Sept. 24, 1946. S. E. BUTLER 2,408,042

DIAL

Filed June 18, 1943

Fig: 1.

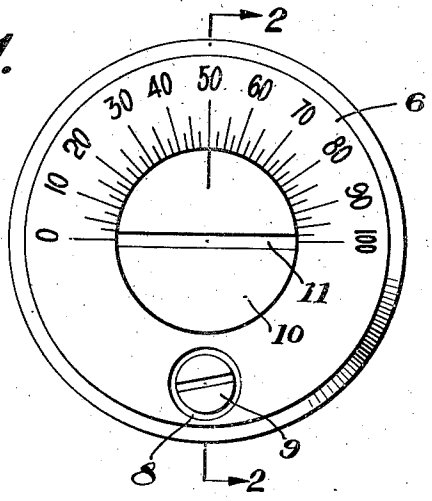


Fig: 2.

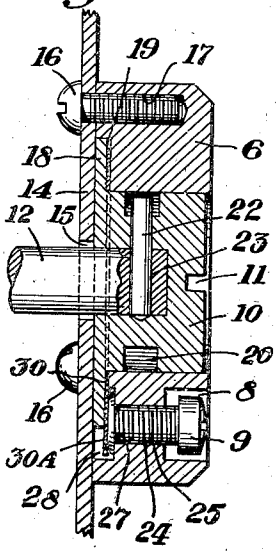


Fig: 3.

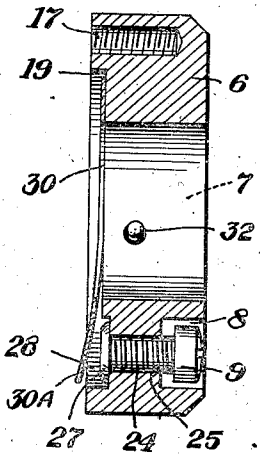
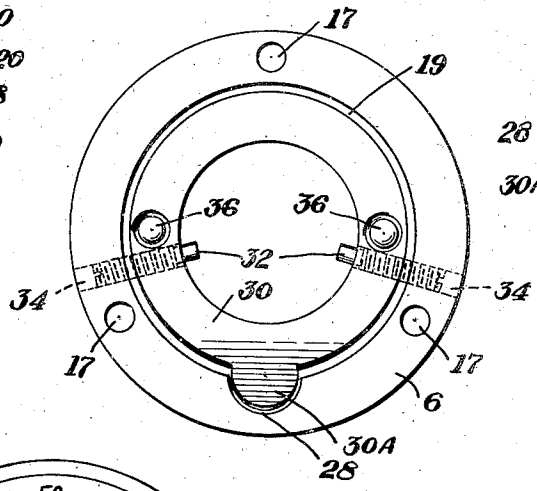


Fig: 4.



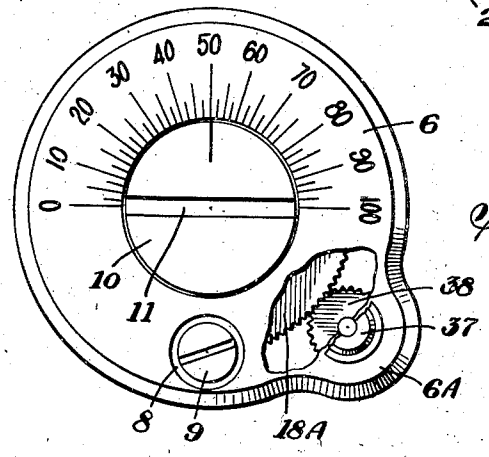


Fig: 5.

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DIAL

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6 Claims. (Cl. 116—124.2)

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My invention relates to dials for controlling electrical or other apparatus, and more specifically to an improved form of dial assembly which permits the dial to be locked in position without disturbing the selected setting.

The invention has as one object, therefore, the provision of a dial structure having a locking means which is designed to eliminate the possibility of "creeping," or undesirable movement, being introduced into the control apparatus as a result of the locking action.

Another object of the invention is to provide a dial for panel mounting which includes a control means and a locking mechanism formed as a compact unit.

A further object of the invention is to provide a dial assembly including adjusting means and locking means, each of whch has a slotted control face so as to permit operation thereof by any tool having a relatively thin edge.

A still further object of the invention is to provide a locking dial assembly for panel mounting which utilizes the panel itself as the rear enclosure for the assembly, thus dispensing with a separate back cover for the dial.

