July 11, 1967 W. L. LINN 3,330,918

TIMER HAVING A MULTI-SIDED OR DRUM-SHAPED HOUSING

Filed Sept. 10, 1965 3 Sheets-Sheet 1

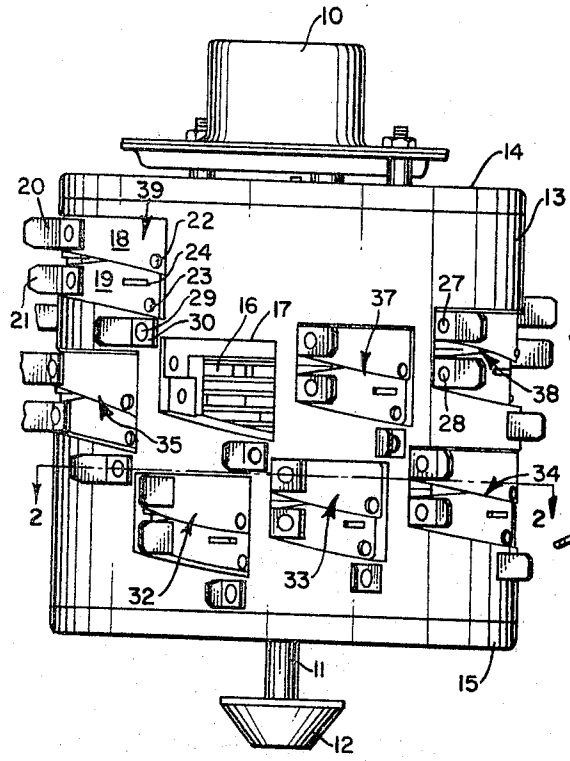


FIG. 1

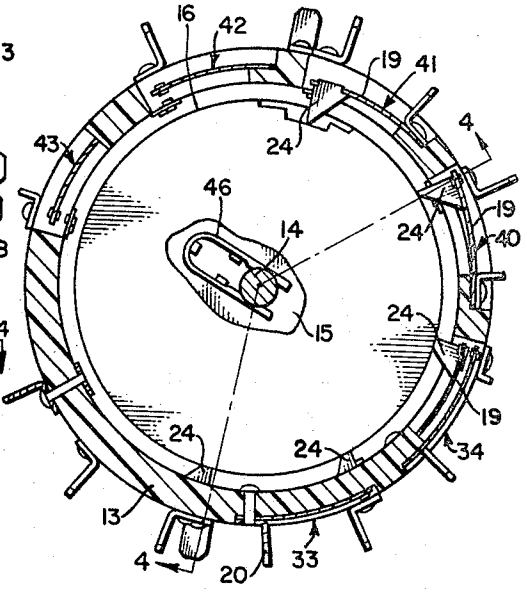


FIG. 2

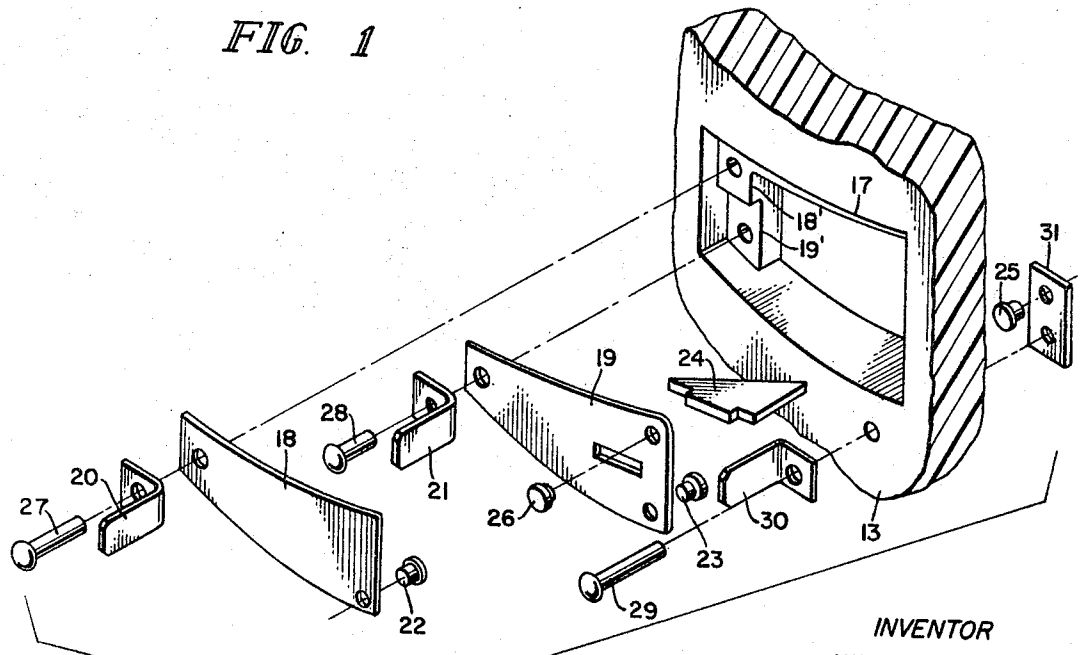


FIG. 3

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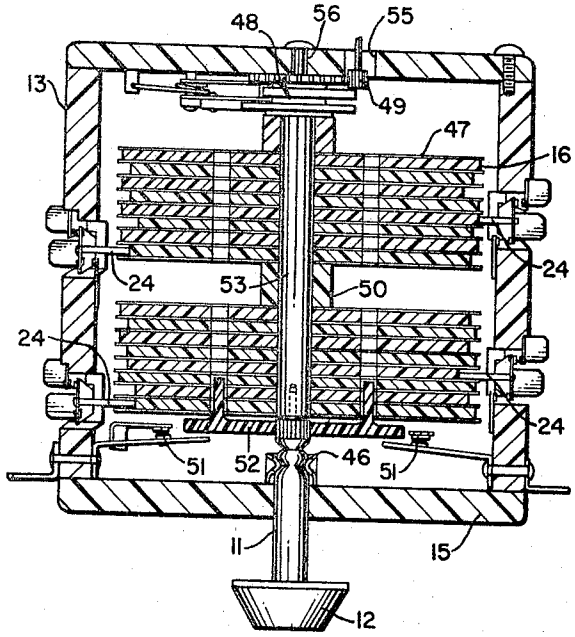


FIG. 4

