March 4, 1969 J. F. LAWRENCE, JR 3,430,515

ADJUSTMENT KNOB FOR ELECTRIC DEVICE

Filed Nov. 14, 1966

Fig. 1

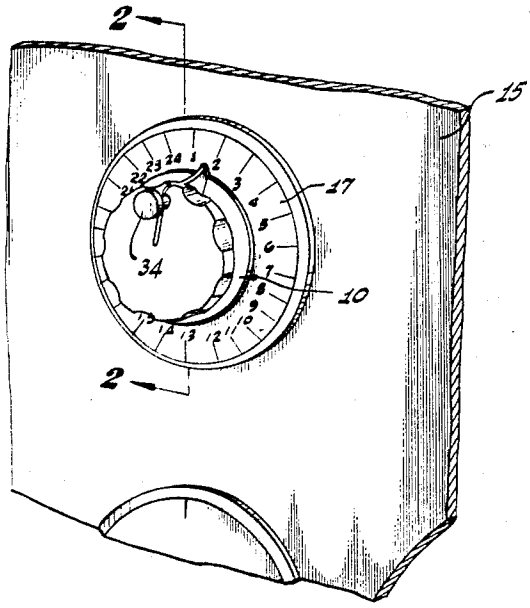


Fig. 4

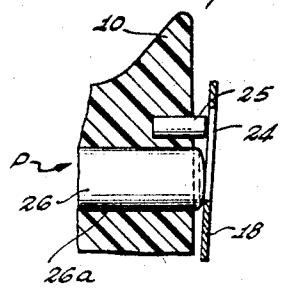


Fig. 2

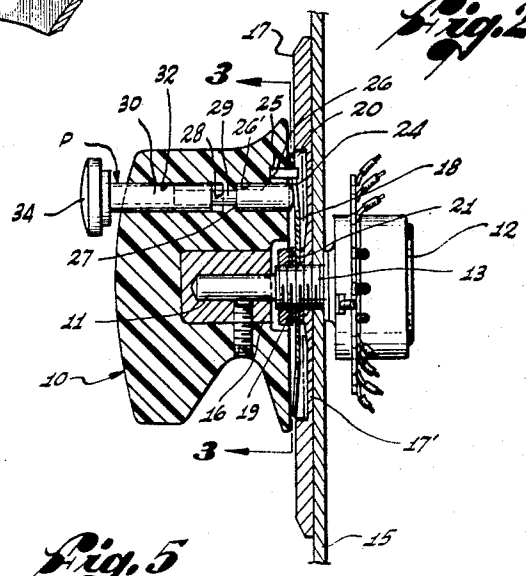


Fig. 3

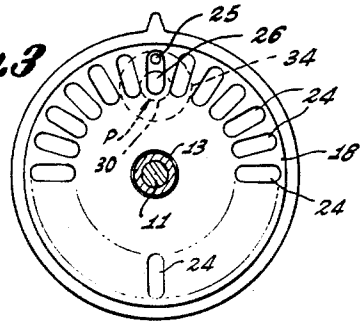


Fig. 6

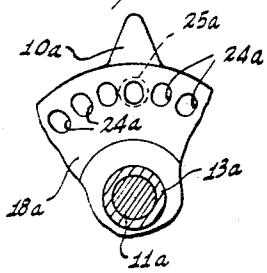


Fig. 5

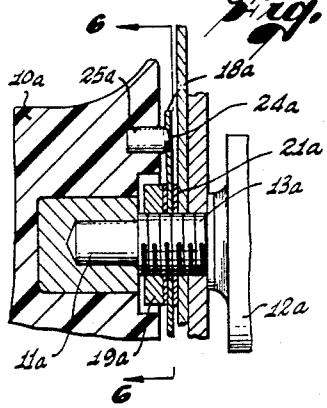
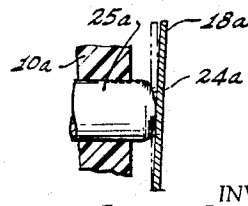


Fig. 7



INVENTOR.
JAMES F. LAWRENCE
BY Forrest J. Lilly
ATTORNEY

United States Patent Office 3,430,515 Patented Mar. 4, 1969

3,430,515

ADJUSTMENT KNOB FOR ELECTRIC DEVICE

James F. Lawrence, Jr., Santa Ana, Calif.
(2952 Randolph St., Costa Mesa, Calif. 92626)

Filed Nov. 14, 1966, Ser. No. 594,246
U.S. Cl. 74—527 7 Claims
Int. Cl. G05g 1/12, 5/06

ABSTRACT OF THE DISCLOSURE

A knob which can be mounted on the shaft of the tuning device, also includes structure whereby it provides detent operation without any external structure.

This invention relates generally to adjustment knobs for electrical equipment, particularly for panel-mounted units such as potentiometers which are adjusted step-by-step by rotation of a shaft on which an adjustment rotor of the unit is mounted.

