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2,489,626

ROTARY ELECTRIC SWITCH

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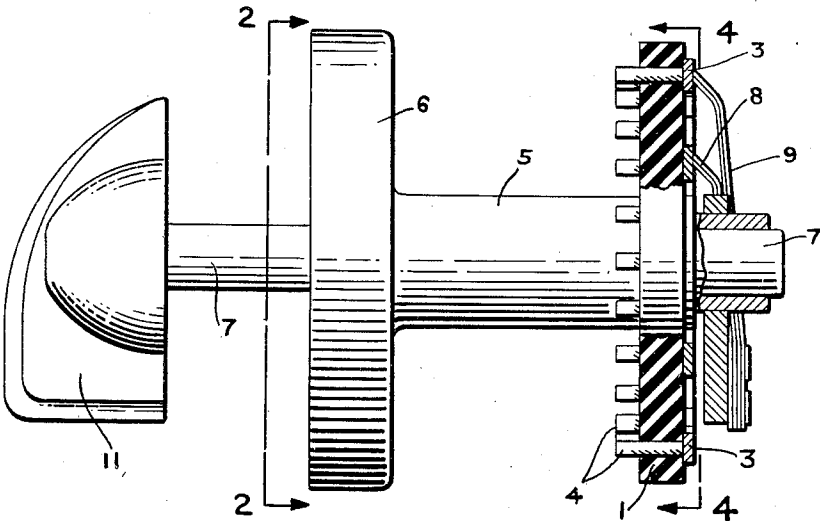


FIG. 1

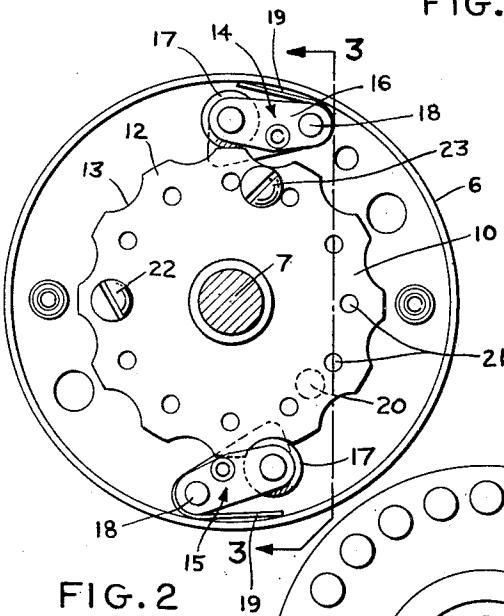


FIG. 2

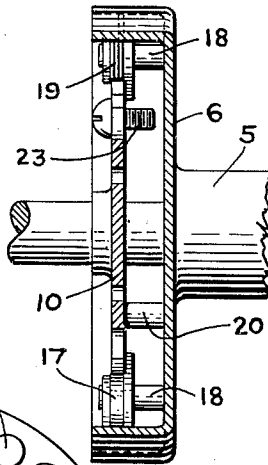


FIG. 3

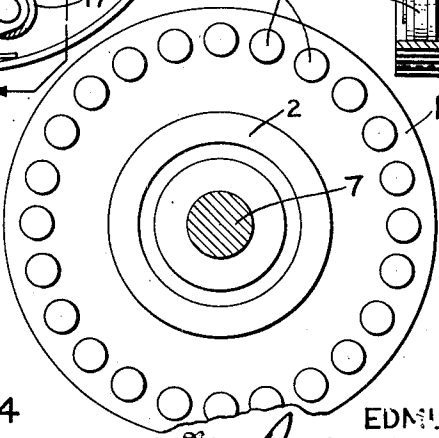


FIG. 4

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ROTARY ELECTRIC SWITCH

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4 Claims. (Cl. 200—11)

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This invention relates to electric switches of the rotary type for use in test equipment, portable instruments, inspection set-ups, experimental circuits and other uses where a superior type multiple position rotary switch is desirable.

An object of the present invention is to provide a rotary switch which may be manufactured in standard sizes for stock and by adjustment of easily adjusted parts any division or combination up to a predetermined multiplication of the number of teeth on the detent gear of the switch may be provided, as well as to provide a switch structure which will permit twice the number of "make before break" or "break before make" operations or circuit controls in a switch as are possible in comparable switches of the same size now on the market.

Another object of the invention is to provide a rotary switch in which by novel positioning of two or more pawls which co-act with the detent gear of the switch, a multiple number of positions may be provided with a detent gear of a given size and given number of teeth or detents, thus permitting an increased number of switch positions in a switch structure of the present invention over the number possible in a corresponding size switch of the present approved type now on the market.

With these and other objects in view, as may appear from the accompanying specification, the invention consists of various features of construction and combination of parts, which will be first described in connection with the accompanying drawings, showing a rotary electric switch of a preferred form embodying the invention, and the features forming the invention will be specifically pointed out in the claims.