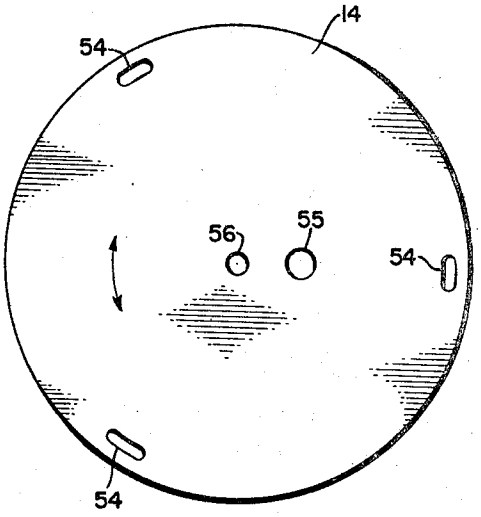


FIG. 5

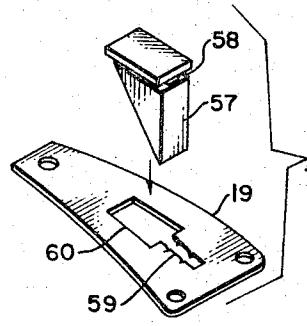


FIG. 6

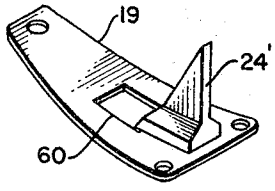


FIG. 7

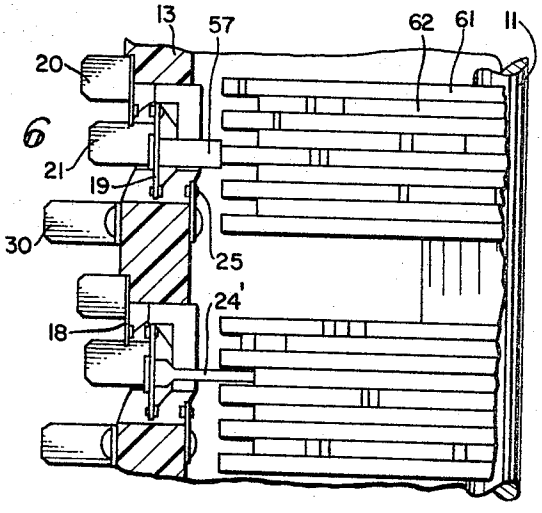


FIG. 8

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TIMER HAVING A MULTI-SIDED OR DRUM-SHAPED HOUSING

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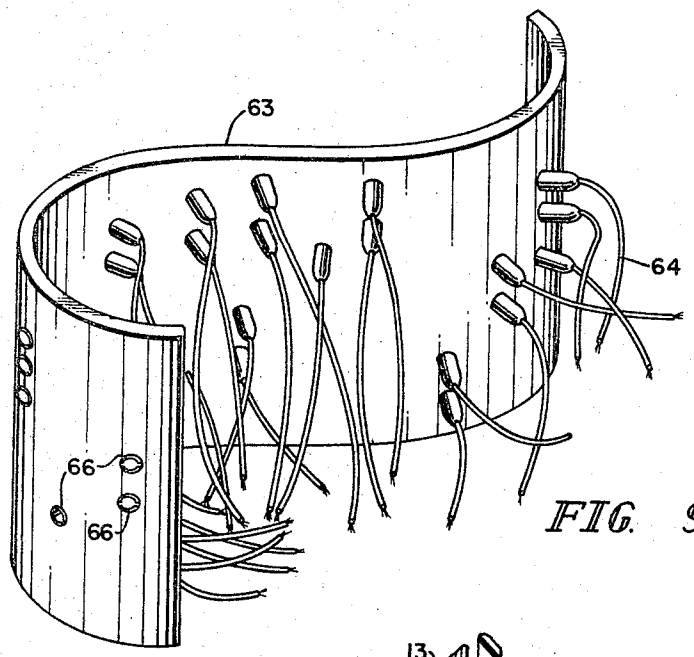


