Feb. 22, 1966 F. R. BECK ETAL 3,236,123

TIMER

Filed Feb. 18, 1963 3 Sheets-Sheet 1

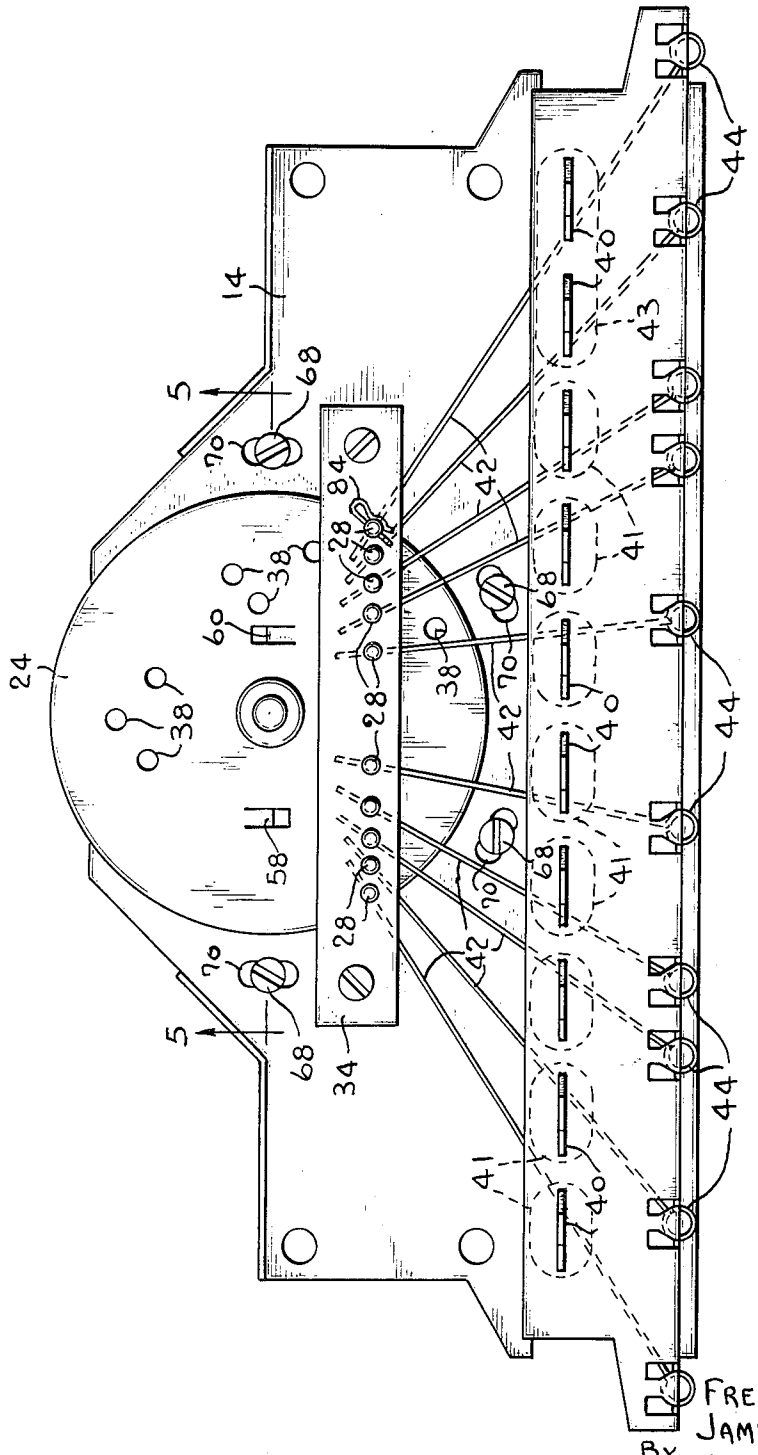


FIG. 1

INVENTOR.
FREDERICK R. BECK
JAMES M. THORNBERY
BY Bayard H. Michael
ATTORNEY

Feb. 22, 1966 F. R. BECK ETAL 3,236,123

TIMER

Filed Feb. 18, 1963 3 Sheets-Sheet 2

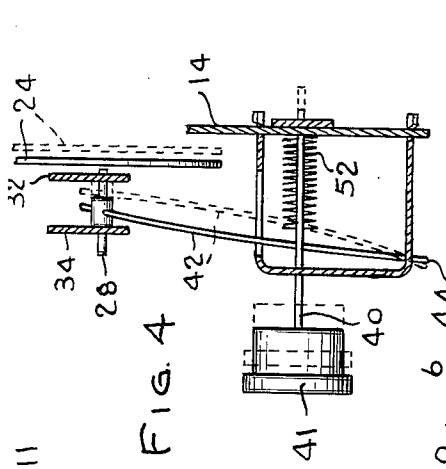


