The present invention relates generally to a timer and more particularly to the means and method for providing a selective indexing mechanism for locating the cycle starting point of a timer.

Contemporary timers for controlling appliances must offer a multiplicity of cycle programs which can be easily selected by an operator. Since a rotary timer ordinarily has only one revolution or 360 degrees throughout which it may operate without cycle repetition, it therefore becomes necessary to incorporate all of the required programs within that angular travel. Hence, the need arises for accurately determining the cycle starting point for each program. It is novel and practical to do this with a hydraulic pin setting mechanism which will accurately position an indexing member which is affixed to the rotating shaft of the timer.

Accordingly, the present invention discloses a hydraulic pin setting mechanism which acts as an indexing device for locating cycle starting points of a timer. An advantage of the hydraulic pin setting mechanism is that the push buttons representing particular cycles can be remotely located from the timer. All that is required is a fluid reservoir connecting the actuating plunger means with a plunger means which restrains the indexing member of the timer. The fluid reservoir could be a flexible hose with fitting adapted to accommodate the plunger means or a cavity in a metallic structure such as is illustrated in the drawing accompanying this specification.

The life of the mechanism of the present invention should be greater than that of a mechanical pin setting mechanism because of the self-lubricating characteristics of the hydraulic system.

It is an object of the present invention, therefore, to provide a hydraulic pin setting mechanism for locating a cycle starting point of a timer.

Still another object of the present invention is to provide an indexing device for determining the cycle starting point of a timer wherein the actuating mechanism is simple, efficient, versatile, reliable, and economical.

Still another object of the present invention is to provide an indexing device for locating the cycle starting points of a timer wherein the mechanism contains a plurality of independent hydraulic systems for stopping an indexing member of said timer.

Still another object of the present invention is to provide an indexing device for locating the cycle starting points of a timer wherein the selector knobs may be remotely located from said timer.

The present invention, in another of its aspects, represents a novel embodiment 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 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 purpose, the invention will be described in conjunction with the accompanying drawing in which:

FIGURE 1 is a perspective view of a timer with the indexing device assembled to said timer.

FIGURE 2 is a fragmentary perspective view of the indexing device showing the side which is adjacent to the timer, said timer not being shown in this view.

FIGURE 3 is a fragmentary front view of the indexing device showing the layout of the hydraulic fluid reservoirs or passages.

FIGURE 4 is an exploded perspective view of one of the first plunger means of the indexing device.

FIGURE 5 is an exploded perspective view of one of the second plunger means of the indexing device.

FIGURE 6 is a sectional view 6—6 taken from FIGURE 3 showing the indexing member on the rotating shaft of said timer in a position not to be restrained by the second plunger means.

FIGURE 7 is a sectional view 6—6 taken from FIGURE 3 showing the indexing member on the rotating shaft of said timer in a position to be restrained by the second plunger means.

Generally speaking, the present invention is a hydraulic pin setting mechanism for locating a cycle starting point of a timer comprising, a reservoir filled with a fluid, a first plunger means in a first end of said reservoir and a second plunger means in a second end of said reservoir, a means for actuating said first plunger means so as to compress said fluid, said second plunger means being responsive to compression of said fluid so as to protrude from said reservoir, said second plunger means having an end which restrains a preselected stop-lug on an indexing member of said timer when said second plunger means protrudes from said reservoir, and said preselected stop-lug being located on said indexing member so as to represent a selected cycle starting point of said timer.

Referring now to the drawing, and particularly to the perspective view of FIGURE 1, the component parts of the present invention can be visualized in conjunction with the following description. The hydraulic pin setting mechanism, hereinafter referred to as the indexing device, is assembled to the timer 10 by means of screws not shown in FIGURE 1. The rotating shaft 11 of the timer 10 extends through the body of the indexing device and is a means for rotating and supporting the switch actuating members of the timer and the indexing member, hereinafter referred to as the stop-disc 12. A plurality of stop lugs 12 are radially spaced about the stop-disc 12. There are a plurality of first plunger means 13 through 22 extending through associated apertures in latch-bar 23. Screws 49 slidably affix latch-bar 23 to the indexing device and flat metallic spring 50 provides a force for returning said latch-bar to its original position.