FIG. 9

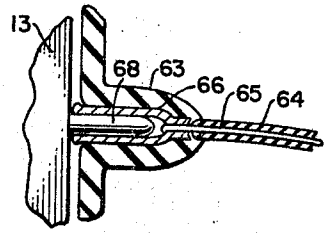


FIG. 10

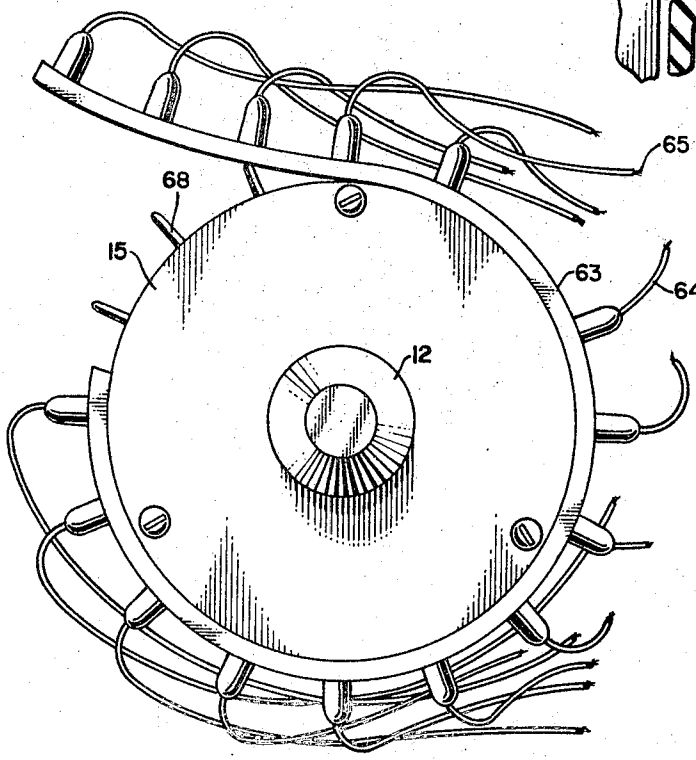


FIG. 11

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TIMER HAVING A MULTI-SIDED OR DRUM-SHAPED HOUSING

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Filed Sept. 10, 1965, Ser. No. 486,430
15 Claims. (Cl. 200—38)

ABSTRACT OF THE DISCLOSURE

A timer having a multi-sided or drum-shaped housing wherein a plurality of circumferentially spaced switches are disposed in the walls of said housing in a substantially helical path.

The present invention relates generally to sequential timers and more particularly to the means and methods for providing a timer with expanded control capability in a space formerly occupied by a contemporary timer. The timers, which are the subject of this invention, are of the type having a plurality of cams mounted on a rotating shaft for operating a plurality of control switches. Usually, each additional control function assigned to the timer will require the addition of at least one cam and an associated control switch. As extra cams are added, the camshaft of the timer has to be lengthened to accommodate the added cams. The amount that the camshaft has to be lengthened for the addition of a cam and control switch is generally equal to the width of the switch. That is, the switch is usually the widest component to be accommodated. The cams usually do not have to be more than one-sixteenth of an inch thick.

The present invention provides a novel and practical means for housing a timer which will permit the utilization of additional cams and switches without increasing the length of the camshaft. The housing, as will be discussed later in this specification, is an insulated multi-sided housing substantially cylindrical in shape and with openings in the wall to accommodate the switches. The novel feature is that each opening is spaced about the housing so as to permit the cams to be placed on the camshaft without a spacer or space between the cams. The particular pattern that will provide this feature, and which is shown in this specification as an embodiment of this invention, is with each adjacent opening being radially and longitudinally disposed from each other so as to develop a helical path about the housing.

Another novel feature of the invention is the arrangement of the switches entirely within the thickness of the wall of the housing. This particular feature provides a timer with all of the switches protected from abuse by handling, repair, etc.

Still another novel feature of this invention is the provision of a flexible connector for interconnecting the terminal members of the timer and for connecting said terminal members to elements of the appliance being controlled by said timer. The flexible connector, which is designed to wrap around the housing of the timer will facilitate rapid assembly of said timer and will prevent a wiring error since the flexible connector will be molded with the correct connection pattern.

It is an object of the present invention, therefore, to provide a timer which is capable of providing more control functions in less space than contemporary timers.

It is still another object of the present invention to provide a timer having an insulated cylindrical or multi-sided housing with circumferentially spaced switches disposed about said housing in a helical path.

It is still another object of the present invention to provide a timer having an insulated cylindrical or multi-sided housing with walls of a suitable thickness and with the switches of said timer disposed within said thickness of said walls.

It is still another object of the present invention to provide a flexible connector means for wrapping around a timer so as to interconnect the switches of said timer and to connect said switches to elements of an appliance being controlled by said timer.

It is still another object of the present invention to provide a timer wherein the cams for actuating the switches of said timer are juxtapositioned on a shaft without a space or spacer between said cams.

The present invention, in another of its aspects, relates to novel features of the instrumentalities described herein for teaching the principal object of the invention and to the novel principles employed in the instrumentalities whether or not these features and principles may be used in the said object and/or in the said field.

Other objects of the invention and the nature thereof will become apparent from the following description considered in conjunction with the accompanying drawings and wherein like reference numbers describe elements of similar function therein and wherein the scope of the invention is determined rather from the dependent claims.

