Feb. 17, 1959 F. DONEIT 2,874,239

PROGRAM TIMING SWITCH ASSEMBLY

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FIG. 1

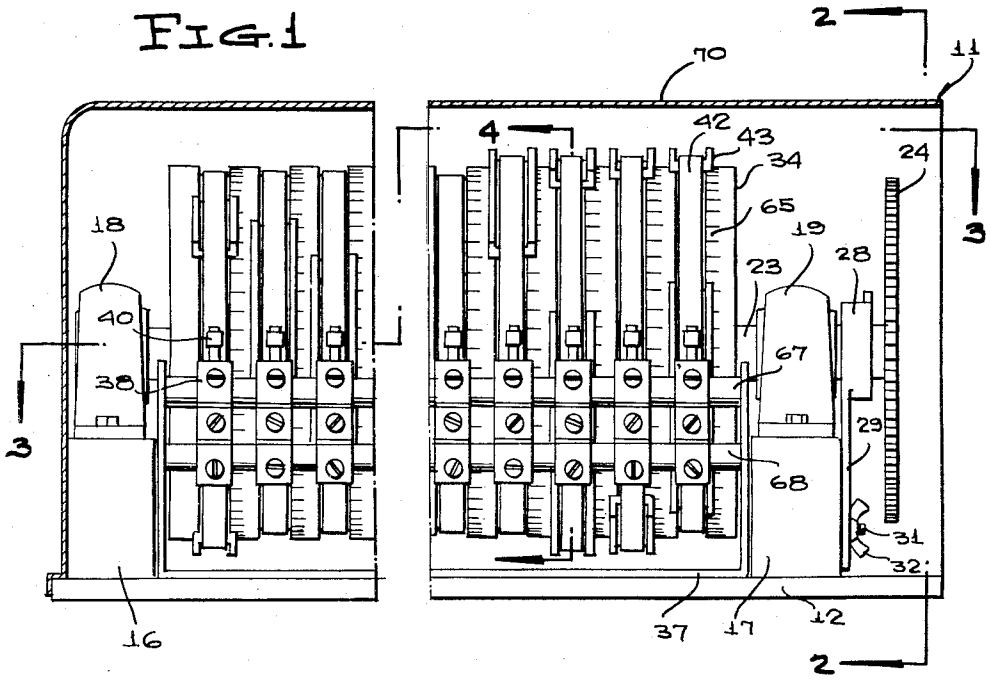


FIG. 2

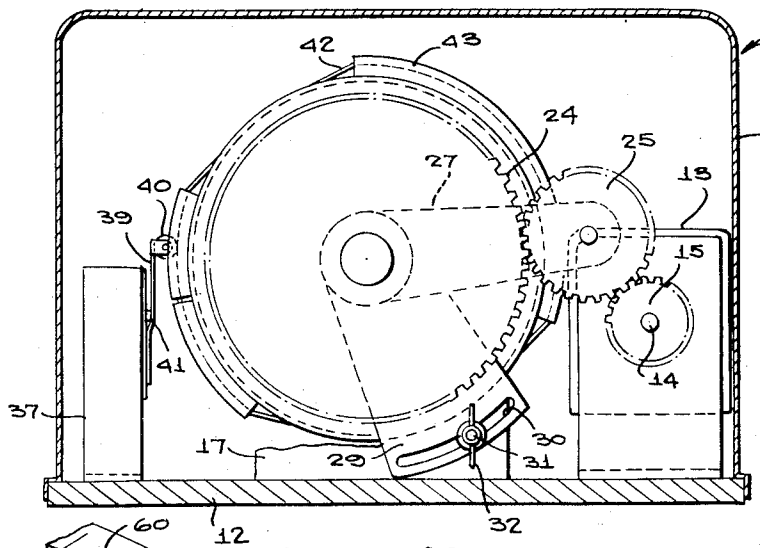
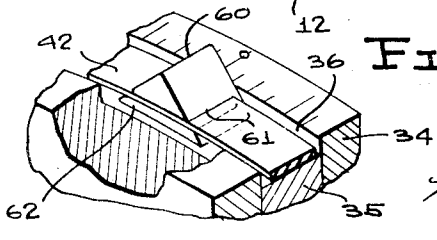