Other objects and advantages will be apparent from the following description of a preferred embodiment of the invention and from the drawing, in which:

Fig. 1 is a front view of a preferred form of dial assembly in accordance with the present invention;

Fig. 2 is a transverse cross-sectional view taken along the line 2—2 of Fig. 1;

Fig. 3 is a view of the dial assembly similar to Fig. 2 with the panel, the shaft, and the hub assembly removed;

Fig. 4 is a back view of the dial assembly shown in Fig. 3;

Fig. 5 is a front view of a modification of the dial assembly of Fig. 1, showing a vernier attachment.

In Figs. 1 and 2 is shown a substantially cylindrical dial body 6 having a scale on the face thereof, this scale being calibrated according to the characteristics of the apparatus with which the dial is to be associated, such as, for example, a radio tuning condenser. A central opening 7 (Fig. 3) is formed within the dial body 6. In this opening 7 is rotatably positioned a hub 10 mounted on a shaft 12, as shown in Fig. 2. A slot 11 is cut into the face of hub 10 to permit rotation of the hub by any tool which can be inserted in the slot, such as a screwdriver.

The dial body 6 is mounted on a panel 14 by means such as screws 16 receivable in threaded openings 17 in the dial body (see Fig. 4). An opening 15 in panel 14 coaxial with the opening 7 permits passage therethrough of the shaft 12.

The hub 10 is provided with a flange 18 which

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is positioned adjacent and parallel to the panel 14, as shown in Fig. 2. An annular groove 20 is cut into the surface of hub 10, and a pin 22, which is receivable by an opening 23 in hub 10 and shaft 12, projects into this groove. This pin thus also secures hub 10 to shaft 12 so that they rotate together.

A recess 19 (Fig. 4) in the rear portion of dial body 6 receives a ring-shaped flexible spring element 30 which is made of material such as phosphor bronze, and which has an opening corresponding in size and shape to the opening 7. This spring element 30 is securely attached to the dial body 6 by means such as two drive screws 36 which have their heads recessed so as not to project above the surface of the spring element. Another recess 28 in the lower portion of dial body 6 forms an extension of recess 19 as shown in Figs. 2, 3 and 4. A tab portion 30A forms an extension of spring element 30, and is adapted to be positioned within the recess 28 as best shown in Fig. 2.

Two threaded openings 34 in dial body 6 receive two threaded stop pins 32 which when in place project radially within the opening 7 as shown in Fig. 4. These pins 32 lie in the plane of rotation of the pin 22 and contact the latter to limit the extent of rotary movement of the hub 10. Since these stop pins extend into the groove 20, they perform the further function of preventing the hub and shaft from becoming dissociated from the dial body whenever the assembly is separated from the panel 14.

From Fig. 2 it can be seen that the panel 14, the flange 18 of hub 10, and the spring element 30 are disposed in substantially parallel relationship, the rotatable flange 18 being positioned between the stationary panel 14 and the stationary spring element 30. To maintain a tension on the flange 18 so that the shaft 12 will not be subject to slipping, the lower portion of flexible spring element 30 is bent slightly toward the panel, as shown in Fig. 3.

A second opening 8 is formed in the lower portion of dial body 6 as best shown in Fig. 2. This opening 8 has a threaded extending portion 25 which is designed to receive a screw 24. The opening 8 has sufficient depth to allow for several turns of the screw head 9. The end of screw 24 is peened over as shown at 27 to make the screw captive in the opening 25.

The center of tab portion 30A is axially disposed with respect to the screw 24. Thus when the head 9 is selectively turned, the peened-over end 27 of the screw 24 will contact this tab. Further tuning of the head 9 will force the tab against the flange 18, compressing the flange between the tab and the panel 14 and preventing rotation of the flange. It will be seen that this force is parallel to the shaft 12, so that no rotary pres-

sure can possibly be applied to the shaft as a result of this locking action.

While the stops 32 have been illustrated in a position which permits a 180° rotation of the hub 10, it will be clear that they may be located at other points to allow for any desired angle of rotation. In fact they may be omitted entirely if desired, in which case the pin 22 as well as the groove 20 in the hub 10 will no longer be required.