For illustrative purposes, the invention will be described in conjunction with the accompanying drawings in which:

FIGURE 1 is a side view of the timer.

FIGURE 2 is a sectional view 2—2, taken from FIGURE 1, wherein the relationship of the cams, cam followers and switches is illustrated.

FIGURE 3 is an exploded perspective drawing illustrating how the contact members of the switches are assembled to openings in the walls of the drum or cylindrical shaped housing.

FIGURE 4 is a sectional view 4—4, taken from FIGURE 2, illustrating how the cams, camshaft, escapement mechanism, and switches are assembled within the drum.

FIGURE 5 is a drawing of the end plate of the timer which rotatably supports the escapement mechanism and the camshaft of said timer.

FIGURE 6 is an exploded perspective view of one of the contact members of a switch showing how the wide cam followers are assembled to said contact member.

FIGURE 7 is a perspective view of a contact member showing how a narrow cam follower is assembled to said contact member.

FIGURE 8 is a fragmentary sectional view of the timer illustrating the application of the wide and narrow cam followers.

FIGURE 9 is a perspective view of the flexible connector which is wrapped around the drum of the timer so as to interconnect the switches of said timer and to connect the switches to other elements of the appliance being controlled by said timer.

FIGURE 10 is a fragmentary sectional view showing how the terminals which are molded into the flexible connector are pressed onto terminals of the switches.

FIGURE 11 is an end view of the timer illustrating how the flexible connector is wrapped around the drum of the timer.

Generally speaking, the present invention resides in a timer of the type having a plurality of cams mounted on a rotating shaft and comprises, an insulated substantially cylindrically shaped housing therefor, a plurality of circumferentially spaced switches disposed thereabout, each of said switches adapted to be activated by said individual cams so as to establish circuit conditions for operating associated equipment, a driving means for rotating said shaft, individual end plates

closing said housing and supporting said rotating shaft and said driving means, and a plurality of cutouts formed in said housing for receiving contact members of said switches therewithin, whereby a greater number of connecting electrical circuits may be controlled.

Referring now to the drawing, and particularly to FIGURE 1, the component parts of the timer of this invention can be visualized in conjunction with the following description. Timer motor **10**, which is a constant speed motor, is mounted to the first end plate **14** of the timer by means of mounting studs and nuts. A rotating shaft, hereinafter referred to as the camshaft **11**, which supports and rotates cams **16** is shown projecting through the second end plate **15** of the timer. Selector knob **12** is affixed to said camshaft **11** so as to provide a manual means for positioning said timer at a particular cycle starting point. A plurality of switches are circumferentially spaced about the multisided housing, which is substantially cylindrical and which is hereinafter referred to as the drum **13** of the timer. It is obvious that a hexagonal, octagonal, or any other multisided drum can be used in lieu of a perfect cylinder for housing the timer of the present invention. For example, the drum **13**, shown in FIGURE 2, could have been octagonal with a switch placed on each flat side of the octagonal drum. Each of the switches comprise a first spring contact member **18**, a second spring contact member **19**, a terminal **20** affixed to said first spring contact member **18** by a rivet **27**, a terminal **21** affixed to said second spring contact member **19** by a rivet **28**, a cam follower **24** snapped in a slot of said second spring contact member **19**, a terminal **30** affixed to the wall of said timer by a rivet **29**, a contact **22** staked to said first spring contact member **18**, and a contact **23** staked to said second spring contact member **19**. Other components and the details of assembly of said switch will be discussed in conjunction with FIGURE 3. The switches of said timer are mounted in a plurality of cut-outs or openings **17** formed in the wall of the drum **13** of said timer. The cams **16** of said timer can be seen through opening **17** illustrated in FIGURE 1. The openings **17** are circumferentially spaced about the walls of said drum in a helical path. That is, the openings **17** are spaced in the direction of the camshaft **11** and with respect to each other so as to develop a helical pattern about said drum **13**. This helical pattern is represented by the position of switches **32, 33** and **34**. It can be seen that switch **33** is displaced slightly above switch **32** and switch **34** is slightly above switch **33**. Referring to FIGURE 2 it can be seen that switch **33** is circumferentially spaced from switch **32** and that switch **34** is circumferentially spaced from switch **33**. Since the switches form a helical pattern around the periphery of drum **13**, the cams **16** which operate each switch can be placed very close together. Hence, more cams can be utilized without increasing the size of the timer. The drum **13** is a hollow enclosure of a proper insulating material. The openings **17** in the drum **13** are trapezoidal-shaped to permit the arrangement of contact members **18** and **19** as is shown in FIGURE 3.

Referring again to FIGURE 2 we see a sectional view **2—2**, taken from FIGURE 1, showing how the cams **16** operate the switches of the timer. The section taken shows parts of switches **32, 33, 34, 40, 41, 42** and **43**. In the case of switch **32**, only the cam follower **24** is shown. Switch **41** is shown in its lowest position, switch **40** is shown in its highest position, and switch **34** is shown in its neutral position. The lowest, highest, and neutral positions are the three basic portions of each switch. The contact relationship for these three positions will be discussed in conjunction with FIGURE 3. It can be seen in FIGURE 2, that spring contact member **19** is responsive to the rotation of a cam so as to make electrical contact with the other contact members of the switches. Indexing spring clip **46** is shown gripping a groove in shaft **11**. The purpose of indexing spring clip **46** will be discussed in conjunction with FIGURE 4.