In the drawings:

Figure 1 is a view partly in side elevation and partly in section of the improved switch without any wiring connections thereon.

Figure 2 is a cross section through the switch taken on the line 2—2 of Figure 1.

Figure 3 is a fragmentary longitudinal section through the switch taken on the line 3—3 of Figure 2.

Figure 4 is an end view of the contact-carrying head of the switch and taken on the line 4—4 of Figure 1.

Referring more particularly to the drawings the improved rotary switch includes the contact carrying head 1 which is of suitable insulating material and carries the slide ring contact 2 and a plurality of circumferentially spaced stationary contacts 3 which have portions extending

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through the head 1 to the ends 4 of which suitable wires (not shown) may be connected. The head 1 is rigidly connected by a suitable sleeve 5 to the detent carrying housing 6. A shaft 7 is rotatably carried by the sleeve 5 and extends through the housing 6 and the contact carrying head 1. The shaft 7 has movable contacts 8 and 9 thereon which contact respectively with the ring 2 and any one of the spaced contacts 3. The movable contacts 8 and 9 are carried by and rotate with the shaft 7.

A detent gear 10 is mounted on the shaft 7 for rotation therewith and the shaft may be rotated by any suitable type of switch arm as indicated at 11. The detent gear 10 has alternate teeth 12 and indentations 13 formed on its perimeter. Pawls 14 and 15, including carrier structures 16, which rotatably carry rollers 17 are pivotally connected as shown at 18 to the housing 6. The rollers 17 are urged into perimetral engagement with the detent gear 10 by springs 19.

The number of teeth 12 and indentations 13 of the detent gear 10 are a predetermined fraction of the number of stationary contacts 3 and in the construction shown in the drawings there are half as many teeth 12 and indentations 13 as there are contacts 3. The contacts are spaced apart 15° whereas the teeth 12 and the indentations 13 are spaced 30° apart. The pawls 14 and 15 are arranged so that the axis of the rollers 17 will be 15° off from a diametrical line through the detent gear 10, one being upon one side of the line and the other upon the other side of the line, and thus (as clearly shown in Figure 2 of the drawings) one of the rollers 17 will be engaging in one of the indentations 13 and the other roller will be riding upon the outer edge of one of the teeth 12; thus the pawls alternate in holding the detent gear 10 and consequently the shaft 7 and movable contacts 8 and 9 in adjusted positions and by so positioning the pawls relative to each other twice as many adjustments are permitted with the use of the detent and consequently an adjustment for each of the contacts 3 which are twice in number to the number of indentations 13 are provided. Also, with the positioning of the two pawls at 15° on each side of the diametrical line through the detent gear and the positioning of the indentations and of the teeth at 30° apart, 15° movement of the detent is provided to correspond to the 15° separation of the stationary contacts 3.

While in the drawings the relation of the number of teeth 12 to the stationary contacts 3 and the relation of the indentations 13 to the number

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of stationary contacts 3 is shown as 1 to 2, it is to be understood that any predetermined numerical relationship may be provided, such as one-third as many teeth and indentations as stationary contacts, without departing from the spirit of the present invention.

Since switches of this type are adaptable for being made up in stock quantities for various uses, it is embodied with means which will provide adjustment of the stops or movement limiting means for limiting the rotation of the detent gear 10, shaft 7 and movable contacts 8 and 9 within different ranges or combinations. To permit this adjustment or variation of the range of movement of the movable elements of the switch, a stop member 20 is carried by the housing 6 and the detent gear 10 is provided with a plurality of stop pin receiving openings 21 extending therethrough inwardly of the teeth 12 and spaced the same as the teeth 12 about the detent gear, that is, the stop pin receiving holes or openings 21 are spaced at 30° from each other. A stop pin 22 is provided which is a threaded screw or pin of the self-cutting thread type which when it is threaded into one of the openings or holes 21 will cut threads thereon, to hold the pin 22 against accidental displacement. A thirteenth or additional hole is drilled midway between two of the adjacent stop pin receiving holes 21 and this additional stop pin receiving hole is adapted to receive a stop pin 23 which is of the same construction as the stop pin 22. The stop pins 22 and 23 are located to engage the stop member 20 so as to limit the movement of the detent gear 10. By putting the twelve holes or openings 21 at a spacing of 30° and the thirteenth hole which receives the stop pin 23 at 15° permits any division or combinations up to twenty-four on a twelve-toothed detent gear, that is, namely, twice as many as are now provided in rotary switches of the same or companionable sizes as now in use.

It will be understood that the invention is not to be limited to the specific construction or arrangement of parts shown, but that they may be widely modified within the invention defined by the claims.