FIG. 4

FIG. 2

INVENTOR.
FREDERICK R. BECK
BY JAMES M. THORNBERY
Bayard H. Michael
ATTORNEY

Feb. 22, 1966 F. R. BECK ETAL 3,236,123

TIMER

Filed Feb. 18, 1963 3 Sheets-Sheet 3

FIG. 6

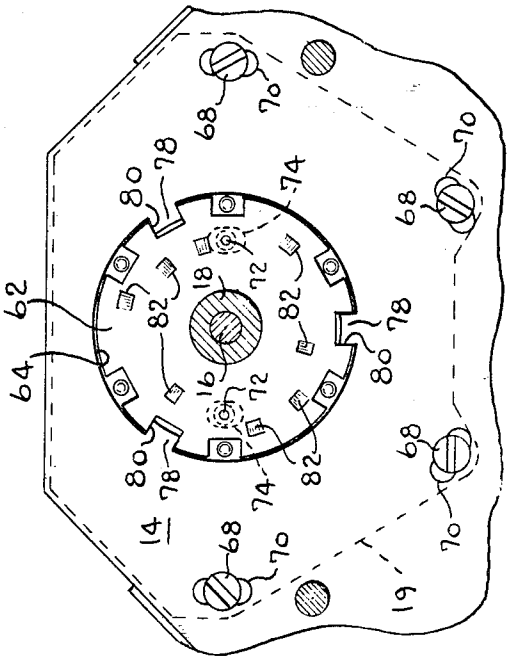


FIG. 3

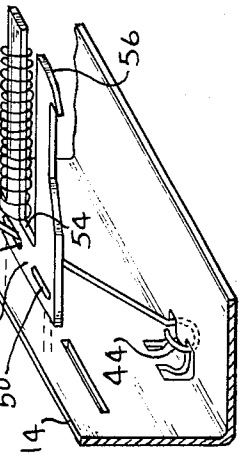
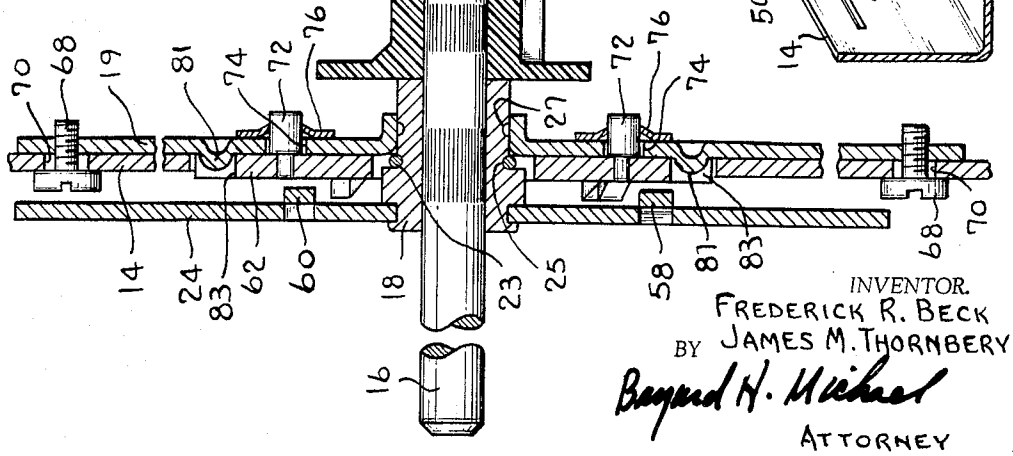