Referring now to FIGURE 3 we see an exploded perspective view of a switch. The purpose of this view is to illustrate the contact relationship for the aforementioned three basic switch positions. When spring contact member **19** is in its lowest position, with the cam follower **24** in a lower level of the cam, contact **23** on said contact member **19** is in contact with contact **25** and there is a connection between terminals **21** and **30**. When spring contact member **19** is in its highest position, contact **26** on said contact member **19** is in contact with contact **22** on spring contact member **18** and there is a connection between terminals **20** and **21**. When spring contact member **19** is in a neutral position, terminal **21** is not connected to either terminal **20** or terminal **30**.

Referring further to FIGURE 3, it can be seen that both spring contact members **18** and **19** are assembled within the thickness of the wall of the drum **13**. Spring contact member **18** is at the level **18'** and spring contact member **19** is at the level **19'**. As shown in FIGURE 4, the level **19'** is slightly lower than the level **18'**. It can be seen that spring contact member **18** is restrained by the elevation, or level **18'**, within the thickness of the wall of the drum **13**. It can also be seen that spring contact members **18** and **19** are movable contact members and that contact plate **31** is a stationary contact member.

Referring now to FIGURE 4 we can see how the various components of the timer are assembled to the drum **13**. A pinion gear **49** is driven by the timer motor **10**, not shown in FIGURE 4, to impart motion to the escapement mechanism **48**. The escapement mechanism **48** is a means for imparting a "snap action" rotational motion to the camshaft **11**. In the embodiment illustrated, there are sixteen cams **16** rotatably mounted on camshaft **11**, and consequently, there are sixteen switches on the timer. The spacer **50** in between the two sets of eight cams **16** is required for the embodiment shown because of the choice of a particular helical path for the switches about the drum **13** of the timer. In this embodiment of the invention, the cams **16** are separated by a spacer **47** which keeps the cam follower **24** on the periphery of the correct cam. The camshaft **11** is a two-piece shaft with said two pieces being coupled by a pin **53** which will permit separation in the axial direction. The indexing spring clip **46** provides a means for indexing the selector knob **12** portion of the shaft **11** in two positions. When the selector knob **12** is pulled out of the timer, the switch activating member **52** opens the two normally closed line switches **51** which provide power for the appliance being controlled by said timer.

Referring now to FIGURE 5, we see a view of the first end plate **14** which mounts on the drum **13** of the timer. There are three elongated holes **54** about the periphery of the end plate **14** which will permit alignment of the escapement mechanism **48** which is affixed to said end plate **14**. The hole **55** is to accept the pinion gear **49** and the hole **56** is to contain the bearing stud for the escapement mechanism **48**.

Referring now to FIGURE 6, we see an exploded perspective view of a contact member **19** and a wide cam follower **57** which is snapped into said contact member **19**. The wide cam follower **57** is pushed into the opening **60** as is illustrated by the arrow in FIGURE 6 and then is pushed forward so that the narrow part of groove **58** is held by the slot **59**. The slot **59** has small spears formed to hold the cam follower **57**.

Referring now to FIGURE 7, we see a perspective view of a contact member **19** with a narrow cam follower **24'** snapped in slot **59**. It will be noted that the cam follower **24'** has a different configuration than the cam follower **24** shown in FIGURE 3.

Referring now to FIGURE 8, we see another embodiment of the present invention which illustrates the use of wide cam followers **57** and narrow cam followers **24'**. The cams **61** used in this embodiment have an outside diameter which is larger than the outside diameter of

cams 62 used in said embodiment. As shown in FIGURE 8, the cams 61 and 62 are alternately placed on the camshaft 11. The wide cam followers 57 are adapted to follow the periphery of cams 61 and the narrow cam followers 24' are adapted to follow the periphery of cams 62. This embodiment of the present invention eliminates the need for the spacers 47 shown in FIGURE 4.

Referring now to FIGURE 9, we see a perspective view of the flexible connector 63 which is wrapped around the drum 13 of the timer so as to interconnect the switches of said timer and to connect the switches to other elements of the appliance being controlled by said timer. The details of the flexible connector 63 will be discussed in conjunction with FIGURE 10 and FIGURE 11.

Referring now to FIGURE 10, we see a fragmentary sectional view showing how the terminals 66 of the flexible connector 63 are pushed onto terminals 68 which are fixed to the wall of the drum 13. The wire 65 with insulation wrapping 64 is affixed to terminal 66 before the flexible connector 63 is molded. The material of the flexible connector 63 is a flexible insulating material.

Referring now to FIGURE 11, we see how the flexible connector 63 is wrapped around the drum 13 of the timer. The purpose of the flexible connector is to assure that the correct switch terminals 68 will be connected and to protect said switch terminals 68.

