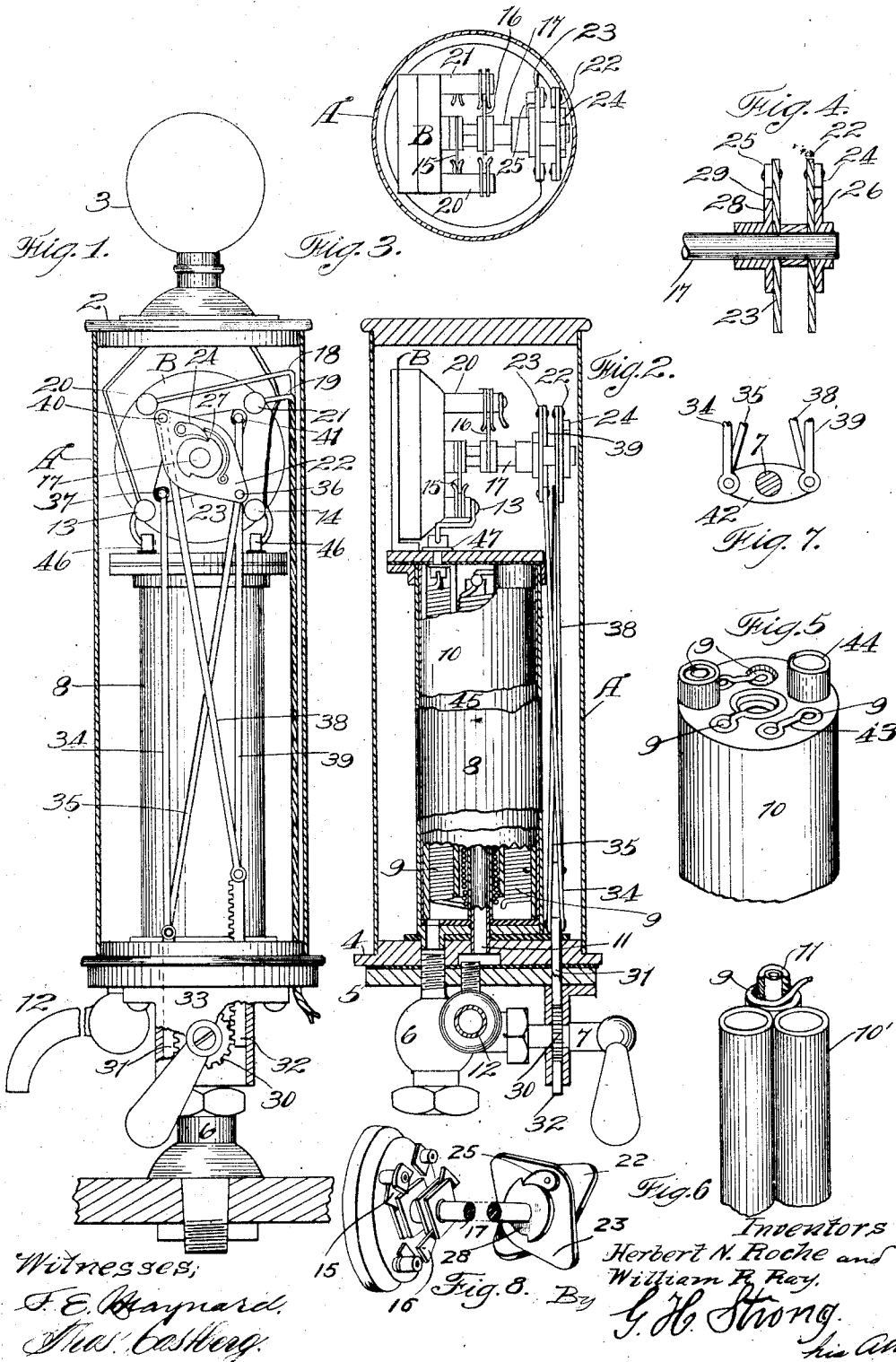


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ELECTRIC WATER HEATER.
APPLICATION FILED AUG. 3, 1910.

987,493.

Patented Mar. 21, 1911.



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UNITED STATES PATENT OFFICE.