FIG. 5



INVENTOR.
FREDERICK R. BECK
BY JAMES M. THORNBERY
Bayard H. Michael
ATTORNEY

United States Patent Office 3,236,123 Patented Feb. 22, 1966

3,236,123

TIMER

Frederick R. Beck, Glen Ellyn, and James M. Thornbery, Glenview, Ill., assignors to Controls Company of America, Melrose Park, Ill., a corporation of Delaware

Filed Feb. 18, 1963, Ser. No. 259,156
16 Claims. (Cl. 74—813)

This invention relates to timers and, more particularly, to the type of timer known as pin set timers.

In a pin set timer a number of pins are mounted for selective movement into position for engaging a member rotatable with the timer cam bank to thereby initially position the timer for one of several programs. The rotatable member, or plate, is manually rotated (with corresponding rotation of the timer cam bank) until it is engaged by the selected pin whereupon it is held against further rotation thereby locating the starting point for the particular selected operational program. With the starting point located the apparatus is activated and the selected operational program carried out under control of the pin set timer.

Pin set timers are used in conjunction with timers having a plurality of available programs and facilitate the accurate location of the desired starting point for any one of the programs. The first such mechanism is shown in Patent No. 2,973,672 and in that arrangement actuation of any one of the available selector buttons would act to push a pin for engagement with a corresponding lug or aperture in a plate rotatable with the timing cam. The nature of that construction was such as to restrict the freedom of choice in the arrangement of the selector buttons and the distance of the selector buttons from the axis of the timer. Patent No. 3,074,282 shows another form of pin set mechanism allowing the push buttons to be located in a line and is further differentiated from the first patent in that only one pin is employed and this pin rotates with the timing cam. Actuation of a push button serves to position the proper stopping hole or lug for engagement by this pin. The holes or lugs are carried by a plate which is not rotatable but is movable through actuation of the push buttons. This patent made possible a different arrangement of push buttons and a more uniform actuating force for the push buttons, but represented a rather costly solution to the problem. Furthermore, the possible arrangements of the push buttons were still somewhat confining if any reasonable degree of manufacturing economy was to be realized.

The principal object of the present invention is to provide a pin set timer which can be manufactured at lower costs than either of the prior arrangements while permitting virtually any arrangement of the push buttons and obtaining a uniform actuating force of the desired magnitude.

These timers are generally fabricated as a timer sub-assembly and a pin set sub-assembly which are then brought together and in the prior designs some difficulty was experienced in properly orienting one with respect to the other in the final assembly and this is particularly true with respect to the mechanism operative at the conclusion of any program to reposition the movable pin or plate for engagement with or by the stationary member in accordance with the previously selected program. A further object of this invention then is to improve upon the construction so as to permit accurate alignment of the two sub-assemblies and obviate the problems just mentioned.

A further object is to provide a simplified construction of a pin set timer which is readily converted to provide the washing machine manufacturer a choice of suds return or standard programming with the same timer. This not

only simplifies the inventory problems but field repair or replacement as well.

While the manner in which the second and third of the above objects are attained is best understood after a detailed consideration of the present construction the attainment of the first object can be broadly understood when it is appreciated that actuation of any of the push buttons will act to resiliently "set" a corresponding pin with the force being applied to the pin through a simple straight section of music wire. The wire serves as the spring and the diameter of wire employed is selected in accordance with the distance the wire must "reach" between the button and the pin. Since this wire is available in a wide range of diameters it is possible to select wire sizes to achieve virtually uniform actuating forces on the buttons even though they are various distances from the axis of the timer or from the pins. The wire is relatively inexpensive and simple to fabricate for this purpose and results in a very low cost construction which actually represents an improvement over the prior designs.

Other objects and advantages will be pointed out in, or be apparent from the specification and claims, as will obvious modifications of the embodiment shown in the drawings, in which:

FIG. 1 is a front elevation of a timer;

FIG. 2 is a top plan view of the timer;

FIG. 3 is a perspective view of a portion of the selector mechanism;

FIG. 4 is a partial view of the selector mechanism illustrating the actuated and unactuated positions of the wires;

FIG. 5 is a partial section taken along lines **5—5** of FIG. 1; and

FIG. 6 is a view taken generally along lines **6—6** of FIG. 2.