Referring now to FIGURE 2, we see a back side of the indexing device showing the effect of depressing the first plunger means 22 to cause an associated second plunger means 24 to protrude from the back surface of the indexing device. The balance of the second plunger means 25 through 33 are shown in a de-activated position. Flat head screws 35 and round head screws 36 hold the front portion 37 of the indexing device securely to the back portion 38 of said indexing device, thereby compressing gasket 34 to form a plurality of reservoirs for hydraulic fluid.

Referring now to FIGURE 3, we see a fragmentary front view of the indexing device with knobs 52 removed and showing outline views of the hydraulic fluid reservoirs 39 through 48. It can be seen that the first plunger means 13 through 22 are coupled to the second plunger means 24 through 33 by the hydraulic fluid reservoirs 39 through 48.

Referring now to FIGURE 4, we see an exploded perspective view of a first plunger means 13 through 22...
comprising, a first plunger 51, a knob means 52, a first seal 53, a second seal 54, and a coil spring 55. The first seal 53 fits in groove 56, and the second seal 54 fits in groove 57. As shown in FIGURE 5, the first and second seals 53 and 54 are typical O ring seals.

Referring now to FIGURE 5 we see an exploded perspective of a second plunger means 24 through 33 comprising, a second plunger 58, a seal 59, a coil spring 60, a stop-pin 61, a washer 62, and a second coil spring 63. The second plunger means 24 is represented by the dotted outline of said first plunger means 51 and stop-disc 51'.

Referring now to FIGURE 6, we see a sectional view 6-6 taken from FIGURE 3 showing a first plunger means 22 in a de-activated position, and consequently, an associated second plunger means 24 in a de-activated position. The stop-disc 12 is in a position to be rotated by the rotating shaft 12 without being restrained by the stop-pin 61.

Referring now to FIGURE 7 we see the sectional view 6-6 taken from FIGURE 3 showing a first plunger means 22 in an activated position, and consequently, an associated second plunger means 24 in an activated position. The stop-disc 12 is shown in a position where a selected stop lug 12' is restrained by the plunger means 24. The axial movement of the rotating shaft 11 and stop-disc 12 is represented by the dotted outline of said rotating shaft and stop-disc in FIGURE 7. The gasket 34 and the latch-bar 23, shown in FIGURE 1, are means for holding and depressing a first plunger means or a means for acting said plunger means. The axially movable rotating shaft 11, which rotatably supports the stop-disc 12 is a means for disengaging stop-lugs 12' from the second plunger means 24 through 33.

With the above description of component parts in mind, and by making reference to the drawing figures, the following analysis of operation will serve to convey the functional details of the present invention. As stated previously the indexing device of the present invention is a hydraulic pin setting mechanism. That is, movement of a first plunger means 13 through 22 compresses hydraulic fluid to cause relative movement of an associated second plunger means 24 through 33. The stop-disc 12 on the timer can be axially moved and rotated by rotating shaft 11 so as to be restrained by a selected second plunger means 24 through 33, thereby selecting a cycle starting point for timer 10.

Referring again to FIGURE 1 we can see how one embodiment of the present invention will perform the above-mentioned function. Assume that the operator of the equipment utilizing the present invention has chosen a cycle starting point represented by the first plunger means 22. The first plunger means 22 will be depressed or actuated, as shown in FIGURE 2, to cause the associated second plunger means 24 to protrude from the surface of the indexing device so as to restrain a preselected stop lug 12' on stop-disc 12. At that point the operator will axially pull rotating shaft 11 and rotate said shaft until the preselected stop lug 12' is restrained by the actuated second plunger means 24. The latch-bar 23 is a means for holding a depressed first plunger means 13 through 22 in a depressed or activated position and for releasing any said plunger means which were already depressed.

