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H. A. HILSINGER, JR.
 FRICTION DEVICE FOR OPERATING
 KNOBS IN ADJUSTABLE APPARATUS
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2,660,904

FIG. 1

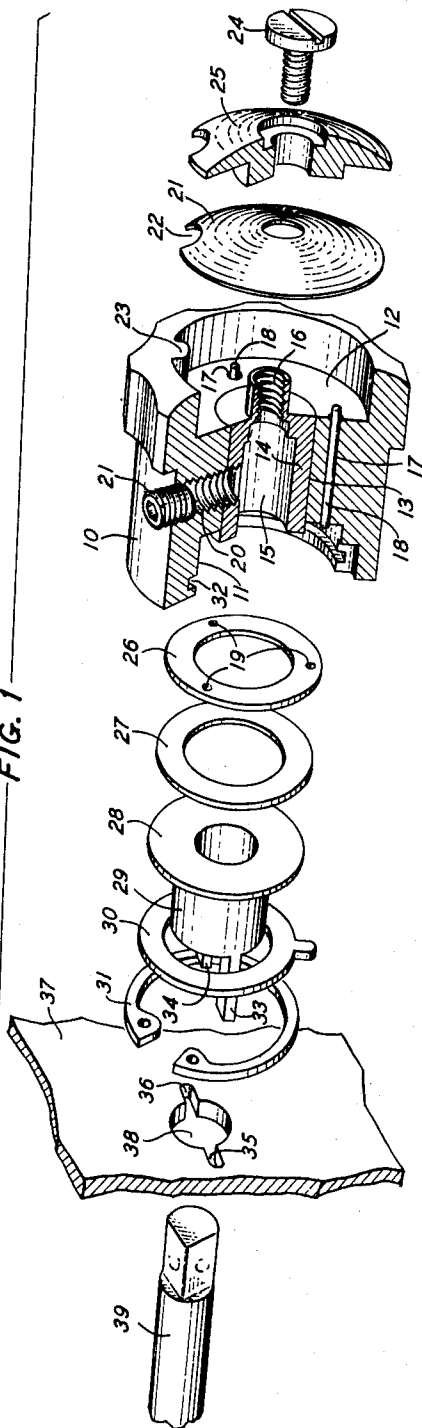


FIG. 3

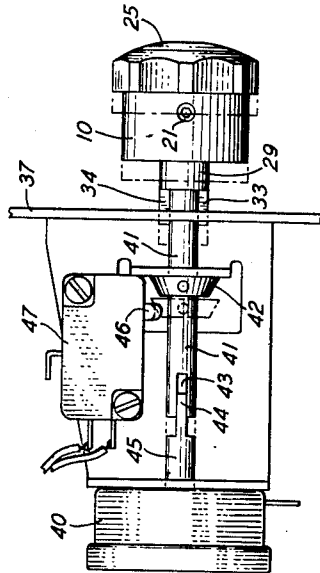
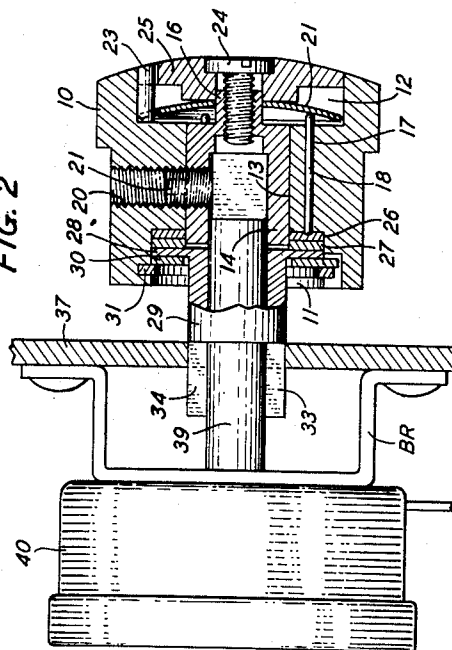


FIG. 2



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FRICTION DEVICE FOR OPERATING KNOBS
IN ADJUSTABLE APPARATUS

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4 Claims. (Cl. 74-504)

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This invention relates to control knobs and more particularly to a control knob having a self-contained adjustable brake mechanism, and particularly suitable for use on apparatus adjustable by means of a rotatable shaft.

An object of this invention is the provision of a control knob wherein the knob may be so adjusted that the shaft secured thereto may be frictionally loaded to provide a braking force from a deadlocked condition, through varying degrees of friction to a freely rotatable condition.