FIG. 7



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FIG. 3

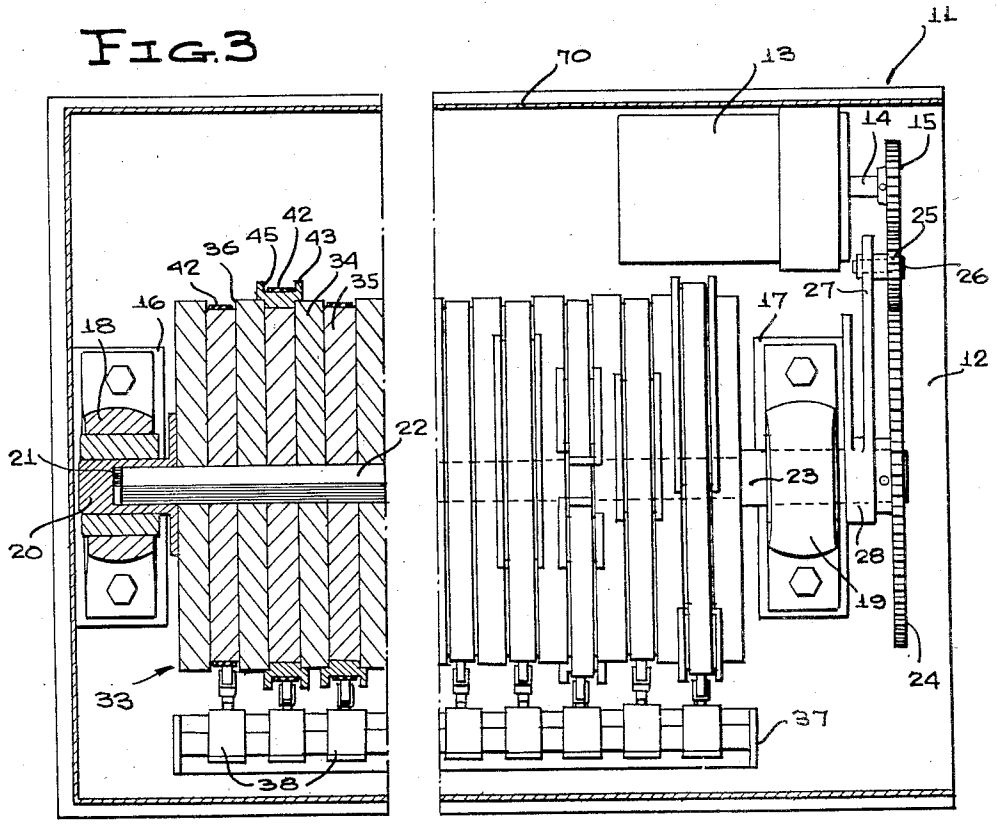


FIG. 4

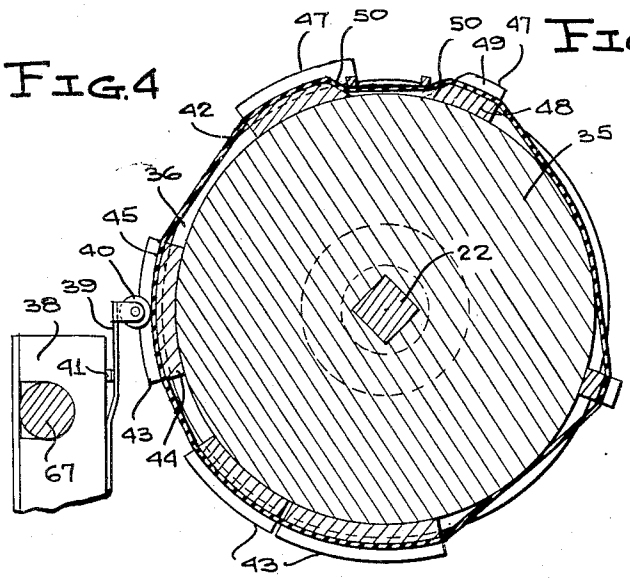


FIG. 5

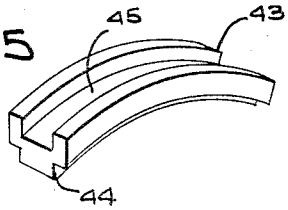
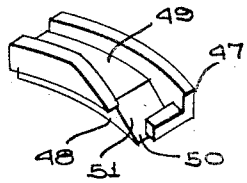