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ELECTRIC WATER-HEATER.

987,493.

Specification of Letters Patent. Patented Mar. 21, 1911.

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To all whom it may concern:

Be it known that we, HERBERT N. ROCHE, and WILLIAM R. RAY, citizens of the United States, residing in the city and county of San Francisco and State of California, have invented new and useful Improvements in Electric Water-Heaters, of which the following is a specification.

This invention relates to electric water heaters.

It is a purpose of our invention to provide in an electric water heater, means of simple, reliable and effective construction whereby an electric current may be controlled automatically by the operation of the handle of the water supply, and to so design the mechanism as to provide against short circuiting of the current, and which may be easily repaired and renewed from time to time.

A particular object is to provide means which will operate a standard snap switch in a manner as nearly normal as is possible.

The invention consists of the parts and the construction and combination of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is a side elevation of the device, partly in section. Fig. 2 is a central, vertical section, partly in elevation. Fig. 3 is a plan view of the switch. Fig. 4 is a sectional view of the actuator. Fig. 5 is a detail of the heating coils and insulators. Fig. 6 shows the coils protected by separate tubes. Fig. 7 shows a modified form of connection to the valve stem. Fig. 8 is a detail showing in perspective the switch, including the plates or levers, 22—23, and associated parts.

The illustrations represent one form of our invention as actually constructed and successfully operated, in which—

A is a suitable casing having a crown 2 on which may be mounted an incandescent light 3 connected to the heating circuit of the apparatus for the purpose of indicating the flow of current. The lower end of the casing is sealed by a disk 4, insulated from a suitable base 5, through which is a cock or valve 6 having a handle-stem 7. When the stem 7 is turned to open the valve water will flow into an appropriate receiver 8 in-

ulated from and mounted on the bottom 4, and will pass upwardly through parallel, serially connected resistance coils 9 supported in a tubular insulator 10, then the heated water will flow through a central conduit 11, insulated from its coil, and pass out to the bottom of the heater through a suitable nozzle 12.

It is absolutely necessary in constructing heaters of this class that the transmissions of high voltage electric current be very carefully controlled, and that all possible chance of electrolysis and short circuiting be guarded against, and it is to this end that the coils 9 are connected to the posts 13, 14 of a standard snap switch B of well known and approved structure. The switch blades 15 and 16 turn in one direction only, and are actuated by a stem 17, which is journaled in the switch so that the current may be turned through the posts 13 and 14 from lead mains 18 and 19 secured to switch posts 20 and 21.

A particular and important feature of this invention is the means whereby the stem is actuated in a manner in simulation of the pressure of the human hand on the usual switch stem, that is, the stem is turned by power applied equally on opposite sides of the stem to prevent side thrust of the stem in its bearing and consequent binding of parts. This action is accomplished by mounting at the outer end of the stem independent, loose plates or leaves 22 and 23, having a walking-beam motion thereon, and each carrying respective spring-pressed pawls 24 and 25, the former of which, when moving up, will engage a coöperative collar 26 notched at 27 and fastened on the stem 17. The pawl 25 on lever 23 coacts on its downward stroke with a collar 28, also notched at 29 and fastened on the stem. The levers 22—23 are adapted to rock simultaneously in opposite directions, and are connected to the valve spindle 7 in such relation that the valve may be opened nearly full before the switch closes the circuit, and may then be nearly closed to shut off the water before breaking the circuit so that a small volume of water may be allowed to flow through the coils 13 and become highly heated, if desired. The relative disposition

of levers 22 and 23 to each other is such that as pawl 24, on lever 22, is swung down it will freely ride over the ratchet 26, while the pawl 25, on lever 23, is being simultaneously moved upward and is in operative engagement with and driving the ratchet 28, thus turning the stem 17 a quarter turn, breaking the circuit at blades 15 and 16. The pawl plates 22 and 23 are disposed at approximately a right angle and since they move in opposite directions each pawl 24 and 25 is effective, when moved clockwise, to engage its ratchet, thus always turning the stem 17 in one direction.