The pin set timer includes the pin set mechanism **10** and a conventional timer sub-assembly **11** located to the rear of the pin set mechanism. Since the particular arrangement or type of timer has no bearing on the present invention it has not been shown in detail but includes a rotatable arbor **13** carrying a plurality of cams **12** which sequentially operate the various switches (not shown) for control of the functions of the machine on which the timer is mounted. The arbor may be rotated by timer motor **15** or may be manually rotated by means of shaft **16** connected to and rotating with the arbor. The shaft is also axially slidable and in many timers this axial movement is employed to actuate a line switch (not shown) controlling power to the timer. In the present arrangement this shaft carries a fixed hub **18** which, in turn, is rotatable in the front plate **19** of the timer sub-assembly, the front plate being in turn connected to frame **14** which is also the main support of the pin set mechanism. The hub carries a disc **24** which will rotate with the timer and move axially as the shaft is moved axially. In the out position the line switch would be de-energized and the disc would be positioned so as to be engageable by whichever of the pins **28** of pin set mechanism **10** has been selected. When the shaft is moved in or towards the rear, after having located the desired starting point, the disc is disengaged from the pin so as to allow the motor to rotate the cam bank. The present invention is not, however, limited to this type of timer and can be applied with equal facility to those timers having face cams for actuating switches or combinations of face cams and a cam bank. The pin set mechanism is employed to accurately locate the correct starting point for one of a plurality of programs available on the timer. With many appliances the number of available programs has increased to such a point that the end of one program and the start of another program are tightly spaced in terms

of angular movement of the timer cam and, thus, without the aid of a pin set mechanism or the like the user would have to locate the starting point within, say, six degrees of rotational movement and this is not considered practical in home appliances. With the aid of the pin set mechanism any of the push buttons may be actuated to select the desired program and knob **17** carried by the shaft is then manually rotated until the pin engages and stops the disc at which time the timer is positioned for proper starting of the selected program. The knob is then depressed to put the timer into operation and the pin set mechanism is no longer a factor in the operation of the timer.

More particularly, the pin set mechanism **10** includes a plurality of pins **28** supported and guided by parallel plates **32, 34** carried by the frame on posts **36**. The pins are supported for axial movement relative to disc **24** so as to be movable into and out of the path of rotation of the disc. When any pin is "set" it is resiliently urged against the disc so it will drop into the proper hole of the various holes **38** provided on and relatively angularly and radially spaced about the rotational axis of the disc with each corresponding to a particular program starting point so that upon engagement by a selected pin the starting point for a particular cycle is positively located. It will be appreciated that the pin engaging means can take forms other than apertures **38** (such as tabs or the like), the apertures being preferred as they can be readily fabricated and accurately positioned.

The pins **28** are actuated by depressing one of push bars **40**, in FIG. 1, that furthest to the left is shown in its actuated state, to bend or load a corresponding wire actuator **42**. Each of the wire actuators **42** is connected to the timer frame **14** by a looped end **44** which engages a tab **46** formed on the timer frame. The free end **48** of each wire extends through an aperture in a pin **28**. Each push bar has two slots **50—50** and each of the wire actuators extends through one of the slots so that the wire will be displaced in response to movement of the push bar. A return spring **52**, seated between the frame and a shoulder **54** on each of the push bars, biases each push bar to an "out" position whereby the wire actuators are bowed and stressed (as illustrated in full lines in FIG. 4) to hold the corresponding pin retracted so it cannot engage disc **24**. When a push bar is depressed it moves its wire actuator to the dotted line position of FIG. 4 biasing the pin against disc **24** (assuming the disc is "out") for engagement with the holes **38** which will line up with the pin as the disc is manually rotated. The music wire actuators provide both the connection between the push bars and the pins and the force biasing the pins into engagement with the disc holes. Each push bar includes a hook portion **56** which is engageable with a suitable latch mechanism (not shown) of the well known type which latches the actuated push bar while releasing a previously actuated bar.