The operation of the timer, as hereinbefore described, is similar to the operation of contemporary timers which have a constant speed timer motor, an escapement mechanism driven by said timer motor, a camshaft coupled to said escapement mechanism, a plurality of cams mounted on said camshaft, and each of said cams adapted so as to operate a switch when said cams are rotated. The practical and novel feature of the timer of the present invention is the use of a drum or a hollow substantially cylindrically shaped housing as a means for mounting the switches of the timer. The switches are placed in a helical path around the periphery of the drum to permit close spacing of the cams on the camshaft of the timer. The particular helix used in the embodiment of the invention shown in FIGURES 1 through 11 has switches placed at an angular position of 45 degrees with respect to each other and adjacent switches advanced approximately one-sixteenth of an inch in an axial direction. This particular helix proved to be acceptable for the size of the switches being used and permitted the use of one-sixteenth-inch thick cams placed adjacent to each other with no space or spacer between said cams.

It is obvious that a helical path is not the only way in which a drum type of housing can be utilized to miniaturize a timer. For instance, a designer might prefer to place the switches at random about the drum and still achieve a degree of miniaturization as a result of using a drum. The value of a helical path is that adjacent cams operate adjacent switches, thereby permitting a progression of timing sequences which is relatively easy to follow.

The timer of the present invention, as hereinbefore described in one of its embodiments, is merely illustrative and not exhaustive in scope. Since many widely different embodiments of the invention may be made without departing from the scope thereof, it is intended that all matter contained in the above description and shown in the accompanying drawing shall be interposed as illustrative and not in a limiting sense.

What is claimed is:

1. In a timer of the type having a plurality of cams mounted on a rotating shaft, wherein the improvement comprises an insulated substantially cylindrically shaped housing therefor, a plurality of circumferentially spaced cut-outs disposed about said housing in a helical path, each of said cut-outs containing a switch disposed therewithin, each of said switches having first and second movable contact members and a stationary contact member, said first and second movable contact members being curved so as to provide a spring force which is applied in a direction toward said rotating shaft, said first movable contact member being restrained from movement toward said shaft by an elevation which is formed within said cut-out, said second movable contact member adapted to be moved by one of said cams through a cam follower so as to make electrical contact with said first movable contact member and said stationary contact member, thereby establishing a circuit condition for controlling elements of an appliance, a plurality of terminals affixed to said housing so as to make electrical contact with contact members of said switches, a driving means for rotating said shaft, and an end plate in each end of said housing for supporting said rotating shaft and said driving means.

2. In a timer of the type having a plurality of cams mounted on a rotating shaft, wherein the improvement comprises an insulated cylindrical housing therefor, a plurality of circumferentially spaced openings disposed about said housing in a helical path, each of said openings containing a switch disposed within the thickness of the walls of said housing, each of said switches having first and second movable contact members and a stationary contact member, said first and second movable contact members being curved so as to provide a spring force which is applied in a direction toward said rotating shaft, said first movable contact member being restrained from movement toward said shaft by an elevation which is formed within said thickness of said wall, said second movable contact member adapted to be moved by one of said cams through a cam follower so as to make electrical contact with said first movable contact member and said stationary contact member, thereby establishing a circuit condition for controlling elements of an appliance, a plurality of terminals affixed to said housing so as to make electrical contact with contact members of said switches, a driving means for rotating said shaft, an end plate in each end of said housing for supporting said rotating shaft and said driving means, and said end plate which supports said driving means having elongated mounting holes to permit rotational alignment of said driving means and said shaft with said switches.

3. In a timer of the type having a plurality of cams mounted on a rotating shaft, wherein the improvement comprises an insulated cylindrical housing therefor, a plurality of circumferentially spaced openings disposed about said housing in a helical path, each of said openings containing a switch disposed within the thickness of the walls of said housing, each of said switches having first and second movable contact members and a stationary contact member, said first and second movable contact members being curved so as to provide a spring force which is applied in a direction toward said rotating shaft, said first movable contact member being restrained from movement toward said shaft by an elevation which is formed within said thickness of said wall, said second movable contact member adapted to be moved by one of said cams through a cam follower so as to make electrical contact with said first movable contact member and said stationary contact member, thereby establishing a circuit condition for controlling elements of an appliance, a plurality of terminals affixed to said housing so as to make electrical contact with contact members of said switches, a driving means for rotating said shaft, an end plate in each end of said housing for supporting said rotating shaft and said driving means, said end plate which supports said driving means having elongated mounting holes to permit rotational alignment of said driving means and said rotating shaft with respect to said switches, and a flexible connector for wrapping around said housing to interconnect predetermined combination of said switches and to connect said switches with various elements of said appliance.

4. In a timer of the type having a plurality of cams mounted on a rotating shaft, wherein the improvement comprises an insulated cylindrical housing therefor, a plurality of circumferentially spaced openings disposed about said housing in a helical path, each of said openings containing a switch disposed within the thickness of the walls of said housing, each of said switches having first and second movable contact members and a stationary contact member, said first and second movable contact members being curved to substantially conform to the curvature of the periphery of said cylindrical housing so as to provide a spring force which is applied in a direction toward said rotating shaft, said first movable contact member being restrained from movement toward said shaft by a substantially L-shaped elevation which is formed within said thickness of said wall, said second movable contact member adapted to be moved by one of said cams through a cam follower so as to make electrical contact with said first movable contact member and said stationary contact member, thereby establishing a circuit condition for controlling elements of an appliance, a plurality of terminals affixed to said housing so as to make electrical contact with contact members of said switches, a driving means for rotating said shaft, an end plate in each end of said housing for supporting said rotating shaft and said driving means, said end plate which supports said driving means having elongated mounting holes to permit rotational alignment of said driving means and said rotating shaft with respect to said switches, and a flexible connector for wrapping around said housing to interconnect predetermined combination of said switches and to connect said switches with various elements of said appliance.

