May 13, 1941. H. W. BATCHELLER 2,242,165

OPERATING MEMBER FOR ELECTRIC SWITCHES AND THE LIKE

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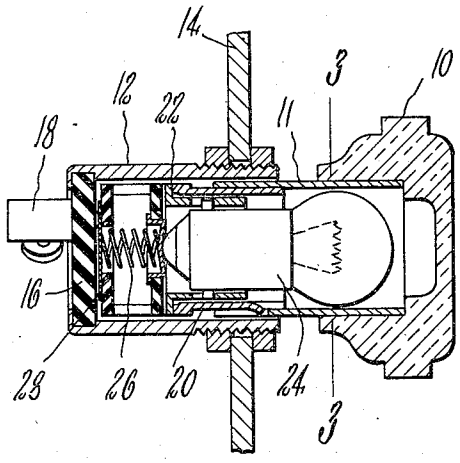



Fig. 1.

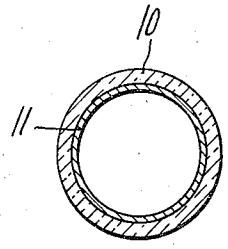



Fig. 3.

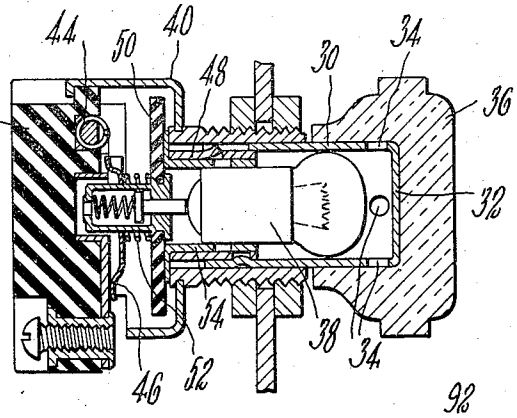



Fig. 2.

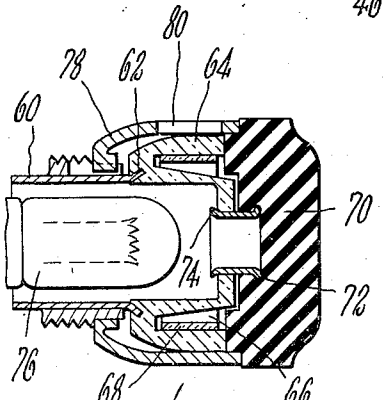



Fig. 4.

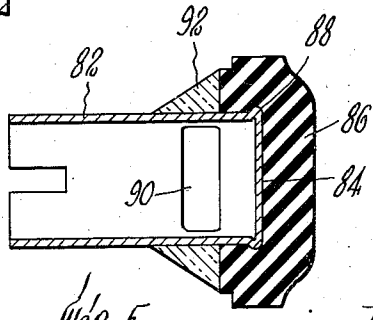



Fig. 5.

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# UNITED STATES PATENT OFFICE

2,242,165

## OPERATING MEMBER FOR ELECTRIC SWITCHES AND THE LIKE

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Application May 3, 1937, Serial No. 140,294

3 Claims. (Cl. 200—172)

This invention relates to operating members for electric switches, rheostats and the like, such, for example, as are illustrated in my copending applications Serial No. 52,855, filed December 4, 1935, Patent 2,087,935, July 27, 1937; Serial No. 73,217, filed April 8, 1936; and Serial No. 73,218, filed April 8, 1936, of which applications this application is a continuation-in-part.

According to the invention, I provide an improved operating member adapted to be manually rotated so as to actuate some other member to open or close the switch, vary the resistance of the rheostat, or perform some equivalent service. Consequently, such operating member may conveniently comprise a shaft, preferably hollow, on the outer or forward end portion of which is secured a knob to be grasped by the operator. Since the driving torque produced by the operator's fingers is impressed directly on the knob, it is essential that there be no possibility of relative rotation between the knob and shaft. In order to achieve this result, I mold the knob directly on the outer or forward portion of the shaft so that in the molding process the plastic material of the knob enters and hardens in the minute surface irregularities of the portion of the shaft which is embedded in the knob. Moreover, the plastic material is usually molded hot and in cooling shrinks against the surface of the shaft, thus gripping it so tightly as to render relative movement between the knob and shaft impossible except by practical destruction of one or the other. In some cases, such as when only a relatively small portion of the shaft is embedded in the knob, it may be desirable to strengthen the bond between the knob and shaft by first expanding or flaring the end portion of the shaft, and then molding the knob onto the flared portion.

For a more complete understanding of the present invention, reference may be had to the following description thereof, and to the drawing of which—

Figure 1 is a sectional view of an electric switch, including an operating member which embodies the invention.

Figure 2 is a sectional view of an electric switch and rheostat including an operating member embodying a modified form of the invention.

Figure 3 is a section on the line 3—3 of Figure 1.

Figures 4 and 5 are sectional views of other modified forms of the invention.

The switch illustrated in Figure 1 includes an operating member consisting of a knob 10 preferably of molded plastic material in the form of a cap having a skirt, the knob having a tubular shaft 11 of brass or other suitable material inserted prior to the molding operation so as to form a substantially integral structure with the molded material. The material used in molding the knob 10 is preferably of a type requiring heat and pressure in the molding operation. As the molded knob cools, it contracts somewhat, thus shrinking the skirt tightly against the surface of the end portion of the shaft 11 while the cap covers the end of the shaft. Since the molding operation causes the plastic to enter into all of the slight surface irregularities of this end portion of the shaft, the resulting structure is virtually integral since the knob and shaft cannot be separated without the substantial destruction of one or the other of these members. As is also evident, the knob 10 cannot by any possibility slip upon the shaft 11, so that rotation of the knob 10 results in positive rotation of the shaft 11.

