

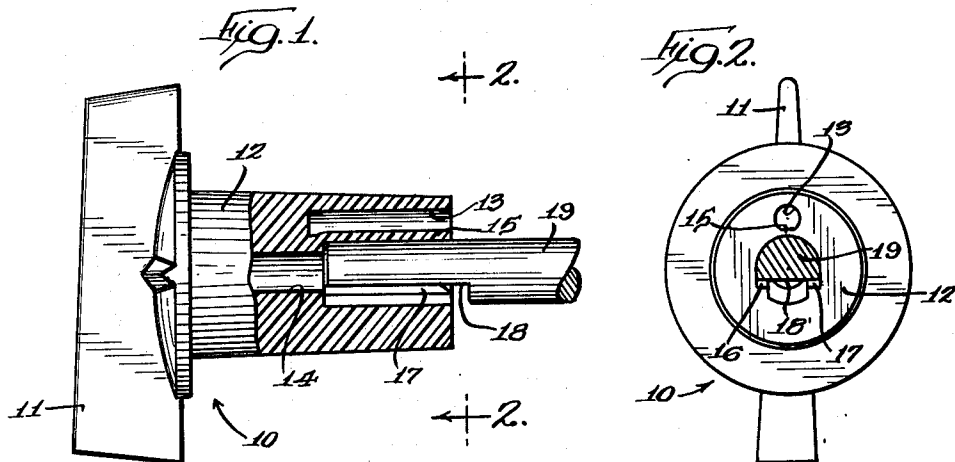
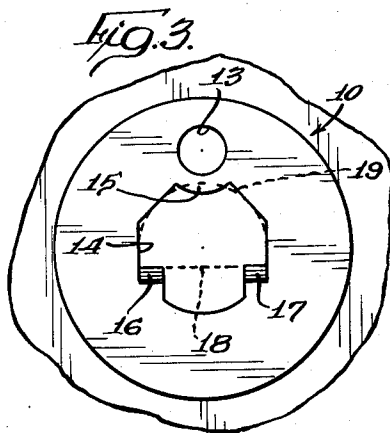
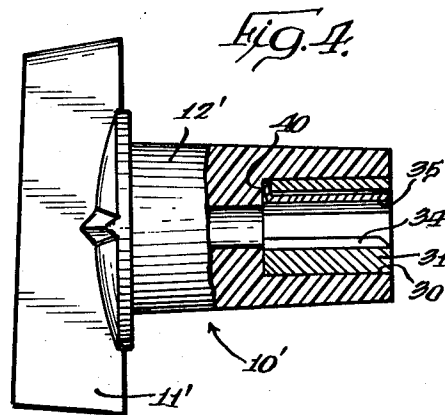
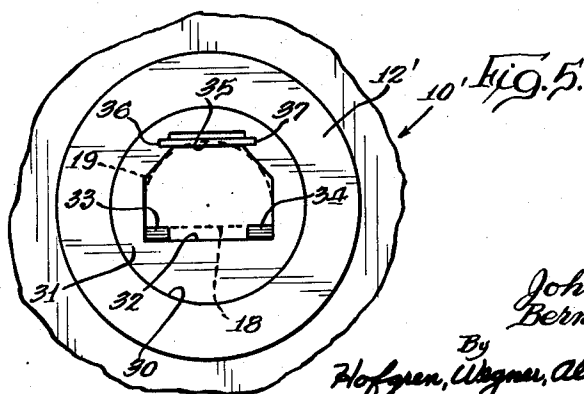
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KNOB

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This invention relates to a knob for releasable attachment to a shaft and more particularly to an improved control knob of an operating shaft of radio or television set or the like.

As presently known, knobs for operating shafts of radios or television sets or other appliances must be releasably engaged with their operating shaft so that they can be removed when necessary and must also operate to transmit force from the knob to the shaft. It is common practice to have a knob stem with an interior opening for receiving the shaft and some form of spring means engageable with a flat abutment on the shaft which functions to releasably hold the shaft and knob together. The location of this spring has been such as to have the torque created by turning of the knob taken up by the spring which causes fatigue in the spring and the spring eventually loses its capacity to hold the knob on the shaft.

An object of the invention is to provide a new and improved knob construction in which the knob will have spring means for retaining the knob and its operating shaft in association with the spring not being subjected to the torque created when the knob is turned.

Another object of the invention is to provide a knob having a stem with a hollow interior and abutment means positioned within the interior of the stem engageable with an abutment on an operating shaft and means opposite the stem abutment holding the stem and shaft in association by resiliently gripping the shaft with the turning force applied to the knob being transmitted to the shaft through the engaging abutments.

Still another object of the invention is to provide a knob as defined in the preceding paragraph in which the stem is formed of molded material with the abutment thereon being formed by integrally molded shoulders and the spring means for holding the knob in association with the shaft comprises a flexible wall section opposite said shoulders with the interior chamber of the stem which receives the shaft being of a size less than the shaft to cause slight deformation of the flexible wall section of the stem whereby said wall section compressively engages the shaft and shoulders of the stem together.

A further object of the invention is to provide a knob having a stem which receives a knob bushing having shoulders defining a plane for abutting relation with an abutment on an operating shaft and a spring mounted in said bushing opposite from said plane and positioned to cause the shoulders and abutment to compressively engage.

Further objects and advantages will become apparent from the following detailed description taken in connection with the accompanying drawings in which:

FIGURE 1 is an elevational view of a preferred embodiment of the knob with parts shown in vertical section and in associated relation with an operating shaft;

FIGURE 2 is a vertical section taken generally along the line 2—2 in FIGURE 1;

FIGURE 3 is an end elevational view of the knob taken looking toward the right hand side as shown in FIGURE 1 and with the operating shaft shown in broken line;

FIGURE 4 is a view similar to FIGURE 1 showing a second embodiment of the invention; and

FIGURE 5 is an end elevational view of the knob shown in FIGURE 4 looking toward the right hand end of the knob as shown in FIGURE 4.