Referring again to FIGURE 7 we can see how depression of the first pin means 22 compresses the hydraulic fluid in reservoir 48 to cause the second plunger means 24, to protrude from the indexing device to restrain a stop lug 12' on the stop-disc 12. The coil spring 55 is a spring means for biasing the first plunger means 22 out of reservoir 48. The coil spring 60 acts to push the stop pin 61 of said second means 24 when said second plunger means is moved by the pressure of the hydraulic fluids. Coil spring 60 also allows the stop pin to move back into the reservoir if said stop pin hits another component. The coil spring 63 is a spring means for biasing the second plunger means 24 into reservoir 48. The hydraulic fluid in reservoir 48 is retained by the walls formed in the front portion 37 and back portion 38, the gasket 34, and the first seal 53, the second seal 54, and the seal 59.

As shown in FIGURE 7, the rotating shaft 11 and stop-disc 12 are axially moveable so that said stop-disc can be disengaged from the stop-pin 61 after the cycle starting point is located.

The indexing device 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 drawings shall be interposed as illustrative and not in a limiting sense.

What is claimed is:

1. A hydraulic pin setting mechanism for locating a cycle starting point of a timer comprising, a reservoir filled with a fluid, a first plunger means in a first end of said reservoir and a second plunger means in a second end of said reservoir, a means for actuating said first plunger means so as to compress said fluid, said second plunger means being responsive to compression of said fluid so as to protrude from said reservoir, said second plunger means having an end which restrains a preselected stop lug on an indexing member of said timer when said second plunger means protrudes from said reservoir, said preselected stop lug being located on said indexing member so as to represent said cycle starting point of said timer, and a means for rotating said indexing member so as to be restrained by said second plunger means, thereby locating said cycle starting point.

2. A hydraulic pin setting mechanism for locating a cycle starting point of a timer comprising, a reservoir filled with a fluid, a first plunger means in a first end of said reservoir and a second plunger means in a second end of said reservoir, a means for actuating said first plunger means so as to compress said fluid, said second plunger means having an end which restrains a preselected stop lug on an indexing member of said timer when said second plunger means protrudes from said reservoir, said preselected stop lug being located on said indexing member so as to represent said cycle starting point of said timer, a means for rotating said indexing member so as to be restrained by said second plunger means, thereby locating said cycle starting point, and a means for disengaging said indexing member from said second plunger means after said selected cycle starting point has been located.

3. A hydraulic pin setting mechanism for locating a cycle starting point of a timer comprising, a reservoir filled with a fluid, said reservoir having a main channel and oppositely disposed end channels, said end channels being hydraulically sealed, a first plunger means in a first of said end channels and a second plunger means in a second of said end channels, a means for actuating said first plunger means so as to compress said fluid, said second plunger means being responsive to compression of said fluid so as to protrude from said reservoir, said second plunger means having an end which restrains a preselected stop lug on an indexing member of said timer when said second plunger means protrudes from said reservoir, said preselected stop lug being located on said indexing member so as to represent said cycle starting point of said timer, a means for rotating said indexing member so as to be restrained by said second plunger means, thereby locating said cycle starting point, and a means for disengaging said indexing member from said second plunger means after said selected cycle starting point has been located.

4. A hydraulic pin setting mechanism for locating a cycle starting point of a timer comprising, a reservoir filled with a fluid, said reservoir having a main channel and oppositely disposed end channels, said end channels being hydraulically sealed, a first plunger means in a first of said end channels and a second plunger means in a
second of said end channels, a means for actuating said first plunger means so as to compress said fluid, said second plunger means being responsive to compression of said fluid so as to protrude from said reservoir, said second plunger means having an end which restrains a preselected stop-lug on an indexing member of said timer when said second plunger means protrudes from said reservoir, said preselected stop-lug being located on said indexing member so as to represent a selected cycle starting point of said timer, a means for rotating said indexing member so as to be restrained by said second plunger means, thereby locating said selected cycle starting point, and a means for disengaging said preselected stop-lug from said second plunger means after said cycle starting point has been located.