The control knob of this invention comprises a housing or main body member having a longitudinally extending bore therein which communicates with recesses in the inner and outer ends thereof and has positioned therein a suitable apparatus shaft. The free or inner end of the shaft is arranged to be connected to the apparatus to be adjusted and the outer end is secured in the knob housing, and is journaled in a flanged sleeve or bushing which is secured against rotation to a suitable panel. The flanged portion of the sleeve is in frictional engagement with an adjacent washer which is arranged to be forced against the flange of the sleeve when the longitudinally extending pins, slidably mounted in knob housing, are forced against a second washer positioned in contact with the first washer, by means of a dished member located in the outer recess of the knob housing which exerts a varying force on the pins when means, also located in the outer recess of the knob, is adjusted. This structure permits the apparatus shaft, secured to the knob, to be adjusted from a freely rotatable condition to a deadlocked condition to provide a braking action on the shaft which will cover a wide range of loading.

The invention and the features thereof will be clearly understood from the following detailed description when read in connection with the accompanying drawing in which:

Fig. 1 is an exploded view in perspective of a knob assembly constructed in accordance with this invention;

Fig. 2 is a side elevational view partly in section and illustrates the knob connected to the shaft of a potentiometer; and

Fig. 3 is a side elevational view and illustrates the knob used in cooperation with a potentiometer and switch mechanism wherein longitudinal movement of the knob and its associated shaft operates the switch and rotatable movement operates the potentiometer.

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Referring now to the drawing, the knob of this invention may be constructed from any suitable material, for example metal, and comprises a main body or housing portion 10 having recesses

11 and 12 at its inner and outer ends. Communicating with the recesses 11 and 12, and extending longitudinally with respect to the knob housing 10 is a central bore 13, which has secured therein, as by a press fit, the bushing 14. The bushing 14 is provided with a longitudinally extending bore 15 having a shoulder portion 16 adjacent its outer end. Projecting from the outer end of the bushing 14, above the surface of the recess 12, is the internally threaded protuberance 16. Located in the longitudinally extending bores 17, which communicate with the recesses 11 and 12, are the pins 18 which are spaced equidistant, are slidably mounted therein, and have their end portions projecting into the recesses 11 and 12.

Located in the wall of the knob housing 10 and extending at right angles with respect to the bore 15 is the threaded aperture 20 for receiving the set screw 21.

Positioned over the protuberance 16 in the outer recess 12 is the apertured concavo-convex disc 21 having a notch 22 on its periphery which is arranged to register with the boss 23 on the inner wall of the recess 12 to prevent displacement of the disc. Bearing against the convex or outer surface of the disc 21, and held in position thereagainst, in adjusted relation by means of the screw 24, is the shouldered cap member 25 which is also notched on its periphery, to prevent movement. Located in the rear recess 11, adjacent the end of the bushing 14 and bearing against the ends of the pins 18, is the washer member 26 which is prevented from rotating by the indentations 19 which register with the ends of the pins 18.

Located at the end of the bushing 14, and in frictional engagement with the indented washer 26 is the friction or brake washer 27. This washer is confined between the flanged surface 28 of the hub or sleeve 29 and the washer 26, and is held in position by the washer 30 located on the body portion of the hub 29 and which bears against the inner surface of the flange 28. The washers 26 and 27, the hub 29 and the washer 30 are all held in juxtaposition by means of the spring locking ring 31 which bears against the washer 30 and is positioned in the groove 32 in the recess 11.

In order to prevent rotatable movement of the hub 29, the inner end thereof is provided

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with projecting ears 33 and 34 which are arranged to register with the slots 35 and 36 in the panel 37, which communicate with the shaft aperture 38. The shaft 39, which may be connected to any suitable apparatus, for example the potentiometer 40, is provided with flats at its end portion to provide a bearing surface for the set screw 21 to secure the knob to the shaft 39.

In Fig. 2 there is illustrated the knob of this invention operatively connected to the shaft of a potentiometer 40 which is secured to the panel 37 by means of the bracket BR. In this figure the hub member 29 is shown as being securely held against rotation by means of the ears 33 and 34 registering with the notches 35 and 36 in the panel thereby providing the stationary element of the braking mechanism. The hub 29, which forms the stationary braking element of the brake mechanism, is confined between the rotatable braking elements which comprise the washers 27 and 30 by means of the locking ring 31 on the inner end and the concavo-convex disc 21, the cap 25 together with the set screw 24 on the outer end. The pins 18 are forced against the washer 26, which in turn is forced against the washer 27 and into frictional engagement with the flange on the hub member 29, by pressure of the concavo-convex disc 21 on the pins 18 by means of the cap 25 and a screw 24. By adjusting the screw 24 the pressure on the concavo-convex disc 29 may be varied thereby varying the pressure on the pins 18 and consequently varying the friction between the washers 26 and 27, the hub 29 and the washer 30. Thus, when the screw 24 is turned home, in a clockwise direction, the shaft 39 will be in a deadlocked position and when turned counter-clockwise, to release the pressure on the concavo-convex disc 21, the shaft will be freely rotatable, thereby providing a means for adjustably braking the rotary motion of the shaft 39 and the adjustable elements associated therewith.

