Sept. 13, 1938. K. C. ALLISON ET AL 2,130,219

INDEX MECHANISM

Original Filed Dec. 9, 1935

Fig. -1.

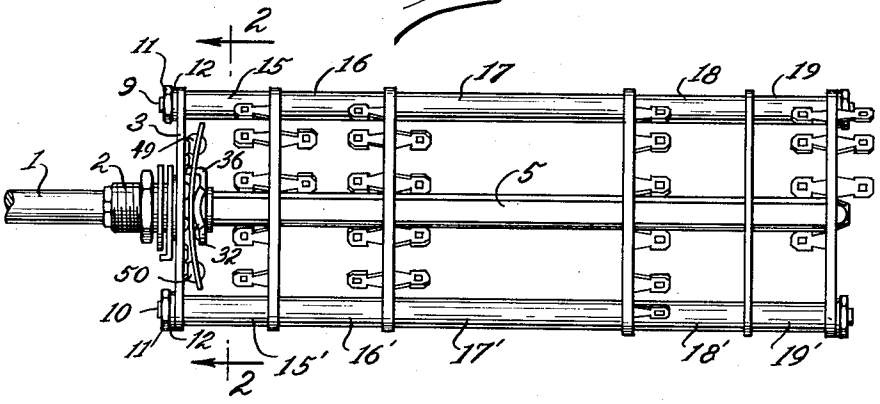
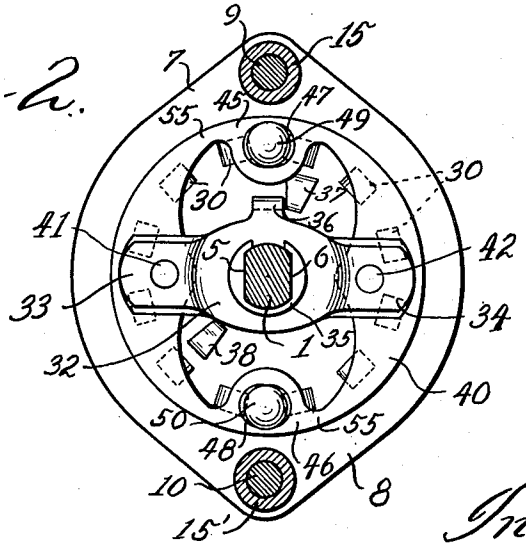


Fig. -2.



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INDEX MECHANISM

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13 Claims. (Cl. 74—527)

This invention relates to an index mechanism, particularly for electric switches. For use in electrical switches of small size, such as wave changing switches in radios, it is necessary to have an index mechanism which will be effective, simple and cheap and yet take up but little room. In particular, it is necessary that the index mechanism be small enough so that it does not extend beyond the confines of the switch sections themselves.

It is desirable that the index action which is spring operated, be great enough so that the action is definite. This requires a comparatively large movement of a spring arm. If the spring is short the stiffness thereof, together with the substantial motion of the arm, induces fatigue in the spring metal with a resultant breakage. It is desirable, therefore, that the action of the spring be distributed over as great a length of spring as possible and to this end the present invention is addressed.

In general the index spring herein has a substantial, if not the entire portion thereof, distributed along the circumference of a circle.

Referring to the drawing:

Figure 1 shows a view of the index mechanism coupled to a gang switch.

Figure 2 is a view along line 2—2 of Figure 1.

Referring to Figure 1, a circular shaft 1 is mounted for rotation in a bushing 2 carried by a front plate 3. Beyond the indexing assembly, carried by plate 3, to be described later, shaft 1 has opposite portions removed to provide flattened sides 5 and 6. Front plate 3 is of generally circular shape and provided with diametrically opposed projections 7 and 8, having suitable apertures therethrough. Elongated bolts 9 and 10 pass through each of the apertures in plate 3 and are adapted to be locked in position by nuts 11 and lockwashers 12. Bolts 9 and 10 may be as long as desired and are provided with a plurality of sleeves 15 to 19 and 15' to 19' inclusive. The sections having the same numbers but with a prime, are preferably of the same length and are adapted to maintain a plurality of switching sections in spaced relationship to each other.

In order to limit the operation of the switch between predetermined positions and force the switch sections to assume one of a number of definite positions, an indexing mechanism is provided on front plate 3. Front plate 3 is provided with a plurality of struck-up portions 30 disposed on the circumference of a circle with respect to shaft 1. Rigidly carried by shaft 1 immediately behind front plate 3 is a rigid cross member 32, having arms 33 and 34. This cross member 32 is preferably maintained in position by a C washer 35 engaging shaft 1 in a groove thereof, cross member 32 being prevented from rotating relative to shaft 1 by non-circular cross section of shaft 1 and a corresponding aperture through cross arm 32. The central portion of cross arm 32 is provided with a finger 36 which is adapted to play between two indentations 37 and 38 on front plate 3, spaced apart a predetermined angular distance. Finger 36 can only travel between indentations 37 and 38 and functions as a stop mechanism for the entire switch. Between cross arm 32 and front plate 3 a spring member 40 is disposed. This member has its central portion cut out to leave an irregularly shaped rim. The portion of spring 40 immediately below arms 33 and 34 is widened and is provided with apertures 41 and 42 which are engaged by fingers depending from arms 33 and 34 and extending thereinto. These fingers and apertures, it will be noted, clear the series of indentations 30 of plate 3. Spring 40 narrows as the distance from the arms 33 and 34 increases until at right angles to said cross arms this spring flares out to form regions 45 and 46 extending inwardly down toward shaft 1. These regions 45 and 46 are provided with elliptical apertures at 47 and 48, these apertures being directly above the series of struck-up portions 30. Below the spring are two ballbearings 49 and 50 positioned in apertures 47 and 48 of the spring and adapted to ride over and between struck-up portions 30 of front plate 3. It will be noted that region 55 of spring 40 on each side of regions 45 and 46 is so narrow in comparison with these portions that the center of apertures 47 and 48 is nearer to shaft 1 than region 55 with the result that when the ballbearings 49 and 50 ride on top of struck-up portions 30, the ball retaining regions 45 and 46 remain substantially parallel with respect to front plate 3 and do not tend to tilt outwardly in such a way as to throw out the ballbearings. Furthermore, because of the elliptical shape of apertures 47 and 48, the ballbearings are gripped at only two points, reducing the friction and permitting the balls to roll as the index arm is turned.