5. A hydraulic pin setting mechanism for locating a cycle starting point of a timer comprising, a reservoir filled with a fluid, a first plunger means in a first end of said reservoir and a second plunger means in a second end of said reservoir, a knob means for depressing said first plunger means so as to compress said fluid, a latching means for holding said knob means in a depressed position, said second plunger means being responsive to compression of said fluid so as to protrude from said reservoir, said second plunger means having an end which restrains a preselected stop-lug on an indexing member of said timer when said second plunger means protrudes from said reservoir, said preselected stop-lug being located on said indexing member so as to represent said cycle starting point of said timer, and a means for rotating said indexing member so as to be restrained by said second plunger means, thereby locating said cycle starting point.

6. A hydraulic pin setting mechanism for locating a cycle starting point of a timer comprising, a reservoir filled with a fluid, a first plunger means in a first end of said reservoir and a second plunger means in a second end of said reservoir and a second plunger means in a second end of said reservoir, a knob means for depressing said first plunger means so as to compress said fluid, a latching means for holding said knob means in a depressed position, said second plunger means being responsive to compression of said fluid so as to protrude from said reservoir, said second plunger means having an end which restrains a preselected stop-lug on an indexing member of said timer when said second plunger means protrudes from said reservoir, said preselected stop-lug being located on said indexing member so as to represent a selected cycle starting point of said timer, and a means for rotating said indexing member so as to be restrained by said second plunger means, thereby locating said cycle starting point.

7. An indexing device for determining a cycle starting point of a timer comprising, a fluid reservoir, a first plunger means and a second plunger means projecting into opposite ends of said reservoir, said plunger means being adapted for movement in and out of said reservoir, a first spring means for biasing said first plunger means out of said reservoir, a second spring means for biasing said second plunger means into said reservoir, and a means for depressing and holding said first plunger means so as to cause said second plunger means to protrude from said reservoir, said second plunger means having an end which restrains a preselected stop-lug on an indexing member of said timer, said preselected stop-lug being located on said indexing member so as to represent a selected cycle starting point of said timer, and a means for rotating said indexing member so as to be restrained by said second plunger means, thereby locating said cycle starting point.
mounted a plurality of switch activating members, a selective indexing device for positioning said rotating shaft comprising, an indexing member coupled to said rotating shaft so as to be rotated thereby, said indexing member having a plurality of stop-lugs projecting therefrom, each of said stop-lugs being located so as to represent a cycle starting point of said timer, a plurality of independent hydraulic systems mounted on said timer, each of said systems having a reservoir filled with hydraulic fluid and a first and second plunger means projecting into opposite ends of said reservoir, said first and second plunger means being adapted for movement in and out of said reservoirs, each of said second plunger means being responsive to depression of a first plunger means so as to protrude from a reservoir, thereby restraining a preselected stop-lug on said indexing member.

13. In a timer having a rotating shaft upon which are mounted a plurality of switch activating members, a selective indexing device for positioning said rotating shaft comprising, an indexing member coupled to said rotating shaft so as to be rotated thereby, said indexing member having a plurality of stop-lugs projecting therefrom, each of said stop-lugs being located so as to represent a cycle starting point of said timer, a plurality of independent hydraulic systems mounted on said timer, each of said systems having a reservoir filled with hydraulic fluid and a first and second plunger means projecting into opposite ends of said reservoir, said first and second plunger means being adapted for movement in and out of said reservoirs, each of said second plunger means being responsive to depression of a first plunger means so as to protrude from a reservoir, thereby restraining a preselected stop-lug on said indexing member, and a means for disengaging said preselected stop-lug from said second plunger means after said rotating shaft has been positioned.

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