In Fig. 5 is shown a modification of the dial assembly of Fig. 1. Replacing the smooth-edged flange 18 of Fig. 2 is a toothed flange 18A. A gear 38 engages this toothed flange. A knob 37 is provided for rotating the gear 38. To allow for positioning of these additional elements, the dial body is extended as shown at 6A. The function of the toothed flange 18A is similar in all respects to that of the flange 18 insofar as the locking action is concerned, the teeth being merely added to the periphery of the smooth-edged flange 18 illustrated in Fig. 2. By rotation of the knob 37 it is clear that a very precise adjustment of the shaft 12 may be obtained.

Other modifications coming within the scope of the present invention will occur to those skilled in the art. For example, instead of using a slotted flat turning hub, this hub could be in the form of a projecting knob or other form of rotatable control member.

The dial assembly herein disclosed thus presents many features. In addition to those set forth, mention might be made of the relatively large size of the control dial in relation to the overall size of the assembly, thus facilitating adjustment thereof. Moreover it is necessary to provide, in addition to the screw holes, but a single small opening in the panel to accommodate the control shaft. Also, since this panel itself forms the rear cover for the assembly, no separate back enclosure is needed. Furthermore the stop pin members not only limit the extent of rotary movement of the hub, but also prevent the hub and shaft mechanism from being undesirably separated from the dial body while the apparatus is being assembled.

While I have described above the principles of my invention in connection with specific apparatus, and particular modifications thereof, it is to be clearly understood that this description is made only by way of example and not as a limitation on the scope of my invention as set forth in the objects of my invention and the accompanying claims.

I claim:

1. In a dial assembly designed for panel mounting, a dial body having a cylindrical aperture therethrough, means securing said body to said panel, a hub rotatably positioned in said aperture, a shaft secured to said hub and passing through an opening in said panel, a flange forming an extension of said hub, said flange being enclosed within said body and adjoining said panel, a flexible washer secured to the interior of said body and adjoining said flange on the opposite side thereof from said panel, said body having a threaded second opening in alignment with a portion of said washer, and a screw receivable in said threaded opening, said screw being designed upon rotation thereof to contact said washer and thereby compress said flange between said washer and said panel.

2. A dial assembly according to claim 1 in which

said hub is provided with an annular groove on the surface thereof, in combination with a pin in said hub securing the latter to the shaft and extending radially into said groove, and one or more stop pins in said body extending radially into said groove, said stop pins positioned to be contacted by said first mentioned pin upon selective rotation of said hub to thereby limit the rotary movement of said hub in each direction with respect to said body.

3. In combination with a panel having an opening therein, a shaft passing through said opening and having a flange adjacent said panel, a housing secured to said panel and enclosing said flange, a resilient member secured to said housing and adjacent said flange, compressing means carried by said housing, and means responsive to operation of said compressing means for compressing said flange between said panel and said resilient member to thereby prevent rotation of said shaft.

4. The combination of claim 3, further comprising a calibrated scale on the face of said housing, a hub on said shaft, said hub having a pointer thereon associated with said scale, and a slot on said hub for permitting actuation thereof to thereby cause said pointer to be moved relative to said scale.

5. A dial assembly comprising a substantially cylindrical dial body having a scale on the face thereof and a relatively large cylindrically-shaped central opening, a substantially cylindrical hub rotatably positioned in said opening, a pointer on said hub for association with said scale, means for permitting actuation of said hub, a panel having an opening therein, screw means securing said body to said panel so that the opening in said body is coaxial with the opening in said panel, a shaft secured to said hub and passing through the opening in said panel, a flange on said hub, within said body, and having one face thereof adjacent said panel, a ring-shaped washer of resilient material adjacent the opposite face of said flange from said panel, said body having a threaded second opening parallel to said first mentioned opening, a screw receivable in said threaded opening, a tab portion forming an extension of said ring-shaped washer and positioned axially of said screw, whereby selective movement of said screw will cause the end thereof to contact the tab portion of said ring-shaped washer, thereby causing said washer to be forced against said flange to compress said flange between said washer and said panel.

6. A dial assembly according to claim 5, in which said cylindrical hub is formed with an annular groove on its surface, in combination with a pin in said hub and extending radially into said groove, a pair of threaded stop openings in said body extending radially thereof, said stop openings being in the plane of said groove, a pair of threaded stop pins respectively receivable by said stop openings, said stop pins when in place extending at least partially into said groove, whereby rotation of said hub will cause said first mentioned pin to selectively contact said stop pins to thereby limit the extent of rotation of said hub, and whereby movement of said hub lengthwise of said shaft will cause said stop pins to contact a side of said groove.

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