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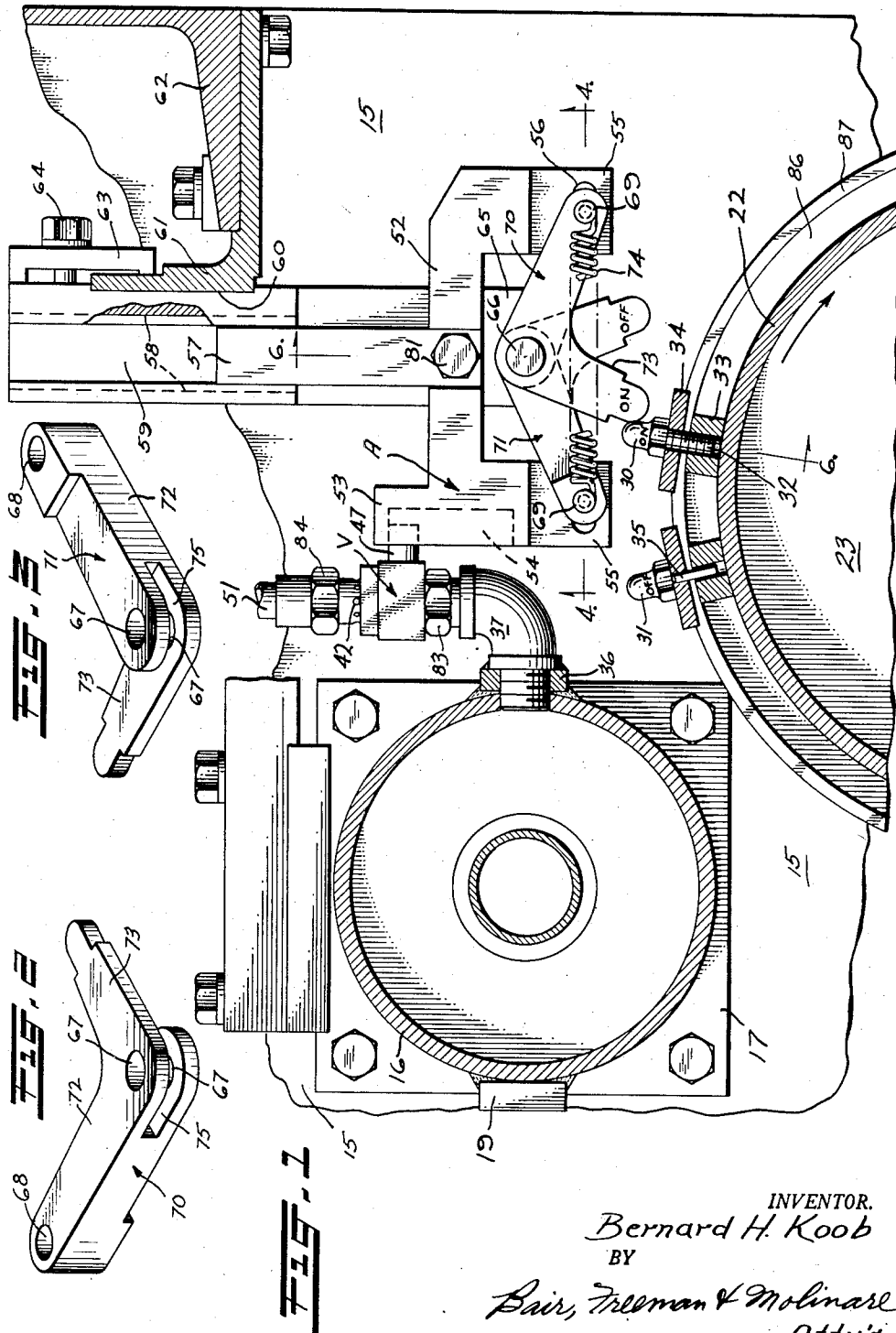
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2,881,803