5. In a timer of the type having a plurality of cams mounted on a rotating shaft, wherein the improvement comprises an insulated cylindrical housing therefor, a plurality of circumferentially spaced openings disposed about said housing in a helical path, each of said openings containing a switch disposed within the thickness of the walls of said housing, each of said switches having first and second movable contact members and a stationary contact member, said first and second movable contact members being curved to substantially conform to the curvature of the periphery of said cylindrical housing so as to provide a spring force which is applied in a direction toward said rotating shaft, said first movable contact member being restrained from movement toward said shaft by a substantially L-shaped level which is formed within said thickness of said wall, said second movable contact member having one end fixedly connected to a second level formed within said thickness of said wall and adapted to be moved by one of said cams through a cam follower so as to make electrical contact with said first movable contact member and said stationary contact member, thereby establishing a circuit condition for controlling elements of an appliance, said L-shaped level being elevated from said second level, a plurality of terminals affixed to said housing so as to make electrical contact with contact members of said switches, a driving means for rotating said shaft, an end plate in each end of said housing for supporting said rotating shaft and said driving means, said end plate which supports said driving means having elongated mounting holes to permit rotational alignment of said driving means and said rotating shaft with respect to said switches, and a flexible connector for wrapping around said housing to interconnect predetermined combination of said switches and to connect said switches with various elements of said appliance.

6. In a timer of the type having a plurality of cams mounted on a rotating shaft, wherein the improvement comprises an insulated cylindrical housing therefor, a plurality of circumferentially spaced openings disposed about said housing in a helical path, each of said openings containing a switch disposed within the thickness of the walls of said housing, each of said switches having first and second movable contact members and a stationary contact member, said first and second movable contact members being curved to substantially conform to the curvature of the periphery of said cylindrical housing so as to provide a spring force which is applied in a direction toward said rotating shaft, said first movable contact member being restrained from movement toward said shaft by a substantially L-shaped level which is formed within said thickness of said wall, said second movable contact member having one end fixedly connected to a second level formed within said thickness of said wall and adapted to be moved by one of said cams through a cam follower so as to make electrical contact with said first movable contact member and said stationary contact member, thereby establishing a circuit condition for controlling elements of an appliance, said L-shaped level being elevated from said second level, a plurality of terminals affixed to said housing so as to make electrical contact with contact members of said switches, a driving means for rotating said shaft, an end plate in each end of said housing for supporting said rotating shaft and said driving means, said end plate which supports said driving means having elongated mounting holes to permit rotational alignment of said driving means and said rotating shaft with respect to said switches.

7. In a timer of the type having a plurality of cams mounted on a rotating shaft, wherein the improvement comprises an insulated cylindrical housing therefor, a plurality of circumferentially spaced switches disposed about said housing in a helical path, each of said switches having first and second spring contact members curved to substantially conform to the curvature of the periphery of said cylindrical housing and a stationary contact member disposed in openings in the walls of said housing, said second spring contact member having a cam follower attached thereto, said follower adapted to follow a periphery of an associated cam so as to move said second spring contact member into electrical contact with said first spring contact member and said stationary contact member, a plurality of terminal members affixed to said housing so as to make electrical contact with said spring contact members and said stationary contact members, a driving means for rotating said shaft, an end plate on each end of said cylindrical housing for supporting said driving means and said rotating shaft, and said end plate which supports said driving means having elongated mounting holes to permit rotational alignment of said driving means and said rotating shaft with respect to said switches.

8. In a timer of the type having a plurality of cams mounted on a rotating shaft, wherein the improvement comprises an insulated cylindrical housing therefor, a plurality of circumferentially spaced switches disposed about said housing in a helical path, each of said switches having first and second spring contact members curved to substantially conform to the curvature of the periphery of said cylindrical housing and a stationary contact member, and second spring contact member having a cam follower attached thereto, said follower adapted to follow a periphery of an associated cam so as to move said second spring contact member into electrical contact with said first spring contact member and said stationary contact member, a plurality of terminal members affixed to said housing so as to make electrical contact with said spring contact members and said stationary contact members, a driving means for rotating said shaft, an end plate on each end of said cylindrical housing for supporting said driving means and said rotating shaft, and a flexible connector for wrapping around said housing to interconnect predetermined combinations of said switches and to connect said switches with various elements of an appliance being controlled by said timer.

9. In a timer of the type having a plurality of cams mounted on a rotating shaft, wherein the improvement comprises an insulated multisided housing therefor, a plurality of circumferentially spaced switches disposed

about said housing in a helical path, each of said switches having a formed spring contact member which is actuated by movement of a cam through a cam follower member, said switches being a means for establishing circuit conditions for operating elements of an appliance, a driving means for rotating said shaft, an end plate on each end of said housing for supporting said rotating shaft and said driving means, said end plate which supports said driving means having elongated mounting holes to permit rotational alignment of said driving means and rotating shaft with respect to said switches, and a plurality of terminal members affixed to said housing so as to make electrical contact with contact members of said switches.

