July 25, 1933. H. ARBER 1,920,049

STOP-COCK WITH ELECTRIC HEATER

Filed May 29, 1930

Fig. 1

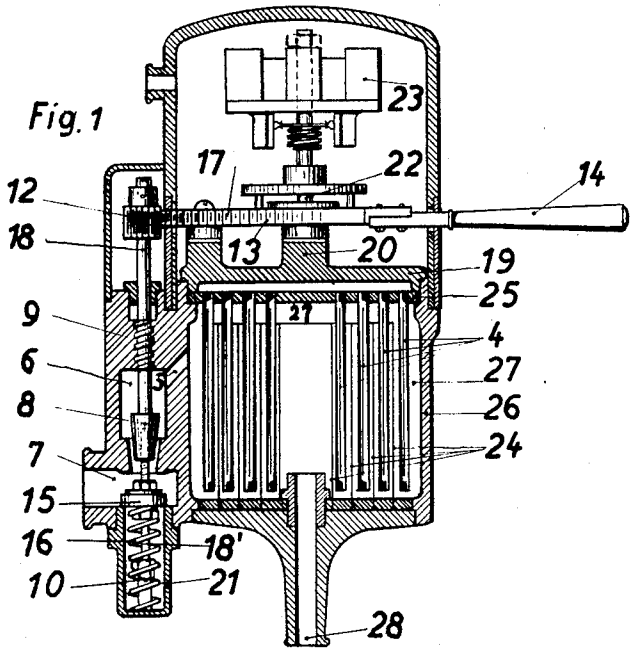


Fig. 2

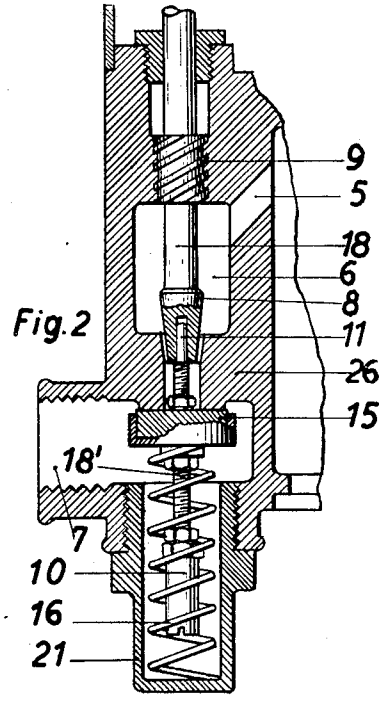


Fig. 3

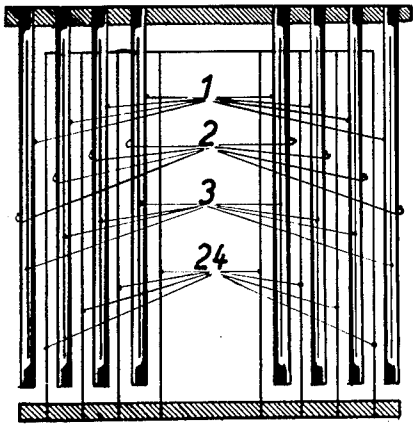
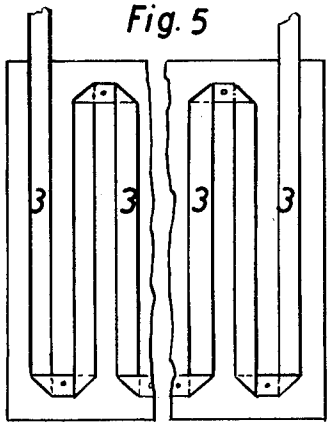


Fig. 5



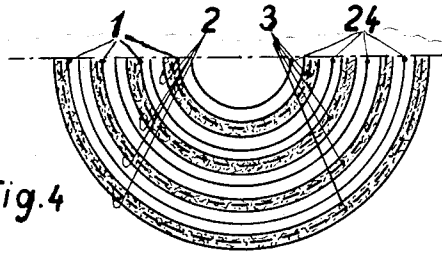


Fig. 4

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UNITED STATES PATENT OFFICE

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STOP-COCK WITH ELECTRIC HEATER

