stem.

In testimony whereof I affix my signature.

ANTON FRANS EDUARD HANSON.