Such adjustable units have in the past been provided with releasable detent means, affording a yieldable "lock" in each of a number of angularly spaced positions, and this yieldable lock is overcome to permit adjustment by simply exerting an overriding torque on the conventional knob which is secured onto its adjustable shaft.

An object of the invention is the provision of a special knob which contains within itself a detent means for locking the shaft of such a panel-mounted unit in selected positions. Thus, the knob contemplated by the invention itself affords the detent means, as contrasted with a detent means incorporated internally of the instrument, i.e., behind the instrument panel. Accordingly, the knob of the invention is purchased separately, and when mounted onto the usual externally protruded shaft and bushing of the adjustment unit, provides the desired detent action.

The knob of the invention is embodied in two forms, first, in a form wherein the detent means affords a positive lock, requiring a special releasing action for adjustment movement, and, second, in a form wherein the detent means affords merely a yieldable "lock," easily overcome by moderate turning effort on the knob. The first mentioned form is especially advantageous in situations wherein the knob, after adjustment, may be turned a step or so by being accidentally brushed against or otherwise, and wherein it is important to guard effectively against such possibility.

The invention will be best understood by referring to the accompanying drawings and description showing illustrative embodiments of these two classes of knob in accordance with the invention, and wherein:

FIGURE 1 is a perspective view of a panel-mounted knob in accordance with the invention;

FIGURE 2 is a transverse section taken on lines 2—2 of FIGURE 1;

FIGURE 3 is a view taken in accordance with line 3—3 of FIGURE 2;

FIGURE 4 is an enlarged view of a portion of FIGURE 2, showing an alternate position;

FIGURE 5 is a view similar to a portion of FIGURE 2, but showing a modification;

FIGURE 6 is a fragmentary view taken in the plane of line 6—6 of FIGURE 5; and,

FIGURE 7 is a fragmentary view of a portion of FIGURE 5, showing an alternate position.

Referring to FIGURES 1–4, the knob of the invention is designated at **10**, secured onto the rotatable shaft **11** of a potentiometer **12**. The latter has, around shaft **11**, an externally screw-threaded bushing **13** which protrudes through instrument panel **15**, and to which it is secured by nut **16**. Against panel **15** is a dial **17**, and just forwardly of the latter is a preferably somewhat dished-spring disc **18**. Dial **17** and disc **18** are centrally bored to receive bushing **13**, and a washer **19** is placed between disc **18** and nut **16**. The front face of the dial **17** is formed with a concentric annular channel **20**, just larger in circumference than disc **18**, and between disc **18** and the resulting reduced thickness dial wall **17***a* is a spacing washer **21**, of a thickness approximately equal to the depth of channel **20**. The nut **16** secures the members **13**, **16**, **17**, **18**, **19**, and **21** to panel **15**. The central or hub portion of the spring disc **18** abuts against the washer **21**, but outside thereof, there is a normal clearance or spacing distance, such that the peripheral portion of the spring disc can be resiliently bent or deflected in the axial direction of the knob, i.e., away from the knob, and towards the dial **18** (FIGURE 4). It will be clear that the dial channel **20** will accommodate this inward bending movement of the disc **18**. The disc **18** is formed near its periphery with a multiplicity of uniformly circularly spaced sockets **24** pref- of the dic. These sockets will ben see to be uniformly erably apertures somewhat elongated radially of the disc. These sockets will be seen to be uniformly spaced from the shaft **11**. Set into the back of the knob, and projecting from the flat rearward face thereof, is a lock or detent pin **25**, which is of a diameter to be just easily receivable in a selected socket or aperture **24** in the disc **18**. The disc **18** will be seen from FIGURE 2 to be positioned normally closely adjacent the flat rearward face of the knob, and when in such a position, with the pin **22** engaged fully in one of the disc apertures **18**, the knob is thereby positively locked against rotation.

In this form of the invention, the knob is provided with a manually actuated member for resiliently depressing or deflecting the portion of the disc **18** engaged by the locking pin **24** of the knob, and thus release the knob for rotation. Thus, as here shown, there is provided, in the inner portion of the knob, just radially inside and in radial alignment with the pin **22**, a plunger pin **26**. This plunger pin **26** is reciprocable within a plunger bore **26***a* extending inwardly into the knob from the rearward face of the latter. Bore **26***a* terminates in a shoulder **27**, through which is a reduced bore **28** for a reduced stem **29** extending from the plunger pin **26**. Tightly fitted to the plunger stem **29** is a shank **30** that works in an enlarged bore **32** that extends from the bore **28** through the front of the knob. The shank **30** projects somewhat forwardly of the knob, and has on its forward extremity a button **34** which is thus positioned a short distance in front of the knob, in a convenient position to be depressed by a finger or thumb of the operator.