When a particular program is to be selected, the push bar corresponding to that program is depressed to move its wire actuator to a position biasing one of the pins **28** against disc **24**. Disc **24** is rotated by the knob **17** and the selected pin rides on the face of the disc until it registers with the particular hole **38** in the disc which corresponds to the starting point for the program. Upon registry of the pin with the hole, the pin is driven into the hole by the stressed wire and locks the disc against further rotation thereby positively locating the starting point for the desired cycle. With the starting point located, the control shaft is moved axially inward to actuate a line switch (not shown) to initiate the program. The inward movement of shaft **16** moves disc **24** to its dotted line position of FIG. 4 and disengages the disc from the selected pin to free the cam bank for motor driven movement.

Music wire is used for the wire actuators **42** and gives a wide range of available actuating forces merely through the selection of wire diameters. Therefore, a uniform actuating pressure can be provided on all of the push bars (which are provided with suitable buttons **41** for finger actuation) through the simple expedient of varying the diameter of the music wire used with the push bars. For example, in the illustrated embodiment, by increasing the diameter of the wires from the two innermost pins adjacent the control shaft to the outermost pins, i.e. by increasing wire diameter as wire length increases, the force can be kept practically constant. Accordingly the physical characteristics of the wires are varied in accordance with the distance they must reach to engage the pins and it is conceivable that expedients other than varying wire diameter could be employed to achieve the same end, uniform actuating pressure, and without departure from the spirit or scope of this invention. The use of straight lengths of music wire is preferred as music wire lends itself particularly well to this application and provides for selection of actuating pressures and maintaining uniform actuating pressures throughout the various stations without increasing the complexity of fabrication and assembly. It will also be appreciated that relative arrangements of the pin and the holes in rotatable disc **24** other than that illustrated in the drawings can be utilized without departing from the scope of this invention.

As can be seen in FIG. 5, a retaining spring **23** suitably supported in fixed relation with respect to control shaft **16** is arranged for cooperation with grooves **25** and **27** in hub **18** to hold the control shaft, and correspondingly disc **24**, in either of its two positions while providing a detent action and feel.

Before the next program can be selected rotatable disc **24** must be returned to the full line position of FIG. 4. This can be accomplished manually by withdrawing shaft **16**, but means is preferably provided for automatically effecting this return motion to insure proper operation. More particularly, the locating disc **24** is provided with tabs **58** and **60** turned towards ramp-out disc **62** positioned in an opening **64** provided in frame **14**. The timer front plate **19** is connected to the frame by screws **68** which extend through elongated slots **70** in the frame to permit adjustable movement relative to the frame as will be discussed more fully hereinafter. Ramp-out disc **62** includes a pair of pins **72** extending through slots **74** in ramp-out disc **62**. Spring washers **76** engage the molded posts and hold the ramp-out disc to the adjusting plate. A plurality of equi-angularly spaced tabs **78** are provided on the frame **14** and register with angularly spaced notches **80** in the ramp-out disc to hold the ramp-out disc against rotation when it is mounted in the frame. A plurality of angularly spaced and axially extending ramps **82** are provided on the face of the ramp-out disc and are positioned so as to engage either one or the other of bent down tabs **58** and **60**. In the operation of the timer, at the end of a program disc **24** comes to rest with the tabs **58** and **60** positioned so that additional rotation from the position in which it has stopped engages one of the ramps **82** with a bent down tab to move disc **24** axially outward to its full line position in FIG. 4 so that a subsequent program can be selected. With this arrangement the user need only remember to push the proper selection button and then turn the knob. The ramp-out action will automatically move the disc to its "out" position.

