

Jan. 5, 1960

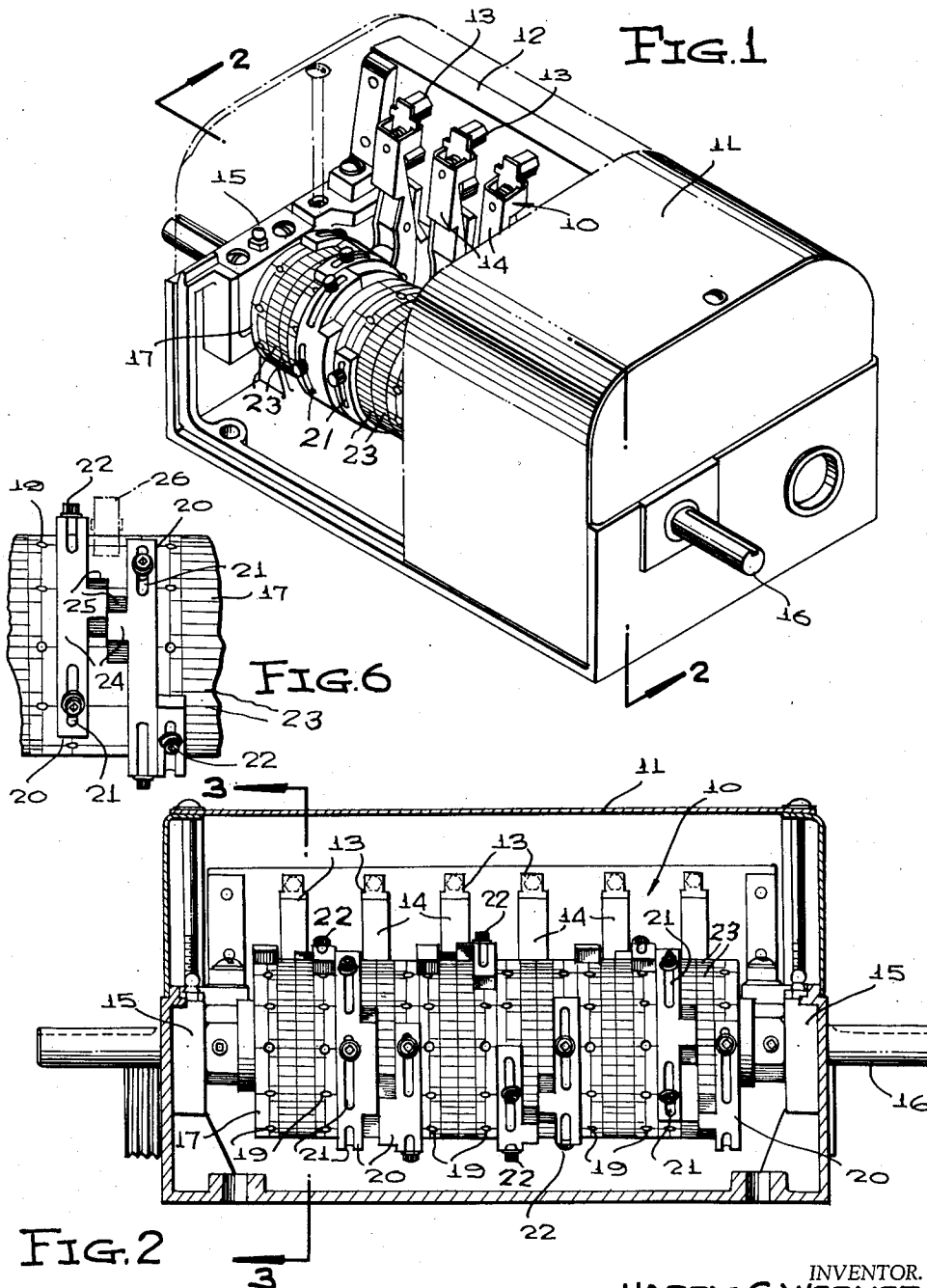
H. C. WERNER

2,920,152

TIME LIMIT SWITCH

Filed Sept. 6, 1957

2 Sheets-Sheet 1



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FIG. 3

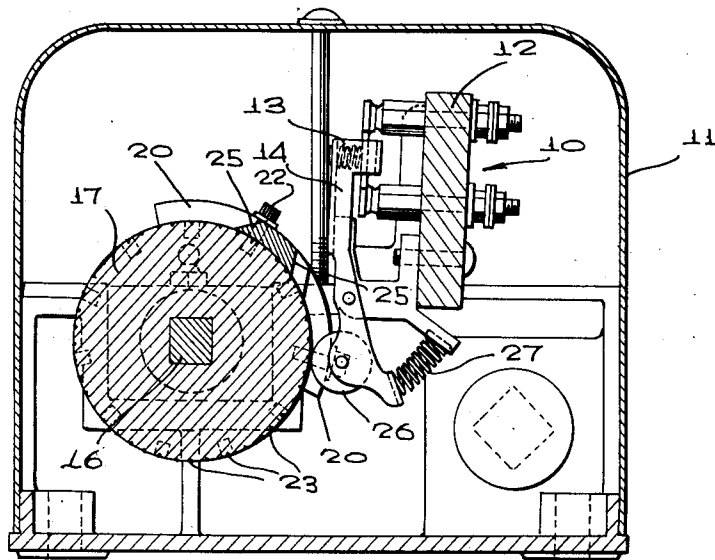


FIG. 4

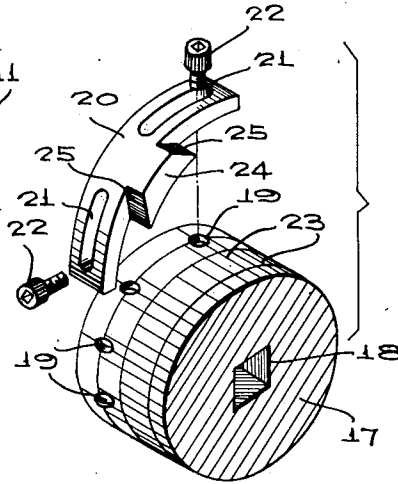
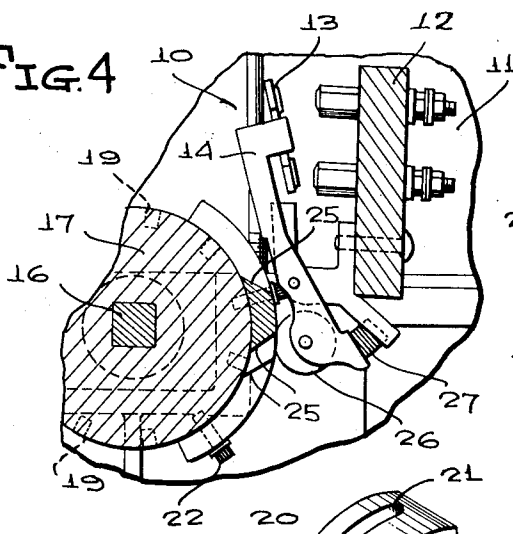
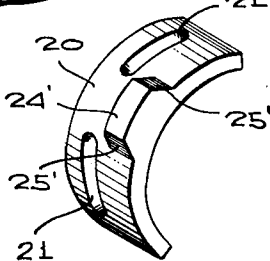


FIG. 5

FIG. 7



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2,920,152

TIME LIMIT SWITCH

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2 Claims. (Cl. 200—27)

This invention relates to a time limit switch and it consists in the constructions, arrangements and combinations herein described and claimed.

It is the cardinal object of the invention to provide a time limit switch wherein the opening and closing movements of a plurality of switches are controlled through cam members mounted upon a motor driven drum with fine accurate adjustability.

More specifically, it is an object of the invention to provide a time limit switch, wherein a rotatably motor driven drum is employed, the drum being provided with paired rows of threaded openings arranged circumferentially of the drum, and in aligned relation longitudinally of the drum, there being a pair of switch operating members for each pair of rows of openings, the switch operating members being of arcuate formation and conforming to the periphery of the drum, each of the operating members being provided with an elongated slot inwardly of the ends thereof and terminating short of the medial portion of the operating members, the intermediate portions of the operating members upon one side having a laterally offset cam, the operating faces of which are inclined in opposite directions, said operating members being adjustably secured by means of a screw engaged through the slots and a selected pair of threaded openings of the drum, the offset cams of the operating members being in edgewise contacting engagement defining a surface for determining the length of dwell of a switch breaker arm, said drum having scale demarkations around the periphery thereof for guidance in the adjustment of said operating members.

It is also an important object of the invention to provide a time limit switch of sturdy construction, such as may be employed in the control of heavy machinery.

Additional objects, advantages and features of invention will be apparent from the following description considered in conjunction with the accompanying drawings, wherein,

Figure 1 is a perspective view of the time limit switch with part of the housing broken away.

Figure 2 is a longitudinal section taken on the line 2—2 of Figure 1.

Figure 3 is a cross section taken on the line 3—3 of Figure 2.

Figure 4 is a fragmentary sectional view illustrating the switch arm in open position.

Figure 5 is a perspective view of a portion of the drum, one of the cams and the securing means.