FIG. 6



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PROGRAM TIMING SWITCH ASSEMBLY

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7 Claims. (Cl. 200—38)

This invention relates to timing switch devices, and more particularly to a program switch assembly adapted to provide timed opening or closing of different electrical circuits in accordance with a predetermined sequence or program.

A main object of the invention is to provide a novel and improved timing switch assembly which is simple in construction, which is easy to adjust for a desired program of operation, and which is dependable in operation.

A further object of the invention is to provide an improved program timing switch assembly which involves inexpensive components, which is relatively compact in size, and which is arranged so that it will provide a predetermined timed sequence of closing or opening of respective electrical circuits and being arranged so that it can be easily readjusted to change the sequence of circuit operations controlled thereby.

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

Figure 1 is a longitudinal vertical cross sectional view taken through an improved programming switch assembly constructed in accordance with the present invention.

Figure 2 is a vertical cross sectional view taken on the line 2—2 of Figure 1.

Figure 3 is a horizontal cross sectional view taken on the line 3—3 of Figure 1.

Figure 4 is a transverse vertical cross sectional detail view taken on the line 4—4 of Figure 1.

Figure 5 is an enlarged perspective view of one of the cam elements employed in the programming switch assembly of Figures 1 to 4.

Figure 6 is an enlarged perspective view of another type of cam element employed in the programming switch assembly of Figures 1 to 4.

Figure 7 is an enlarged fragmentary perspective view showing a still further type of cam element employed in the programming switch assembly of Figures 1 to 4 and illustrating the manner in which the cam element is retained in a cam groove of the drum member of the assembly.

Referring to the drawings, 11 generally designates a program switch assembly constructed in accordance with the present invention.

The switch assembly 11 comprises a base member 12 of any suitable shape, for example, of rectangular shape, on which is mounted a constant speed timing motor 13 which is energized from a suitable power source, not shown. The timing motor 13 is provided with the output shaft 14 on which is secured a gear 15.

Mounted on the base 12 are a pair of upstanding support blocks 16 and 17 on which are secured the respective axially aligned journal bearings 18 and 19. Rotatably mounted in the bearing 18 is a first shaft element 20 formed with a squared axially extending socket or recess 21 which slidably and non-rotatively receives

one end portion of a square shaft 22. The squared shaft 22 extends through and is secured rigidly in a collar element 23 which is rotatably mounted in the journal bearing 19. Secured to the end of the squared shaft 22 is a relatively large gear 24 which is drivingly coupled to the relatively small driving gear 15 by an idler gear 25. The idler gear 25 is rotatably mounted on a shaft element 26 secured to the end portion of an arm 27. Arm 27 is formed integrally with a rotatable collar member 28 mounted on the sleeve-like collar element 23. Integrally formed with the rotatable collar element 28 is another arm 29 which extends downwardly and laterally, as shown in Figure 2, and is formed at its outer portion with an arcuate slot 30 concentric with shaft 22. Rigidly secured to the block 17 is a stud member 31 which extends through the arcuate slot 30 and which is provided with a wing nut 32 which is employed normally to tightly clamp the arm 29 to the block 17 to retain the idler gear 25 in meshing relationship with gears 24 and 15. However, by loosening the wing nut 32, the arm 29 may be released so that it may be at times rotated in a counter-clockwise direction, as viewed in Figure 2, to lift the idler gear 25 relative to the gear 15, whereby to uncouple the large gear 24 from the driving gear 15, so that the device may be manually rotated independently of the timing motor 13.