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While this invention is susceptible of embodiment in many different forms, there is shown in the drawings and will herein be described in detail an embodiment of the invention, together with modifications thereof, with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the invention to the embodiments illustrated. The scope of the invention will be pointed out in the appended claims.

As shown in FIGURES 1—3 in the preferred embodiment, the knob indicated generally at 10 has a flange 11, which is manually engageable for turning the knob, and a stem 12. The stem 12 is formed of molded plastic material and has a pair of interior chambers 13 and 14 with the chamber 13 being generally cylindrical and the chamber 14 having an irregular configuration. The chambers are spaced apart a distance sufficient to provide a flexible wall section 15 therebetween.

A pair of elongate shoulders 16 and 17 are formed integrally on the interior of the wall defining chamber 14 to define a plane which forms an abutment engageable with a flat 18 formed on the operating shaft 19. The abutment plane defined by shoulders 16 and 17 is opposite from the flexible wall section 15 as seen in FIGURES 2 and 3 and the distance therebetween is less than the width of the operating shaft 19 at the location of the abutment section 18 whereby placement of the knob stem on the shaft results in a slight deformation upwardly of the flexible wall section 15 to compressively engage the shaft and hold the abutments 16 and 17 against the flat 18 of the operating shaft. This relation is shown in FIGURE 3 when the operating shaft is not associated with the knob and with the shaft shown in broken line as compared to FIGURE 2 in which the knob is on the operating shaft and the flexible wall section 15 has been deformed. This latter condition is also shown in FIGURE 1.

Any suitable plastic material can be used for the knob stem 12 so long as the wall section 15, when formed, will have the necessary flexibility to flex to the position shown in FIGURES 1 and 2 with the property of wanting to return to its unflexed position, as shown in FIGURE 3, with resultant compressive engagement of the knob stem on the operating shaft 19 which holds the coating abutments together to insure rotation of the shaft by turning of the knob. With the location of the flexible wall section 15 opposite the shoulders 16 and 17 of the knob stem the torque derived from turning of the knob is taken up by the shoulders 16 and 17 and no torque is applied against the flexible wall section 15 which avoids fatigue of the wall section 15 and provides for a longer operating life for the knob. The interior chamber 14 also has opposed sloped surfaces 20 and 21 which closely engage the round of operating shaft 19 to further assist in obtaining close engagement as shown in FIGURE 3.

The alternate embodiment is shown in FIGURES 4 and 5 wherein similar parts have been given the same reference numeral with a prime (') affixed thereto. In this embodiment the knob 10' has a stem 12' formed with a single interior chamber 30 which receives a knob bushing 31.

The knob bushing 31 has a hollow interior defining a chamber 32 with a pair of shoulders 33 and 34 defining an abutment plane engageable with the flat 18 of the operating shaft 19.

A spring 35 is mounted within the knob bushing opposite from the plane defined by the shoulders 33 and 34 and is retained by fitting the edges thereof in a pair of recesses 36 and 37 formed in the knob bushing. The distance between the plane defined by shoulders 33 and 34 and the spring 35 is less than the width of the operating shaft 19 at the location of the flat 18 whereby the spring is flexed slightly when the knob is placed on the operating shaft and the spring functions to compressively engage the

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shoulders of the knob bushing with the flat 18 of the shaft.

Again, as in the embodiment of FIGURES 1-3, the driving torque is taken up between the abutting surfaces of the bushing and shaft and not by the spring 35 so as to avoid fatigue of the spring and provide longer life thereof and avoid the tendency to have a "soft feel" when the knob is manipulated.

In order to secure the spring 35 within the knob bushing an end 40 thereof is turned at an angle to the body of the spring and as seen in FIGURE 4 is captured between an end of the knob bushing and the knob stem 12' whereby removal and replacement of the knob relative to the operating shaft will not work the spring 35 out of the bushing.

We claim:

1. An operating knob having a stem of molded material, said stem having a wall defining an interior chamber adapted to receive a shaft having an abutment thereon, said chamber having a width substantially equal to the diameter of said shaft, a pair of spaced apart shoulders molded into the interior surface of said wall defining a plane engageable with said abutment, and a section of said wall opposite said plane being relatively thin and flexible, the distance between said plane and said wall section being less than the width of said chamber whereby the shaft may be resiliently gripped by the knob stem and turning force applied to the knob is transmitted to the shaft through said shoulders and abutment.

2. An operating knob as defined in claim 1 in which said stem has means defining a space in said wall to form said flexible wall section.

3. An operating knob having a stem of molded material, said stem having a wall defining an interior chamber, means integrally formed on the interior surface of said wall defining a force transmitting abutment, and an

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integral flexible wall section opposite said abutment, said wall section being composed of material having elastic properties.

4. In combination, an operating knob and shaft having a flat thereon, said knob having a plastic molded stem, means defining a pair of interior chambers in said stem with a thin wall section therebetween, one of said chambers having a width substantially equal to the diameter of said shaft, a force transmitting surface engaging the flat of said shaft to have said thin wall section slightly deformed and compressively engage said shaft.

5. In combination, an operating knob having a stem of molded material, said stem having a wall defining an interior chamber receiving a shaft having an abutment thereon, said chamber having a width substantially equal to the diameter of said shaft, means molded into the interior surface of said wall defining a plane engageable with said abutment, and a section of said wall opposite said plane being relatively thin and flexible, the distance between said plane and said wall section being less than the width of said chamber whereby the shaft is resiliently gripped by the knob stem and turning force applied to the knob is transmitted to the shaft through said means and said abutment.

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