Figure 6 is an enlarged fragmentary top plan view of switch breaker members mounted upon the drum, which can be moved for adjustment of timing to a fine degree, and

Figure 7 is a perspective view of a modified form of the cam.

There is illustrated a time limit switch generally indicated by the reference character 10 which comprises a suitable housing 11 having an upright wall 12 for mount-

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ing a plurality of switches 13, each comprising a spring-tensioned breaker arm 14.

The housing includes a pair of opposed spaced bearings 15 in which there is rotatably journaled a shaft 16 of a drum 17, and as best seen in Figures 3, 4 and 5, the major portion of the shaft 16 is of angular formation and the opening 18 through the drum is of similar construction so as to key the drum to the shaft.

The drum 17 is provided with paired rows of threaded openings 19 arranged circumferentially of the drum and in aligned relation longitudinally thereof, these threaded openings being employed in the securement of switch operating members 20, as will now be described.

The switch operating members 20 are of elongated, arcuate formation and conform to the periphery of the drum 17 and may be of varying lengths so as to be adjusted to advance or delay the actuation of the switches to minute fractions of a second, as may be required in various machine operations.

Reference is now made to Figures 1 and 2 of the drawings, wherein it will be seen that the plurality of switches 13 are to be opened and closed at a predetermined time relation, and this is accomplished by adjustment of the switch operating members 20 circumferentially around the drum and securing the same in such position, and to this end the switch operating members 20 are formed with two or more circumferential slots 21 through which screws 22 are inserted and threaded into selected openings 19. Prior to tightening the screws, the switch operating members 20 may be adjusted circumferentially around the drum, the demarkations 23 enabling proper positioning of the operating members to an accurate degree of a fraction of a second, so that they will operate the switches at any desired degree throughout the rotation of the drum. The operating members are then secured in the desired positions upon tightening of the screws.

The switch operating members 20 are each provided with a laterally offset cam 24, the faces 25 of which are inclined in opposite directions at approximately 80 degrees, and as shown in Figure 6, the offset cams are in edgewise contacting engagement providing a surface upon which a roller 26 of the breaker arms may contact upon rotation of the drum.

In the operation of the several breaker switch arms 14, the action is the same, and as shown in Figure 6, the roller 26 of the switch arm will occupy a position between the paired operating members 20 and upon rotation of the drum, the adjacent cam face 25 will contact the roller 26, thus swinging the switch breaker arm 14 against the tension of the spring 27 as shown in Figure 4. The roller 26 will traverse the cam surface 24 until the roller encounters the opposite cam face 25 when the roller will be released, the spring 27 forcing the breaker arm 14 to close the switch 13 as shown in Figure 3. It will be seen that by adjusting the operating members 20 circumferentially of the drum 17, the positions of the cam faces 25 may be varied, thus increasing or decreasing the dwell area that the switch breaker arm will traverse.

In the modified form of cam illustrated in Figure 7, the cam is constructed as previously described, except that the cam 24' is illustrated as a raised rib, the faces 25' being inclined in opposite directions.

While I have shown and described preferred forms of the limit switch, this is by way of illustration only, and I consider as my own all such modifications in construction as fairly fall within the scope of the appended claims.

I claim:

1. In a time limit switch comprising a housing for a plurality of switch units, each unit having a pivoted, spring-urged breaker arm including a roller at the lower

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end thereof, a driven drum rotatably mounted within the housing in advance of said switch units, said drum having a plurality of rows of circumferentially and longitudinally spaced threaded openings, a pair of said rows of openings being complementary to respective switch units, a pair of arcuate, elongated operating members for each paired rows of apertures and seated thereabove, said operating members each having at least two elongated slots for alignment with certain of said threaded openings, fastening means extended through said slots and engaged in said threaded openings permitting circumferential adjustment of the operating members with respect to each other for securing said operating members to said drum, each operating member having a laterally offset cam member the cam members being of corresponding circumferential contour and in edgewise contacting engagement with each other forming a dwell area for the rollers of said breaker arms upon rotation of said drum and said cam members having an inclined face at one end for swinging said breaker arms to open said switches and an oppositely inclined face at the other end thereof for releasing said breaker arm.

2. In a time limit switch comprising a housing for a

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switch having a pivotally spring-urged breaker arm including a roller at the lower end thereof, a rotatable drum within the housing, a pair of arcuate operating members circumferentially adjustable on said drum, said operating members having a laterally disposed cam member of corresponding circumferential contour and in edgewise engagement with each other defining a dwell area for the roller of the breaker arm when said drum is rotated and said cam members having oppositely inclined roller contact faces at respective ends thereof.

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