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The subject of the present invention is a stop-cock provided with an electric heating arrangement, by means of which the water that is flowing through can be heated. For setting this contrivance into operation a single lever suffices, by means of which the passage of the water and the power current switch are opened and closed, so that through the position given to the lever either cold water or more or less heated water will flow out. When the stop-cock is closed the interior of the stop-cock opens towards the outside and hence it not affected by pressure of the water that exists in the network, to which the cock is connected. With such stop-cocks it is a matter of importance that the position of the closing device for checking the flow of water, which is fitted up at the place of entry, is adjustable to the position of the activating lever. For this reason the valve body is adjustable with the stop-cock in the present invention. Furthermore, it is important that with such a stop-cock the quantity of water passing through can be regulated, so that it admits of being connected with the network in which the water-pressure is not always the same, and that it can be adjustable for a definite maximal heating of the water. In order to attain this requirement the stop-cock is provided with a regulatable throttle valve arrangement between the space which encloses the heating arrangement. This latter consists of several ring-elements lying co-axially one to the other, which are in contact with the water on both sides, so that there is an advantageous utilization of the heat, and that accordingly the heating contrivance can be relatively small for the attainment of any definite maximal temperature. This advantage admits of being still further increased if we press the heating resistance of each element of the heating body, which consists of a thin metal tape embedded in a layer of insulation, between two thin-walled pieces of pipe, which are laid one over the other and which lie against one another with conic surfaces that are parallel to one another. In the event that the heating body consists of three or more ring-elements and that the heating resistance is divided into three divisions of equal resistance, then there exists the possibility of connecting the elements in star-connection or in delta-connection, so that the stop-cock can be switched to a three-phase current network in such a manner that this is burdened uniformly on all three phases and thus a rather large number of stop-cocks can be simultaneously switched on.

The accompanying drawing shows us one embodiment of this present invention, viz.,

Figure 1 shows us the stop-cock in longitudinal section;

Figure 2 a part of the same on a larger scale;

Figure 3 an axial section through the heating body;

Figure 4 a transverse section half-part of the heating body;

Figure 5 a part of the heating wire laid flat.

The stop-cock housing 26 constitutes a chamber 27, in which the heating body is located, and a hollow space 6, which opens into the intake 7 and is connected with the chamber 27 by means of the connecting channel 14. The floor of the chamber 27 constitutes the open discharge branch 28, and towards its upper part the chamber 27 is firmly cut off through the screwed-on cover 19. The heating body, which consists of four ring-elements 4, is provided with a rim at its upper end, and is laid upon a projecting piece 25 and made fast in a suitable manner. In an eye 20 of the cover 19 there is the spindle 22, about which the toothed segment 13 can revolve. By means of the handle 14 the segment 13 can be turned. This catches into a transmission wheel 17, with which the piston 12 notches. The valve spindle 18, upon which the piston 12 is wedged, carries a control screw 9, which is screwed into a female screw of the housing 26, so that the spindle can move back and forth, when it is turned in one or the other direction by means of the handle 14 and the toothed gearing 13, 17, 12. The spindle carries the valve body 15, the cone 8 and a head 10. The lower part 18′ of the valve spindle,

which is provided with a thread, is not firmly united with the upper part, but through a pin 11, which projects loosely into a bore of the cone 6, while a spring 16, which rests upon the bottom of the cap 21 and pushes against the valve body 15, holds the two parts together. The valve body 15 is kept firmly in its axial position through two nuts, so that it can be adjusted in its axial direction. This makes it possible to adjust it in such a way that in the one end position of the handle 14 it presses firmly upon the valve seat. This regulating can also, e. g., become necessary, if the packing ring of the valve is somewhat worn. In the open position of the valve there lies the head 10 upon the bottom of the cap 21. According to the position of the head 10 upon the threaded part 18′ of the spindle it will sooner or later push against the cap 21 and thus limits the downward movement of the valve spindle with the cone 8, which plays in a bore suited for it, so that through the adjustment of the head 10 the maximal throttling of the flow of water through the stop-cock, that is occasioned by the cone 8, is determined. If the stock-cock is connected with a water supply installation with high pressure or if we desire to heat intensely the water flowing through, then we adjust the head 10 correspondingly high upon the threaded part 18′, and reversely we screw it towards below, if we desire that, with a definite pressure in the water that is flowing in and with the stop-cock opened to the fullest extent, more water should flow through it and this accordingly be less highly heated.