What is claimed is:

1. In a rotary switch, the combination of, a contact carrying head, a plurality of spaced stationary contacts on said head, an operating shaft carried by said head, movable contact members carried by said shaft for contact with said stationary contacts, a detent gear on said shaft, a housing for said detent gear, said detent gear constructed and arranged with edgewise indentations and a plurality of stop pin receiving holes each spaced from the adjacent one a number of degrees of a circle corresponding to the spacing of the teeth formed by the said indentations, said detent gear provided with an additional stop pin receiving hole between an adjacent pair of said plurality of stop pin receiving holes, a pair of spring pressed pawls disposed on each side of a diametrical line of the detent gear and engaging said detent gear, said pawls spaced from said diametrical line of the detent gear a number of degrees equal to one-half of the degree spacing of the teeth and indentations of said detent gear whereby when one pawl is engaging an indentation the other will engage a tooth of said detent gear, a stop member carried by said housing, a plurality of removable stop pin members in engagement with said stop pin receiving holes and with said additional stop pin receiving hole to

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co-act with said stop member and the spring pressed pawls to limit the movement of said detent gear and increase the number of relative combinations between said detent gear and said stationary contacts.

2. In a rotary switch, a contact carrying head, a plurality of spaced stationary contacts carried by said head, an operating shaft, movable contact members carried by said shaft for contact with said stationary contacts, a detent gear on said shaft and provided with alternate teeth and indentations each tooth and each indentation spaced from those adjacent thereto a predetermined number of degrees, a pair of spring pressed pawls disposed one on each side of a diametrical line of the detent, said pawls spaced from said diametrical line a number of degrees equal to one-half of the degree spacing of the teeth and indentations of said detent gear whereby when one pawl is engaging in a detent the other pawl will be engaging a tooth perimeter, the number of teeth and the number of indentations of said detent being a predetermined fraction of the number of said stationary contacts with their spacing in degrees of a circle corresponding in inverse relation with the spacing in degrees of a circle of said stationary contacts, a housing for said detent, a stop member carried by said housing, said detent provided with a plurality of stop pin receiving holes extending therethrough each spaced from an adjacent one a number of degrees of a circle corresponding to the spacing of the teeth of the detent gear, and a stop pin for insertion through said holes for engagement with said stop member to limit the movement of said detent and movable contacts.

3. In a rotary switch, a contact carrying head, a plurality of spaced stationary contacts carried by said head, an operating shaft, movable contact members carried by said shaft for contact with said stationary contacts, a detent gear on said shaft and provided with alternate teeth and indentations each tooth and each indentation spaced from those adjacent thereto a predetermined number of degrees, a pair of spring pressed pawls disposed one on each side of a diametrical line of the detent, said pawls spaced from said diametrical line a number of degrees equal to one-half of the degree spacing of the teeth and indentations of said detent gear whereby when one pawl is engaging in a detent the other pawl will be engaging a tooth perimeter, the number of teeth and the number of indentations of said detent being a predetermined fraction of the number of said stationary contacts with their spacing in degrees of a circle corresponding in inverse relation with the spacing in degrees of a circle of said stationary contacts, a housing for said detent, a stop member carried by said housing, said detent provided with a plurality of stop pin receiving holes extending therethrough each spaced from an adjacent one a number of degrees of a circle corresponding to the spacing of the teeth of the detent gear, and a stop pin for insertion through said holes for engagement with said stop member to limit the movement of said detent and movable contacts, said detent gear provided with a stop pin receiving hole formed therein equidistant between an adjacent pair of said plurality of stop pin receiving openings to receive a stop pin whereby an increased plurality of relative combinations between the detent gear and stationary contacts may be obtained.

4. In a rotary switch, a contact carrying head,

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a plurality of spaced stationary contacts carried by said head, an operating shaft, movable contact members carried by said shaft for contact with said stationary contacts, a detent gear on said shaft and provided with alternate teeth and indentations, each tooth and each indentation spaced from those adjacent thereto a predetermined number of degrees, a pair of spring pressed pawls disposed one on each side of a diametrical line of the detent, said pawls spaced from said diametrical line a number of degrees equal to one-half of the degree spacing of the teeth and indentations of said detent gear whereby when one pawl is engaging in a detent the other pawl will be engaging a tooth perimeter, the teeth and indentations of said detent each being equal in number to one-half the number of stationary contacts and spaced twice the number of degrees apart as the spacing of the stationary contacts, a housing for said detent, a stop member carried by said housing, said detent provided with a plurality of stop pin receiving holes extending there-through, each of said holes spaced from the adjacent hole a number of degrees of a circle corresponding to the spacing of the teeth of the detent gear, a stop pin for insertion through said holes

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and for engagement with said stop member to limit the movement of said detent gear and movable contacts, said detent gear provided with a stop pin receiving hole therethrough positioned intermediate an adjacent pair of said plurality of stop pin receiving openings to receive a second stop pin whereby an increased plurality of relative combinations between the detent gear and stationary contacts may be obtained.

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