Designated generally at 33 is a drum member which is mounted on the square shaft 22 and which is defined by a plurality of alternating disc members 34 and 35 secured on the shaft member, the disc member 34 being slightly larger in diameter than the disc member 35, whereby to define a plurality of peripheral grooves 36 on the drum member 33. Designated at 37 is an elongated, generally U-shaped bracket member which is secured on base 12 laterally adjacent to and parallel to the drum member 33. Mounted in the bracket member 37 are respective micro switches 38, said micro switches being located substantially in the same transverse vertical planes as the respective grooves 36 and being provided with operating arms 39 having respective rollers 40 journaled thereto and projecting into the respective peripheral grooves 36 of drum member 33. The arms 39 comprise resilient leaf spring members which engage respective switch-actuating plunger elements 41, as shown in Figure 2, the plunger elements 41 being pushed inwardly, namely, to the left, as viewed in Figure 2, responsive to the flexure of the upper portions of the arms 39, namely, by movement of the rollers 40 to the left, as viewed in Figure 2. The micro switches 38 are suitably connected in respective circuits to be controlled by the device and to be opened or closed in a predetermined timed sequence and in accordance with a desired program.

Designated at 42 are respective elastic bands, for example, rubber bands, surrounding the drum member 33 and received in the grooves 36. Respective cam members are disposed in the grooves 36, said cam members being placed beneath the elastic bands 42 and defining cam projections which are engageable with the respective rollers 40 associated with the micro switches 38 to actuate the micro switches responsive to rotation of the drum member 33 by the timing motor 13. Thus, the cam member 43 shown in Figure 5 is one type of element which may be employed for this purpose, said cam member being of arcuate shape and being formed with a depending arcuate rib element 44 engageable in a groove 36 and being further formed with an outer arcuate groove 45 extending along its length and adapted to receive the associated elastic band 42, whereby the element 43 is secured in its groove 36 but may be adjusted peripherally around the groove in accordance with a desired programming

schedule set up for closing the circuit in which the micro switch 38 associated with said groove is connected. As shown in Figure 4, a plurality of cam elements 43 may be disposed in succession in the groove 36 so as to define a relatively elongated projection, including the portion of the elastic band 42 extending between a pair of spaced successive cam elements 43. Thus, as shown in Figure 4, the roller 40 associated with the cam groove 36 is flexed not only when it engages the portion of elastic band 42 disposed in the grooves 45 of the cam element 43 but is maintained flexed while it engages the intervening portion of elastic band 42 between a pair of spaced cam elements 43, whereby to provide a sustained period of closure (or opening) of the associated micro switch 38, as compared with the normal position of said roller 40 which occurs in the absence of a cam element 43 in the groove.

Figure 6 illustrates another type of cam element, designated at 47, which may be employed in the grooves 36, the member 47 comprising a generally arcuate body having a depending arcuate rib 48 slidably engageable in a groove 36 and being formed with an outer groove 49 adapted to receive an elastic band 42. The body of the member 47 is formed adjacent one end with a transversely extending slot 50 having a downwardly inclined inside surface 51, whereby the elastic band may be engaged through the slot 50 in the manner illustrated in Figure 4, whereby to depress the band adjacent the end of the cam member 47 so that the band will not actuate the associated micro switch in the portion of the groove rearwardly adjacent the cam member 47, even when another cam member is employed a short distance beyond the first cam member 47, as shown in Figure 4. Thus, the elastic band 42 is engaged through the slots 50 of a pair of successive cam members 47 so that the portion intervening between the cam members will be maintained substantially in the bottom of the associated groove 36, as shown in Figure 4, and will not cause operative flexure of the micro switch arm 39 associated with the cam groove 36.

As in the case of the previously described cam member 43, the elastic band 42 serves to retain the slotted cam members 47 in adjusted positions in their grooves 36.

In the case of the cam members 43 and 47, the arcuate outer surfaces of their associated grooves 45 and 49 are of substantial length, whereby to provide sustained operation of the associated micro switch 38. Where momentary operation of the micro switch is desired, a cam element such as that shown in Figure 7 may be employed. The cam element illustrated in Figure 7 and designated generally at 60 comprises a generally wedge-shaped body in the form of a triangular prism and formed with a groove 61 extending parallel to its arcuate base portion 62 and being of sufficient depth to receive substantially the entire width of the associated elastic band 42. The base portion 62 of the cam member 60 is engaged in the peripheral cam groove 36 at a desired position therein and the elastic band 42 is engaged in the retaining groove 61 in the manner illustrated in Figure 7 to maintain the cam element 60 in its adjusted position in the groove 36. Thus, when the crest portion of the prismatic cam element 60 engages the roller 40 of the associated switch arm 39, the switch arm is flexed for a very short period of time, providing momentary operation of the associated micro switch 38.