Front plate **19** can be moved relative to the timer frame, within the limits of slots **70**, to adjust the timing cam sub-assembly with respect to pins **28** to provide for initial orientation of the starting points with respect to the timer. The ramp-out arrangement just described is advantageous in that it permits adjustment of the timer relative to the pins without disturbing the relative position of the ramps with respect to the pins since the ramp disc is fixed relative to the frame which carries the pins. Slots **74**, provided in timer front plate **19**, angularly correspond to slots **70** in the frame and permit equal

angular movement of the timer front plate with respect to the ramp-out disc as with respect to the frame. A plurality of pins **81** are provided on the timer front plate and the ramp-out disc is provided with identically spaced notches **83**, in assembly the pins mate with the notches to properly locate the ramp-out disc and notches **83** are over-size with respect to the pins to permit the relative movement between the ramp-out disc and the timer front plate. In assembly, the ramp-out disc is positioned in opening **64** in frame **14** and tabs **78** are bent down into slots **80** to fix the ramp-out disc relative to the frame and the pins. Timer front plate **19**, having been previously connected to the ramp-out disc by assembly of spring washer **76** onto posts **72**, is then adjusted relative to the pins and when the proper orientation with the pins is achieved screws **68** are tightened into slots **70** to position the timer switches relative to the pins.

In the overall operation of a pin set timer including the selector mechanism of this invention, a program is selected by depressing one of the push bars **40**. This moves one of the actuator wires **42** to the dotted line position of FIG. 4 to bias its pin toward a position where it can ride on disc **24**. Disc **24** is rotated until a hole **38** therein registers with the selected pin whereupon the wire actuator moves the pin into the hole and locks the disc, and correspondingly the cam bank, against further rotation. This positively locates the starting point for the selected program and control shaft **16** is then moved axially inward to actuate the line switch and initiate the particular selected program, the duration of the program is then determined by the cam bank and switches. At the end of the selected program disc **24** comes to rest with bent down tabs **58** and **60** so positioned relative to ramps **82** that upon manual rotation of disc **24** it will be moved outwardly to its full line position (see FIG. 4) wherein it will be positioned for reengagement with a subsequently selected pin.

To further illustrate the versatility of this particular selector mechanism and with particular reference to FIG. 1 any particular operational program can be eliminated by insertion of a cotter **84** through a particular pin **28** to prevent motion of that pin relative to disc **24**. For example, an automatic washer can be either provided with or without a suds saver as desired and the timer of this invention can be used equally well with either arrangement. Where a suds saver is used cotter **84** is eliminated, but where the suds saver feature is not included in the machine the cotter is inserted into a corresponding pin **28**, in this instance, the pin furthest to the right in FIG. 1. An enlarged control knob **43** is then used on the two push bars located furthest to the right in FIG. 1, so that the last two push bars are "ganged" but upon depression of that knob only one of the pins **28** will be moved for engagement with the rotatable disc.

Although but one embodiment of the present invention has been illustrated and described, it will be apparent to those skilled in the art that various changes and modifications may be made therein without departing from the spirit of the invention or from the scope of the appended claims.

What we claim is:

1. In a timer having movable switch control mechanism and a plurality of pin means movable into and out of an operative position for engagement with said switch control mechanism to hold said switch control mechanism against movement and establish starting points for said timer; the combination with said pin means of, selector mechanism for moving said pins means into and out of said operative position and comprising a plurality of wire members pivoted at one point relative to said pin means and extending from the pivot point to and engaging said pin means, and means connected to each of said wire members for moving said wire members to effect movement of said pin means into and out of said operative position.

2. The combination of claim **1** wherein said wire members comprise a substantially straight length of wire.

3. In a timer having movable switch control mechanism, a member movable with said switch control mechanism, a plurality of pin means mounted adjacent said movable member for movement transversely of the path of movement thereof and each corresponding to a starting point for said timer, and means provided on and movable with said movable member for engaging said pin means; the combination with said pin means of, a plurality of straight lengths of wire each anchored relative to said pin means and extending to and engaging one of said pin means, and means engaging each of said wires and mounted for moving said wires to a position biasing said pin means into the path of said pin engaging means for engagement therewith.

4. The combination of claim **3** wherein the distance between respective ones of said anchor points and said pin means varies and wherein the diameters of said wires increase as said distance increases.

5. The combination of claim **3** wherein said member is axially movable to free said member from said pin means for rotation with said switch control mechanism when one of said starting points is established and including means for returning said member, prior to a subsequent operational cycle, to a position for engagement of said pin engaging means with said pin means.