It is clear, therefore, that as disclosed herein each index portion of the spring branches away on opposite sides from the index point so that a thinner and lighter spring may be used. However, it is obvious that the spring may be divided

so that only one-fourth of the circumference is available.

This is a division of our joint application, Serial No. 53,486, filed December 9, 1935.

What is claimed is:

1. An indexing mechanism for switches, comprising a front plate, a shaft rotatively mounted in said plate, a plurality of index indentations in said plate circularly disposed with respect to said shaft, a spring of a generally annular shape disposed in proximity to said front plate and around said shaft, said spring having a plurality of non-circular apertures at spaced points registering with said index indentations on said front plate, a ballbearing disposed in each of said apertures and maintained in a two-point contact at said spring and pressed against said front plate, a member rotatively locked to said shaft and having a plurality of arms extending along spaced points of said spring and pressing said spring to force said ball bearings against said front plate, and means for rotatively coupling said arms to said spring.

2. The structure of claim 1, wherein said spring has its outer edge lying in a circle of greater diameter than the circle defined by said index indentations and wherein said spring has the inner portion thereof cut away on each side of the portions provided with said ballbearing apertures, to provide flexing portions further from said shaft than said index indentations, whereby said portions with the ballbearing apertures, in flexing, tend to keep the outer edge of said spring low enough around said ballbearing to maintain said ballbearing in position.

3. In a rotary electric switch a flat front plate having a central aperture with a plurality of index indentations circularly disposed around said aperture, a shaft rotatably mounted in said aperture, a circular spring member disposed in proximity to said plate and having a portion overlying said index indentations and extending therebeyond and away from the shaft, said portion having an aperture registering with said index indentations, a ballbearing resiliently maintained between said portion at said aperture and front plate and adapted to cooperate with said index indentations, said spring being cut away around the inside of said apertured portion and at the sides so as to pivot with respect to the peripheral edge extending beyond said index indentations whereby said ballbearing retaining part of the spring is maintained in substantial parallelism to said front plate to retain the ball in place, and means for coupling said shaft to said spring and maintaining said spring to force said ball bearing against said front plate whereby as said shaft is rotated, an indexing action is obtained.

4. The structure of claim 3 wherein the shaft portion extending beyond said index mechanism is non-circular in cross section whereby said shaft and index mechanism are removable as a unit.

5. In a rotary switch, a front plate having an aperture and a plurality of index indentations circularly disposed around said aperture, a shaft rotatively mounted in said aperture, a spring disposed adjacent said front plate and retaining a ballbearing against said index indentations, and means connecting said shaft and said spring at a point remote from said shaft and from said ballbearing.

6. An indexing assembly for switches comprising a flat plate having an aperture therethrough and a series of index indentations circularly disposed around said aperture, a shaft rotatively mounted in said aperture, an annular spring disposed in a plane substantially parallel with said plate with the solid part of said spring overlying said index indentations and extending beyond somewhat, said spring having a pair of diametrically opposed non-circular apertures registering with said index indentations, a ballbearing between each apertured portion of the spring adapted to ride said projections and means for coupling said spring to said shaft.

7. The structure of claim 6 wherein the spring is cut out on both sides of the apertured portions to form a pivot section beyond the center of the balls to permit each apertured spring portion to remain substantially parallel to said plate when said balls ride over said index indentations.

8. The structure of calim 6 wherein a rigid arm is coupled to said shaft and to opposite points on said spring at right angles to said apertured portions.

9. The structure of claim 6 wherein the spring is cut out on both sides of the apertured portions to form a pivot section beyond the center of the balls to permit each apertured spring portion to remain substantially parallel to said plate when said balls ride over said index indentations, and wherein said coupling means is a rigid arm coupled to said shaft and to opposite points on said spring at right angles to said apertured portions.

10. An index mechanism comprising an index plate having a shaft rotatively journalled therein with index indentations circularly disposed thereon, a spring member having a portion cooperating with said indentations, said spring member having at least a part thereof disposed to lie substantially adjacent said indentations and rigid means carried by said shaft and rotatively coupled to said spring at a point angularly staggered with respect to the index end of said spring.

11. An index mechanism comprising an index plate having a shaft journalled therein and index indentations circularly disposed thereon, an index spring having diametrically opposed index portions cooperating with said indentations, said spring being shaped so as to overlie a substantial portion of the index indentations and a rigid member carried by said shaft and rotatively engaging said spring at diametrically opposed points have a substantial degree of angularity with respect to the indexing points.

12. An index mechanism comprising an index plate having a series of indentations circularly disposed with respect to an operating shaft, an index spring of flat spring stock having portions extending curvilinearly in a plane generally parallel to the index plate and in the plane of the spring material with index points and coupling points angularly spaced from each other, and means for driving said spring at said coupling points by said operating shaft.

13. The structure of claim 12 where said spring is apertured at the index points, with ball bearings pressed by said apertured spring portions against the index plate and wherein said spring is so shaped that the apertured portions tend to lie in a plane substantially parallel with the plate to retain the bearings securely in place.

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