The knob of this invention may be so connected to the operating shaft of an instrument that both rotary and longitudinal movement may be imparted thereto. As shown in Fig. 3, a shaft member 41, having a tapered collar 42 thereon is secured in the knob housing by means of the set screw 21 in the same manner as the shaft 39 as heretofore described. The opposite end of the shaft 41 is slotted at 43 and has slidably positioned therein the flattened portion 44 of the shaft 45 which is operatively connected to the potentiometer 40. Thus the knob may be moved longitudinally as shown by the dot and dash lines, and since the ears 33 and 34 have a length greater than the thickness of the panel they will ride in the slots 35 and 36 as the knob assembly and the shaft 41 is moved inwardly and outwardly.

Operatively associated with the tapered shoulder 42 on the shaft 41, is the operating arm 45 of a switch mechanism 47, which when the knob assembly is in its extended position, as shown by the full lines, the switch will be in its unoperated position since the arm 46 is fully extended and out of contact with the collar 42. However, when the knob assembly is moved inwardly as shown by the dot and dash lines, the collar 42 will engage the arm 46, move it inwardly and operate the switch and at the same time the knob assembly may be rotated to adjust the potentiometer 40.

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Although I have shown and described herein the preferred embodiment of my invention, it is to be understood that various changes and modifications may be made therein without departing from the scope and spirit of the invention.

What is claimed is:

1. A control knob comprising in combination a panel, a body member having a central bore therein, said body member having inner and outer end recesses, a hub member having a central bore therein, said hub member having a flanged end portion journaled in the inner recess of said body member, a shaft rotatably mounted in said hub member extending through said panel and secured to said body member, means on said hub member in engagement with said panel for preventing the rotation of said hub member, brake means in the inner recess of said body member in frictional engagement with the flanged end of said hub member, for braking the rotation of said knob and said shaft, and means in the outer recess of said body member operatively connected to said brake means, for varying the friction thereof.

2. A control knob for rotatable shafts comprising a hollow body member having inner and outer end recesses, a hub member having a central bore therein, said hub member having a flanged end portion journaled in the inner recess of said body member for supporting said knob, a shaft rotatably mounted in said hub member and secured to said body member, braking means in said inner recess of said body member in engagement with the flanged end of said hub member for braking the rotation of said knob, and means in the outer recess of said body member operatively connected to said braking means for regulating the friction thereof.

3. A control knob for rotatable shafts comprising a hollow body member having inner and outer end recesses, a hub member having a central bore therein, said hub member having a flanged end portion journaled in the inner recess of said body member for supporting said knob, a shaft rotatably mounted in said hub member and secured to said body member, braking means in said inner recess of said body member in engagement with the flanged end of said hub member for braking the rotation of said knob, and means in the outer recess of said body member operatively connected to said braking means, and comprising an adjusting screw member and members operatively interposed between said adjusting member and said braking means for transforming displacement of said adjusting member into pressure on said braking means, for regulating the friction thereof.

4. A control knob comprising in combination a panel, a body member having a central bore therein, said body member having inner and outer end recesses, a hub member having a central bore therein, said hub member having a flanged end portion journaled in the inner recess of said body member, a shaft rotatably mounted in said hub member extending through said panel and secured to said body member, means on said hub member in engagement with said panel for preventing the rotation of said hub member, brake means in the inner recess of said body member in frictional engagement with the flanged end of said hub member, for braking the rotation of said knob and said shaft, and means in the outer recess of said body member operatively connected to said brake means and

comprising an adjusting member threadably engaging said body member, a collar member in engagement with said adjusting member, a spring washer member operatively connected to said collar member, and a plurality of pin members positioned in longitudinal bores in said body member, said pin members making operative contact with the spring washer member at one end and with said braking means at the other end, said collar, spring washer, and pin members adapted to transform displacement of said adjusting member into pressure on said braking means, to vary the friction thereof.

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