6. The combination of claim **5** wherein said means for returning said member includes at least one projection on said member and also includes at least one projection fixed relative to said pin means and positioned for engagement with said projection on said member to effect said return movement of said member.

7. The combination of claim **5** including a plate for supporting said switch control mechanism, means adjustably mounting said supporting plate for movement relative to said pin means, said means for returning said member comprising projections on said member, a second member fixed relative to said pin means, projections on said second member engageable with said projections on said member for displacing and effecting the return movement of the member, and a lost motion connection between said second member and said supporting plate so that said supporting plate is adjustable relative to said pin means without disturbing the relationship between said projections and said pin means.

8. In a timer having rotatable switch control means, a disc rotatable with said switch control means, a plurality of pin means mounted adjacent said disc for movement into and out of the path of rotation thereof and each corresponding to a starting point for said timer, and pin engaging means provided on and rotatable with said disc; the combination with said pin means of a plurality of wires anchored for pivoting relative to said pin means and having an extension from their anchor points to and engaging said pin means, and means engaging each of said wires at a point spaced from the anchor point for moving said wires to a position in which the wire is stressed to bias said pin means into the rotational path of said pin engaging means for engagement therewith.

9. The combination of claim **8** wherein each of said wires are of uniform diameter throughout substantially its entire extension and wherein the diameter of said wires increase as the distance between respective ones of said anchor points and said pin means increases.

10. The combination of claim **9** wherein said pin engaging means are angularly and radially spaced about an axis on said disc, said pin means are aligned transversely of said axis and said selectively movable means are aligned generally parallel to said pin means.

11. The combination of claim **8** wherein said disc is mounted for axial movement to energize said timer when one of said starting points is located and to free said disc from said pin means for rotation with said switch control means during an operation program, and including means

for displacing said disc axially to return said disc, prior to a subsequent operational program, to a position for engagement between said pin engaging means and said pin means.

12. The combination of claim **11** wherein said means for displacing said disc comprises first axial projections on said disc and second axial projections fixed relative to said pin means and positioned for engagement by said first axial projections to effect said axial movement of said disc.

13. The combination of claim **12** including a switch supporting plate and means adjustably mounting said switch supporting plate for movement relative to said pin means, and wherein said second axial projections are provided on a member mounted in fixed relation relative to said pin means and connected to said switch supporting plate through a lost motion connection so that said supporting plate is adjustable relative to said pin means without disturbing the relative positioning of said second axial projections with said pin means.

14. The combination of claim **8** wherein said means for moving said wires comprises an independently movable operator for each of said wires, two adjacent operators are gang connected for simultaneous actuation, and locking means releasably engaging one of the pin means connected to said gang connected operators for locking said one pin means against movement.

15. In a timer having movable switch control mechanism, a member movable with said switch control mechanism, a plurality of pin means mounted adjacent said movable member for movement transversely of the path of movement thereof and each corresponding to a starting point for said timer, and means provided on and movable

with said movable member for engaging said pin means; the combination with said pin means of, independently operable actuating means for moving each of said pin means, at least a pair of adjacent ones of said actuating means interconnected for simultaneous movement, and locking means releasably engaging at least one of the pin means connected to said interconnected actuating means for locking said one pin means against movement.

16. In a timer having movable switch control mechanism, a member movable with said switch control mechanism, a plurality of pin means mounted adjacent said movable member for movement transversely of the path of movement thereof and each corresponding to a starting point for said timer, and means provided on and movable with said movable member for engaging said pin means; the combination with said pin means of, a plurality of wires each pivoted on a fixed pivot relative to said pin means and extending to and engaging one of said pin means, and means engaging each of said wires at a point spaced from its pivot and mounted for moving each wire about its pivot to a position in which the wire is stressed to bias said pin means into the path of said pin engaging means for engagement therewith.

References Cited by the Examiner

UNITED STATES PATENTS

1,293,841	2/1919	McReynolds	74—514
2,973,672	3/1961	Thornbery	74—813

MILTON KAUFMAN, *Primary Examiner.*