Normally, the working parts of the knob occupy such a position as is illustrated in FIGURE 2. The lock pin **25** on the knob is positively engaged in one of the apertures **24** in the disc **18**, being well inside said aperture. To permit adjustment of the knob, the release plunger **P** comprised of the plunger pin **26**, stem **27**, shank **30**, and button **34** is depressed a short distance, so that the preferably somewhat rounded inner end extremity engages the spring disc **18** just inside the point of engagement of the disc by the lock pin, and, moving inwardly, bends the disc back, FIGURE 4, and so out of engagement with the locking pin. The knob is thus free for rotation, and with the plunger P remaining depressed, can be rotated to a new position of adjustment, and the plunger **P** then released, so the disc **18** then springs back, and the aligned aperture **24** engages over the locking pin **25**. With the lock pin re-engaged with a disc aperture **24**, the knob is again positively locked. To facilitate the alignment of the lock pin with an aperture **24**, the apertures **24** have been extended radially inward sufficiently that they are engaged by the rounded end of the plunger pin **26**, whose diam-

eter is substantially greater than the width of an aperture **24**. Accordingly, when the knob is rotated with the plunger P depressed, the operator can feel the plunger pin **26** move slightly into each successive aperture **24**. Since the slight entry of the plunger pin **26** into each aperture **24** must coincide with alignment of the aperture **24** with the lock pin **25**, the operator can, by a sense of feel, accurately position the knob so that, when the plunger P is released and the disc **18** springs forward, an aperture **24** therein will be aligned with and will engage with the lock pin.

The radially elongated aperture **24** in the disc **18** also has the advantage of accommodating for any slight lack of concentricity in the manufacture of the disc.

A modified form of the invention (FIGURES 5–7) results from omission from the knob **10***a* of the release plunger P, and a modification of the form of the end portion of the lock or holding pin **25***a*, such that the latter does not protrude into the spring disc **18***a* (which in this case is not dished) in a positive locking manner. Instead, the end of the lock pin **25***a* and the sockets **24***a*, which are of lesser width than the diameter of the pin, are so cooperatively shaped and dimensioned that the socket **24***a* is only slightly entered by the extremity of the pin, and the disc is cammed rearwardly by the pin to release the latter for movement merely by virtue of rotation of the knob. Thus, as shown, pin **25***a* is rounded at its extremity and projects only slightly into the apertures or sockets, so that sockets **24***a*, the disc **18***a*, and knob **10***a* are only yieldingly restrained by this engagement. The sockets **24***a* are preferably radially disposed, elongated slots, but it will be seen that they need not, in fact, extend entirely through the disc **18***a*, and they may actually be simply dimples or depressions in the wall of the disc **18***a*, these obviously performing the same function as holes.

It will be understood that the drawing and description are for illustrative purposes only, and that various changes in design, structure, and arrangement may be made without departing from the spirit and scope of the appended claims.

I claim:

1. An adjustment knob for mounting on a rotatable adjustment shaft protruding through the front of a panel from a step-by-step tuning device mounted at the rear of the panel, comprising:

a knob body adapted for mounting on a shaft which extends from a panel, said knob body being adapted for mounting at a small spacing distance in front of said panel;

a spring plate non-rotatably mounted between said knob body and said panel;

a detent pin on said knob body projecting toward said plate at a predetermined radial distance from the axis of said shaft, and said plate having formed therein a plurality of pin-engageable, rotation-restraining socks spaced along an arc about said shaft, and said spring plate being resiliently deflectable to permit step-by-step rotation of said knob body between successive positions of engagement of said pin with said sockets.

2. The subject matter of claim **1**, including a bearing bushing for said shaft tightly mounted on said panel; and means mounting said spring plate on said bushing.

3. The subject matter of claim **1**, wherein said detent pin is of a length to protrude deeply into said sockets, so as to afford a positive lock against knob rotation; and,

a manually operable plunger in said knob, parallel to said shaft, engageable against said spring plate in proximity to said detent pin and adapted, upon depression, to resiliently bend said spring plate back so as to disengage it from said locking detent.

4. The subject matter of claim **1**, wherein said sockets comprise elongated slots formed in said spring plate radially of said shaft.

5. The subject matter of claim **3**, wherein said sockets comprise slots formed in said spring plate radially of said shaft, and of width at least equal to the full diameter of said detent pin.

6. The subject matter of claim **1**, wherein said detent pin and socket are cooperatively shaped as camming means for camming said spring plate out of rotation-restraining engagement by said detent upon application of a predetermined turning effort to said knob.

7. The subject matter of claim **6**, wherein said detent pin has a rounded-over extremity, and said socket comprises slots formed in said spring plate radially of said shaft, and of a width slightly lesser in diameter than said pin, whereby said pin engages only partially into said slots.

References Cited

UNITED STATES PATENTS

2,639,338	5/1953	Kwasniewski	74—527 XR
2,770,982	11/1956	Mastney et al.	74—527
2,869,395	1/1959	Allison et al.	74—527
3,198,923	8/1965	Tripp	74—533 XR

HALL C. COE, *Primary Examiner.*

U.S. Cl. X.R.

74—553