The disc members 34 defining the outer margins of the respective grooves 36 are suitably inscribed with time scales 65, or other suitably calibrated scales, so that the various cam elements employed in the grooves may be set at desired positions along said grooves, wehereby to provide the desired sequence of operations of the associated micro switches 38 as the drum member 33 is rotated at a timed rate by the timing motor 13.

As shown in Figure 1, the respective micro switches 38 are accurately positioned in transverse alignment with their associated cam grooves 36, the micro switches being supported on a pair of horizontally extending, vertically spaced parallel rods 67 and 68 secured between the upstanding vertical arms of the U-shaped bracket member 37. Micro switches 38 are clamped to the rods 67 and 68 in transverse alignment with their associated grooves 36 and with their roller elements 40 normally projecting into the grooves, as will be apparent from Figure 3.

To set up a desired program, the respective cam elements required, namely, cam elements 43, 47 or 60, are disposed in the peripheral grooves 36 in which they are to operate and are engaged by the elastic bands 42 in the manner previously described, whereby the cam elements are retained in adjusted positions in the grooves by the elastic bands. The positions are indicated by the associated scales 65 provided adjacent the grooves. The drum member 33 may be set to its starting position by elevating the idler gear 25 in the manner previously described, whereby the drum member may be rotated independently of the timing motor 13 to said starting position, after which the idler gear 25 may be lowered to mesh with the driving gear 15, whereupon the wing nut 32 may be tightened to lock the arm 29 and to maintain the idler gear 25 in its coupling position between gears 24 and 15. Thereafter, the timing motor 13 rotates the drum member 33 at a timed rate and provides the desired program of opening or closing the electrical circuits associated with the respective micro switches 38.

A suitable cover 70 is removably secured on the base 12 so as to protect the working elements of the program switch assembly. However, the housing 70 may be easily removed whenever it is desired to readjust said switch assembly.

The programming switch assembly above described is of particular use for automatically operating a plurality of electrical devices in a desired predetermined sequence of operations, for example, for opening up solenoid valves to control the different sprays of an ornamental water fountain, and to simultaneously control various lighting circuits employed to illuminate the fountain so as to provide different decorative effects. The program timing switch assembly may also be employed for various other purposes, such as for providing sequential colored light effects for theaters, restaurants, display windows, or other public places or for performing various types of operations, such as energizing household appliances at desired times and for turning off the appliances at other desired times.

As will be readily apparent, none of the exposed portions of the apparatus carry current, and therefore the device is safe to handle. Furthermore, all cam adjustments and program changes can be accomplished without requiring the use of any tools whatsoever.

As will be further apparent, the gears 15 and 24 provide a definite ratio therebetween, whereby the drum member 33 rotates at a speed determined by said ratio. The speed of rotation of said drum member may be changed by providing gears having different ratios.

While a specific embodiment of an improved timing switch assembly has been disclosed in the foregoing description, it will be understood that various modifications within the spirit of the invention may occur to those skilled in the art. Therefore, it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

What is claimed is:

1. In a timing switch, a timing motor, a rotary member drivingly coupled to said timing motor, a drum member on said rotary member, said drum member being formed with a peripheral groove, a cam element seated in said groove, an elastic band disposed in said groove and overlying said cam element to hold said cam element in the groove, and a micro switch mounted adjacent said groove, said micro switch having an operating ele-

ment in transverse alignment with the elastic band and at times operatively engageable by the portion of said elastic band overlying the cam element responsive to rotation of said rotary member by said timing motor.