10. In a timer of the type having a plurality of cams mounted on a rotating shaft, wherein the improvement comprises an insulated multisided substantially cylindrically shaped housing therefor, a plurality of circumferentially spaced switches disposed about said housing in a helical path, each of said switches having first and second spring contact members and a stationary contact member, said second spring contact member having a cam follower attached thereto, said follower adapted to follow a periphery of an associated cam so as to move said second spring contact member into electrical contact with said first spring contact member and said stationary contact member, a plurality of terminal members affixed to said housing so as to make electrical contact with said spring contact members and said stationary contact members, a driving means for rotating said shaft, and an end plate on each end of said cylindrical housing for supporting said driving means and said rotating shaft.

11. In a timer of the type having a plurality of cams mounted on a rotating shaft, wherein the improvement comprises an insulated cylindrical housing therefor, a plurality of circumferentially spaced switches disposed about said said housing in a helical path, each of said switches having first and second spring contact members and a stationary contact member disposed in openings in the walls of said housing, said second spring contact member having a cam follower attached thereto, said follower adapted to follow a periphery of an associated cam so as to move said second spring contact member into electrical contact with said first spring contact member and said stationary contact member, a plurality of terminal members affixed to said housing so as to make electrical contact with said spring contact members and said stationary contact members, a driving means for rotating said shaft, an end plate on each end of said cylindrical housing for supporting said driving means and said rotating shaft, and said end plate which supports said driving means having elongated mounting holes to permit rotational alignment of said driving means and said rotating shaft with respect to said switches.

12. In a timer of the type having a plurality of cams mounted on a rotating shaft, wherein the improvement comprises an insulated cylindrical housing therefor, a plurality of circumferentially spaced switches disposed about said housing in a helical path, each of said switches having first and second spring contact members and a stationary contact member, said second spring contact member having a cam follower attached thereto, said follower adapted to follow a periphery of an associated cam so as to move said second spring contact member into electrical contact with said first spring contact member and said stationary contact member, a plurality of terminal members affixed to said housing so as to make electrical contact with said spring contact members and said stationary contact members, a driving means for rotating said shaft, an end plate on each end of said cylindrical housing for supporting said driving means and said rotating shaft, and a flexible connector for wrapping around said housing to interconnect predetermined combinations of said switches and to connect said switches with various elements of an appliance being controlled by said timer.

13. In a timer of the type having a plurality of cams mounted on a rotating shaft, wherein the improvement comprises an insulated substantially cylindrically shaped housing therefor, a plurality of circumferentially spaced cut-outs disposed about said housing in a helical path, each of said cut-outs containing a switch disposed therewithin, each of said switches having first and second moveable contact members and a stationary contact member, said first and second moveable contact members being formed so as to provide a spring force which is applied in a direction toward said rotating shaft, said first moveable contact member being restrained by an elevation which is formed within said cut-out, said second moveable contact member adapted to be moved by one of said cams through a cam follower so as to make electrical contact with said first moveable contact member and said stationary contact member, thereby establishing a circuit condition for controlling elements of an appliance, a plurality of terminals affixed to said housing so as to make electrical contact with contact members of said switches, a driving means for rotating said shaft, and an end plate in each end of said housing for supporting said rotating shaft and said driving means.

14. In a timer of the type having a plurality of cams mounted on a rotating shaft, wherein the improvement comprises an insulated cylindrical housing therefor, a plurality of circumferentially spaced openings disposed about said housing in a helical path, each of said openings containing a switch disposed within the thickness of the walls of said housing, each of said switches having first and second moveable contact members and a stationary contact member, said first and second moveable contact members being formed so as to provide a spring force which is applied in a direction toward said rotating shaft, said first moveable contact member being restrained by an elevation which is formed within said thickness of said wall, said second moveable contact member adapted to be moved by one of said cams through a cam follower so as to make electrical contact with said first moveable contact member and said stationary contact member, thereby establishing a circuit condition for controlling elements of an appliance, a plurality of terminals affixed to said housing so as to make electrical contact with contact members of said switches, a driving means for rotating said shaft, an end plate in each end of said housing for supporting said rotating shaft and said driving means, and said end plate which supports said driving means having elongated mounting holes to permit rotational alignment of said driving means and said shaft with said switches.

15. In a timer of the type having a plurality of cams mounted on a rotating shaft, wherein the improvement comprises an insulated cylindrical housing therefor, a plurality of circumferentially spaced openings disposed about said housing in a helical path, each of said openings containing a switch disposed within the thickness of the walls of said housing, each of said switches having first and second moveable contact members and a stationary contact member, said first and second moveable contact members being formed so as to provide a spring force which is applied in a direction toward said rotating shaft, said first moveable contact member being restrained by an elevation which is formed within said thickness of said wall, said second moveable contact member adapted to be moved by one of said cams through a cam follower so as to make electrical contact with said first moveable contact member and said stationary contact member, thereby establishing a circuit condition for controlling elements of an appliance, a plurality of terminals affixed to said housing so as to make electrical contact with contact members of said switches, a driving means for rotating said shaft, an end plate in each end of said housing for supporting said rotating shaft and said driving means, said end plate which supports said driving means having elongated mounting holes to permit rotational alignment of said driving means and said rotating shaft with respect to said switches, and a flexible connector

for wrapping around said housing to interconnect predetermined combination of said switches and to connect said switches with various elements of said appliance.

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