Any suitable and appropriate means may be employed to connect the valve spindle and the switch stem, and one form is to fasten on the spindle 7 a pinion 30 and on the opposite side of it mount racks 31-32 in a guide 33 so that when the gear 30 is turned with the spindle 7 it will simultaneously reciprocate its complementary racks, one upwardly and one downwardly. This motion of the racks is transmitted to the levers by links, one pair of which, as 34-35, diverges from racks 31 and connects, one with a pivot 36 on lever 22 and the other with a pivot 37 on the opposite end of the other lever 23. The other pair of links 38-39 diverges from the rack 32 and connects to the opposite pivots 40-41 on the separate lever 23. By thus connecting the opposite ends of the independent levers to the valve spindle 7, they will rock at each movement of the spindle when the water is let into the receiver 8, one set of links moving up and the other set moving down so that the force applied to turn the stem 17 in one direction acts through the pawl which is moving in the direction in which the stem is designed to turn, clockwise in this instance. The diametrically opposite notches in the collars 26 and 28 are set at quarters on the stem 17, and as the valve spindle 7 is turned upwardly a quarter revolution the pawl engaging its respective collar will turn the stem 17 and at the end of the quarter turn will snap the switch. The side strain of the actuating pawl on the spindle is neutralized by the simultaneous reverse action of the oppositely moving lever. In this way the oppositely oscillated levers being positively connected to the spindle 7 act as bearings in which the stem or shaft 17 may turn, thus dispensing with one fixed bearing and the resultant additional friction. When the valve stem is being turned to cut off the flow of water, the pawl 25 will engage a notch of the collar 28, and before the water is entirely cut off the switch blades will snap away from the posts and break the circuit instantly.

A very simple and easily operated form of connection between the spindle 7 and the

levers comprises, in place of the racks and pinion, a single lever 42, fastened on the spindle and directly connected by the links to the walking beams 22 and 23.

The insulator 10 may be of any suitable material and form, as in separate tubes 10', and is here shown as having a plurality of longitudinal perforations in which the coils 13 are strung, each coil being connected in series and having its bridge wire counter-sunk in small slots 43 across the ends of the insulator so that they are flush therewith, thus preventing the chance of short-circuiting at this point. The ends of the insulators are provided with slotted cups 44 to space the member within the receiver and allow a free circulation of water, and in order to prevent electrolysis and conserve heat, the body of the insulator is insulated from the receiver wall by a thin sheet of mica or other substance 45. The terminals of the bare wire forming the coils 13 are brought up through the cups 44 and connected to posts 46, which are suitably insulated by mica washers 47.

The special construction of the switch operating device dispenses with any other bearing than that of the switch and facilitates renewal of parts, as well as acting, as nearly as possible, in the manner of a human hand to turn the switch stem.

Having thus described our invention, what we claim and desire to secure by Letters-Patent, is—

1. The combination in an electric water heater, of a rotary snap switch adapted to complete an electric circuit through the heater, and a switch operating mechanism comprising a water valve stem, a lever secured thereon, a pair of independent, loose walking beams on the switch stem adapted to rotate the stem when oscillated, and connections between said lever and the walking beams, whereby the latter may be actuated when the valve stem is moved.

2. The combination in an electric water-heater, of a rotary snap switch adapted to send an electric current through the heater, and a switch operating device comprising a valve shank, a lever secured thereon, a switch stem, a pair of independent rocking plates loosely mounted on and rotating the switch stem, said plates being disposed with their longer axes at approximately right angles, and being adapted to rock simultaneously in opposite directions, and pairs of links connecting said plates and the lever on the valve shank for operating the plates.

3. The combination in an electric water heater, of a rotary electric switch and its stem, a water controlling valve, and means connecting said valve and said switch, said means including a pair of oppositely oscillated

lating plates loosely mounted on the switch
stem, pawls carried by the plates and en-
gageable with the ratchets fast on the stem
when the plates move the pawls in the same
5 direction, and pairs of links connecting the
plates and the valve, whereby the switch
may be actuated, one pair of said links
effective to push on opposite ends of the
plates and the other pair effective to pull on
10 opposite ends of the links simultaneously.

In testimony whereof we have hereunto

set our hands in the presence of two subscri-
ing witnesses.

HERBERT N. ROCHE.
WILLIAM RUTH RAY.

Witnesses as to H. N. Roche:

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