2. In a timing switch, a timing motor, a rotary member drivingly coupled to said timing motor, a drum member on said rotary member, said drum member being formed with a peripheral groove, an arcuate cam element seated in said groove, said cam element being slidably adjustable in said groove and being formed with an outer groove parallel to the first-named groove, an elastic band disposed in said first-named groove and the groove of the cam element to hold said cam element in the first-named groove, and a micro switch mounted adjacent said first-named groove, said micro switch having an operating element in transverse alignment with the elastic band and at times operatively engageable by the portion of said elastic band engaged in the groove in the cam element responsive to rotation of said rotary member by said timing motor.

3. In a timing switch, a timing motor, a rotary member drivingly coupled to said timing motor, a drum member on said rotary member, said drum member being formed with a peripheral groove, a cam element seated in said groove, an elastic band disposed in said groove and overlying said cam element to hold said cam element in the groove, and a micro switch mounted adjacent said groove, said micro switch having an operating element in transverse alignment with the elastic band and at times operatively engageable by the portion of said elastic band overlying the cam element responsive to rotation of said rotary member by said timing motor, said cam element being formed at one end portion thereof with a transverse slot having a downwardly inclined inside surface, said elastic band extending through said slot and being depressed thereby adjacent said end portion of the cam element.

4. In a timing switch, a timing motor, a rotary member drivingly coupled to said timing motor, a drum member on said rotary member, said drum member being formed with a peripheral groove, an arcuate cam element seated in said groove, said cam element being slidably adjustable in said groove and being formed with an outer groove parallel to the first-named groove, an elastic band disposed in said first-named groove and the groove in the cam element to hold said cam element in the first-named groove, said cam element being formed at one end portion thereof with a transverse slot having a downwardly inclined inside surface, said elastic band extending through said slot and being depressed thereby adjacent said end portion of the cam element, and a micro switch mounted adjacent said first-named groove, said micro switch having an operating element in transverse alignment with the elastic band and at times operatively engageable by the portion of said elastic band engaged in the groove in the cam element responsive to rotation of said rotary member by said timing motor.

5. In a timing switch, a timing motor, a rotary member drivingly coupled to said timing motor, a drum member on said rotary member, said drum member being formed with a peripheral groove, an arcuate cam element seated in said groove, said cam element being slidably adjustable in said groove and being formed with an outer groove parallel to the first-named groove, an elastic band disposed in said first-named groove and the groove in the cam element to hold said cam element in the first-named groove, said cam element being formed at one end portion thereof with a transverse slot having a downwardly inclined inside surface, said elastic band extending through said slot and being depressed thereby adjacent said end portion of the cam element, a micro switch mounted adjacent said first-named groove, said micro switch having an operating element in transverse alignment with the elastic band and at times operatively engageable by the portion of said elastic band engaged in the groove in the cam element responsive to rotation of said rotary member by said timing motor, and a time scale inscribed on the periphery of said drum member adjacent said first-named groove.

6. In a timing switch, a timing motor, a rotary drum member drivingly coupled to said motor, said drum member being formed with a peripheral groove, a cam member adjustably positioned in said groove, and an elastic band received in said groove and engaging said cam member to hold same in said groove, and a micro switch mounted adjacent said drum member and having an operating element in transverse alignment with the elastic band and extending adjacent said groove in a position to engage the band and to be actuated at times by the cam member responsive to rotation of said drum member.

7. In a timing switch, a timing motor, a rotary drum member drivingly coupled to said motor, said drum member being formed with a peripheral groove, a cam member adjustably positioned in said groove, said cam member being formed with an outer groove parallel to the first-named groove, an elastic band received in said first-named groove and said outer groove and maintaining said cam member in adjusted position in said first-named groove, and a micro switch mounted adjacent said drum member and having an operating element in transverse alignment with the elastic band and extending adjacent said first-named groove in a position to engage the band and to be actuated at times by the cam member responsive to rotation of said drum member.

References Cited in the file of this patent

UNITED STATES PATENTS

728,944	Levy	May 26, 1903
1,355,829	Ford	Oct. 19, 1920
1,856,832	Halvorson	May 3, 1932
2,194,311	Leonard	Mar. 19, 1940
2,260,980	Newell	Oct. 28, 1941