Up into the ring space between each two elements 4 of the heating body there extends nearly as far as the upper end in each case a cylindrical dividing wall 24, which projects from the bottom of the space 27. The water, which flows in at 7, gets into the space 27 through the closing valve, that is governed by the body 15, through the throttle valve arrangement, that is governed by the cone 8, and the connecting passage 5 and is here forced to flow along each heating element 4 downwards on the outer side and upwards on the inner side until it flows out through the open discharge piece 28. The heat, which comes forth from the heating body, is thereby imparted to the water with little loss. In order that there may also be a good transmission of heat from within to the two outer surfaces in every element of the heating body, each of these in the given representation consists of two thin metal sleeves 1, 2, (Figure 3), which are laid the one over the other and between which the heat resistance, that consists of a thin metal tape 3 and lies in a layer of insulation, is held firmly clutched. The tape 3 is not wound in a spiral manner as usually, but it is laid in zigzag fashion in the direction of the mantle line, as is shown in Figure 5. This has the great advantage that the tape, which is expanded through the heat, will not become loose as a spirally wound wire would. The expansion of the heated tape is distributed upon all the branches of the zigzag line, for which reason it does not cause any weakened condition. It is of greater advantage to embed the metal tape, e. g., between mica sheets in such a manner that we lay it on one of these in zigzag lines and fasten it (Figure 5), lay a second sheet of mica upon it, and lay the whole about the inner sleeve and then place the outer sleeve over it. In order that a strong pressure may be obtained, the surfaces of the sleeves 1 and 2, which lie against one another, are for practical reasons parallel and conical as regards one another and their diameters are thus different from one another, so that the tape, which is embedded between sheets of mica, can scarcely find any place between the sleeves. If we then push the two sleeves 1 and 2 one into the other by means of strong pressure or a blow, while the metal tape that is lying between sheets of mica encloses the inner sleeve, then all parts are firmly pressed against one another, so that the heat of the heated tape is properly conducted to the outer surfaces of the sleeves.

For connecting the stop-cock to a current network, it possesses a double-pole or a triple-pole snap-switch 23, which is in the usual manner connected with the toothed segment 13 through a slit or pin coupling in a way that it is not switched on until the water inlet valve is opened and that this is not closed until it has again interrupted the current.

If it is intended to connect the stop-cock with the rotating current network, the heating tapes of the four heating body elements 4 are divisioned off into three parts of equal resistance and these are connected with one another in star or delta connection, in order to attain a relatively low capacity. A great number of such stop-cocks can be switched on in such a rotating current network without being obliged to fear that disturbances will be caused in the network, through having switched them on.

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

1. An electric water heater comprising a casing having a heating chamber therein, said chamber having a water inlet and an outlet communicating therewith, a valve seat arrangement within said water inlet, a valve for said valve seat, means for controlling the flow of water through said inlet after said valve has been moved from said seat, and means for jointly controlling said valve and said water controlling means.

2. An electric water heater comprising a casing having a heating chamber therein, a water inlet passageway leading to said chamber, a valve seat arranged within said passageway, a valve normally engaging said valve seat, means for adjustably supporting said valve, a plug valve adapted to engage said valve seat, and means for jointly connecting said valves whereby when said adjustably supported valve is moved to open position said plug valve will control the flow of water through said passageway.

3. An electric water heater comprising a casing having a chamber therein, an outlet pipe leading from said chamber, an inlet passageway leading to said chamber, a valve seat arranged within said inlet passageway, a spindle rotatably mounted within said casing, a plug valve carried by said spindle, an adjustably supported valve adapted to engage said valve seat for normally closing said water inlet passageway, and manually controlled means for rotating said spindle, whereby said plug valve and said adjustably supported valve may be alternately opened and closed.

4. An electric water heater comprising a casing having a heating chamber therein, an outlet pipe connected to said casing and communicating with said chamber, a water inlet passageway formed within said casing and communicating with said heating chamber, a valve seat arranged within said water inlet passageway, a vertically movable valve for normally engaging said valve seat for closing said inlet passageway, a plug valve adapted at times to co-operate with said valve seat whereby the flow of water through said passageway may be controlled after said vertically movable valve has been opened, a spindle connecting said valve, and manually operative means mounted upon said casing and connected to said spindle whereby said valves may be controlled.

5. An electric water heater comprising a casing having a heating chamber therein, an outlet pipe communicating with said heating chamber, an inlet passageway formed with said casing and communicating with said heating chamber, a valve seat arranged within said water inlet passageway, an adjustable valve normally closing said water inlet passageway, a plug valve adapted at times to co-operate with said valve seat for controlling the flow of water through said inlet passageway after said adjustable valve has been opened, a vertically positioned spindle rotatably mounted within said casing and operatively connected to said valve, a horizontally arranged control handle mounted upon said casing and operatively connected to said spindle, whereby said valves may be controlled.

6. An electric water heater comprising a cylindrical casing having a heating chamber arranged therein, a bottom wall detachably connected to said casing for closing one end of said chamber and having an outlet opening therein, a cover plate detachably connected to said casing for closing the opposite end of said heating chamber, a plurality of concentric heating elements arranged within said chamber, said casing having a water inlet passageway formed therein and communicating with said chamber, a valve seat arranged within said water inlet passageway, valves engaging said valve seat for controlling and flow of water through said inlet passageway, a valve stem mounted within said casing and operatively connected to said valve, a manually operative handle mounted upon said cover plate and operatively connected to said valves and spindles, a dome cover secured to said casing for housing said cover plate, a snap switch arranged within said dome cover, and means for operatively connecting said snap switch to said control handle.

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