The operating member illustrated in Figure 1 is shown as employed in an electric switch such as illustrated and fully described in my said copending application Serial No. 52,855. The switch is contained in a housing 12 which projects through and is attached to a wall member 14 such as the dashboard of an automobile. The housing also includes a rear plate 16 which carries a pair of binding posts 18, one of which is shown on the drawing. The shaft 11 telescopes over a sleeve 20 within which is a lamp socket 22 for a telltale lamp 24. Where a lamp is thus provided in the shaft, the knob is preferably made partly or wholly of translucent material. The bulb of the lamp 24 is within the shaft 11, so that it shines through the portion of the translucent knob 10 which overlies the end of the shaft. The shell of the lamp is electrically connected to the casing 12 which is grounded, the tip of the lamp being electrically connected through a spring 26 to one of the switch members 28 which is rotatable with the shaft 11 and sleeve 20 to connect or disconnect contact elements connected with the binding posts 18, as fully described in my said copending application Serial No. 52,855.

In Figure 2 is illustrated an operating member consisting of a hollow shaft 30 which may be closed at one end as at 32, the side wall of the shaft adjacent to the end 32 being provided with a number of apertures 34 of suitable number and size. A knob 36 of translucent plastic material

is molded directly onto the end 32 of the shaft and also on the end portion of the side wall of the shaft so as to cover the apertures 34. The hollow shaft is adapted to contain a telltale lamp 38 which shines through the apertures 34, the light being subdued by the translucent material of the knob 36. Since the knob is molded directly onto the shaft 30, it fits into all of the small surface irregularities of the end portion of the shaft and shrinks tightly thereon so that the knob becomes virtually integral with the shaft and the operating member acts as a unit. This operating member is shown in connection with a rheostat switch such as is fully described in my said copending application Serial No. 73,218. The switch includes a housing member 40 with a base 42, the latter having a resistance coil 44 mounted in a groove in the forward face of the base. A contact shoe 46 is adapted to ride on the coil 44 so as to vary the resistance in the circuit, the shoe 46 being swung about the axis of the shaft 30 by a series of elements mechanically connecting it thereto. To this end, the shaft 30 telescopes with and is keyed to a sleeve 48 which in turn is keyed to a fiber disk 50. A stem 52 is secured to the disk 50, the shoe 46 being mounted on the stem 52 for rotation therewith. The sleeve 48 encloses a socket 54 for the lamp 38. Thus rotation of the knob 36 results in rotation of the contact shoe 46 so as to vary the resistance in the circuit and to turn the switch on and off, the condition of the switch being indicated by the telltale lamp 38.

In Figure 4 is illustrated another form of operating member including a hollow shaft 60, an end portion of which is expanded or flared as at 62. This flared end portion is embedded in a cup-shaped element 64 of translucent plastic material which is molded directly onto the end portion of the shaft. This element 64 is formed with a circular groove 66 in which may be mounted colored translucent strips 68. A knob element 70, preferably of opaque plastic material, is secured against the forward end of the element 64 by means of a ferrule 72, one end of which is embedded in the element 70. This ferrule projects through a central opening in the element 64 and has its other end expanded as at 74 to join the elements 64 and 70 together permanently. A telltale lamp 76 may be mounted within the shaft 60 so as to shine through the translucent element 64 and the colored strips 68. A fixed metal shield 78 may be provided to surround the element 64, this shield having one or more suitable openings 80 to permit a portion of the light of the lamp 76 to escape.

Figure 5 illustrates an operating member comprising a hollow shaft 82 which may, if desired, be closed at its end as by an end wall 84. The end wall 84 and a portion of the adjacent side wall is embedded in a knob 86 of plastic material, preferably opaque, which is molded directly onto this portion of the shaft. The shaft may be provided with a radially projecting rim 88 or radially projecting points at its end to lock the molded knob 86 more securely thereon, such projections being an added safeguard when the amount of side wall surface of the shaft, onto which the knob 86 is molded, is relatively small. The shaft 82 is preferably formed with one or more lateral apertures 90 to permit the escape of light from a telltale lamp such as is illustrated in Figures 1, 2 or 4. If desired, strips of transparent colored material, such as are illustrated at 68 in Figure 4, may be inserted within the shaft 82 so as to register with the openings 90. In order to soften the light passing through the openings 90, a suitable ring 92 of translucent material may be mounted on the shaft 82 so as to abut the rear face of the knob 86. The ring 92 preferably fits snugly upon the shaft 82 so as to be held thereon by friction.

It is evident that the invention may be embodied in various other modified forms without departing from the spirit or scope thereof as defined in the following claims.

I claim:

1. In an electric switch or the like, an operating member comprising a tubular metal shaft closed at one end and having lateral apertures adjacent to said closed end, and a knob of translucent plastic material molded directly onto said end and adjacent side wall so as to cover said apertures.

2. In an electric switch or the like, an operating member comprising a tubular metal shaft having lateral openings adjacent to an end thereof, a knob of plastic material molded directly onto the end portion of said shaft adjacent to said apertures, and a ring of translucent material frictionally fitted on said shaft and covering said apertures.

3. In an electric switch or the like, an operating member comprising a single piece of thin metal shaped into the form of a tube with one end closed and with apertures in the tube near said closed end, and a knob of translucent material covering and fitting into the surface irregularities of said closed end and the adjacent end portion of the tube.

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