TIMER FOR CONTAINER MANUFACTURING MACHINES

Filed March 21, 1955

4 Sheets-Sheet 1



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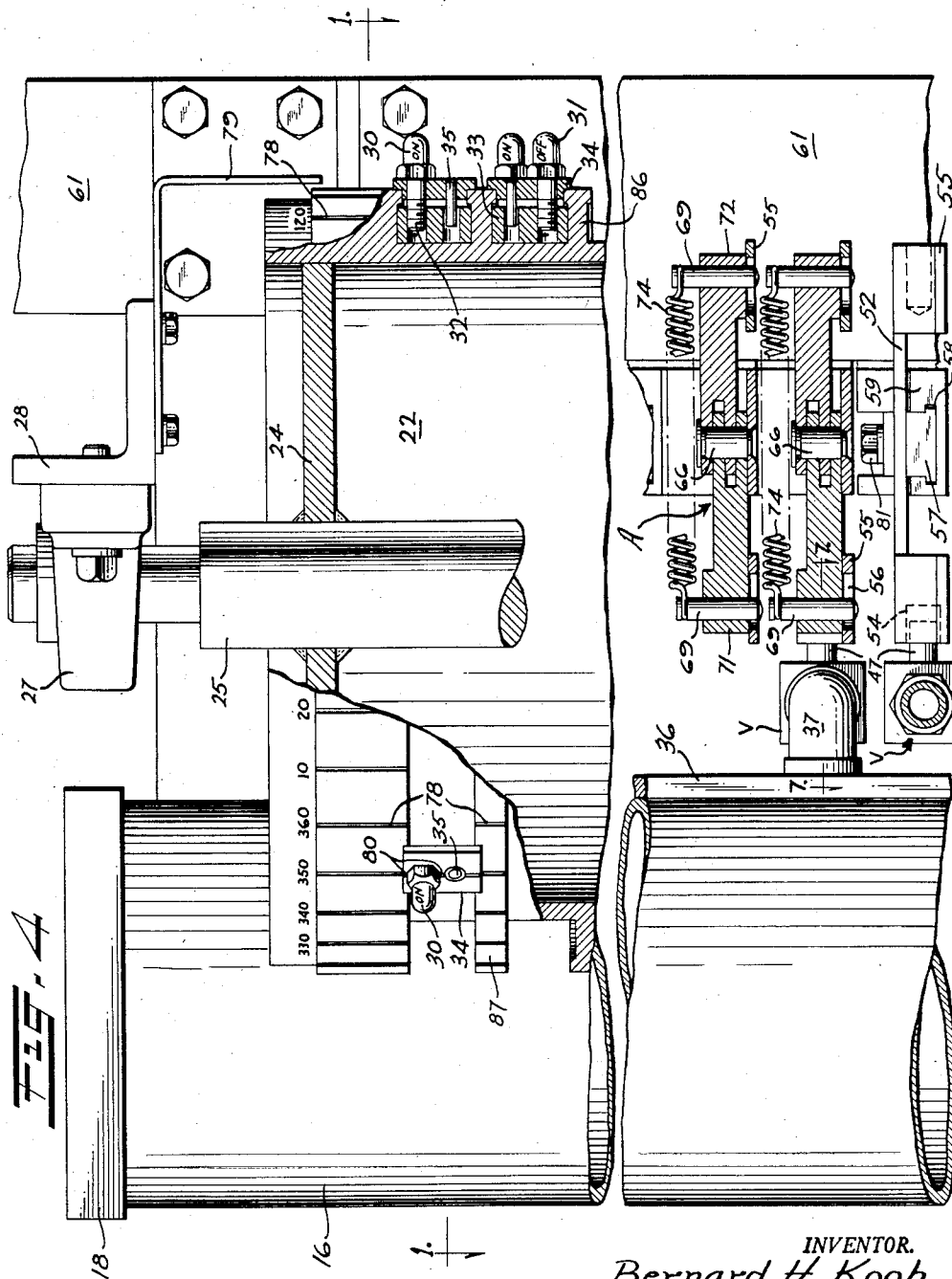
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TIMER FOR CONTAINER MANUFACTURING MACHINES

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4 Sheets-Sheet 2



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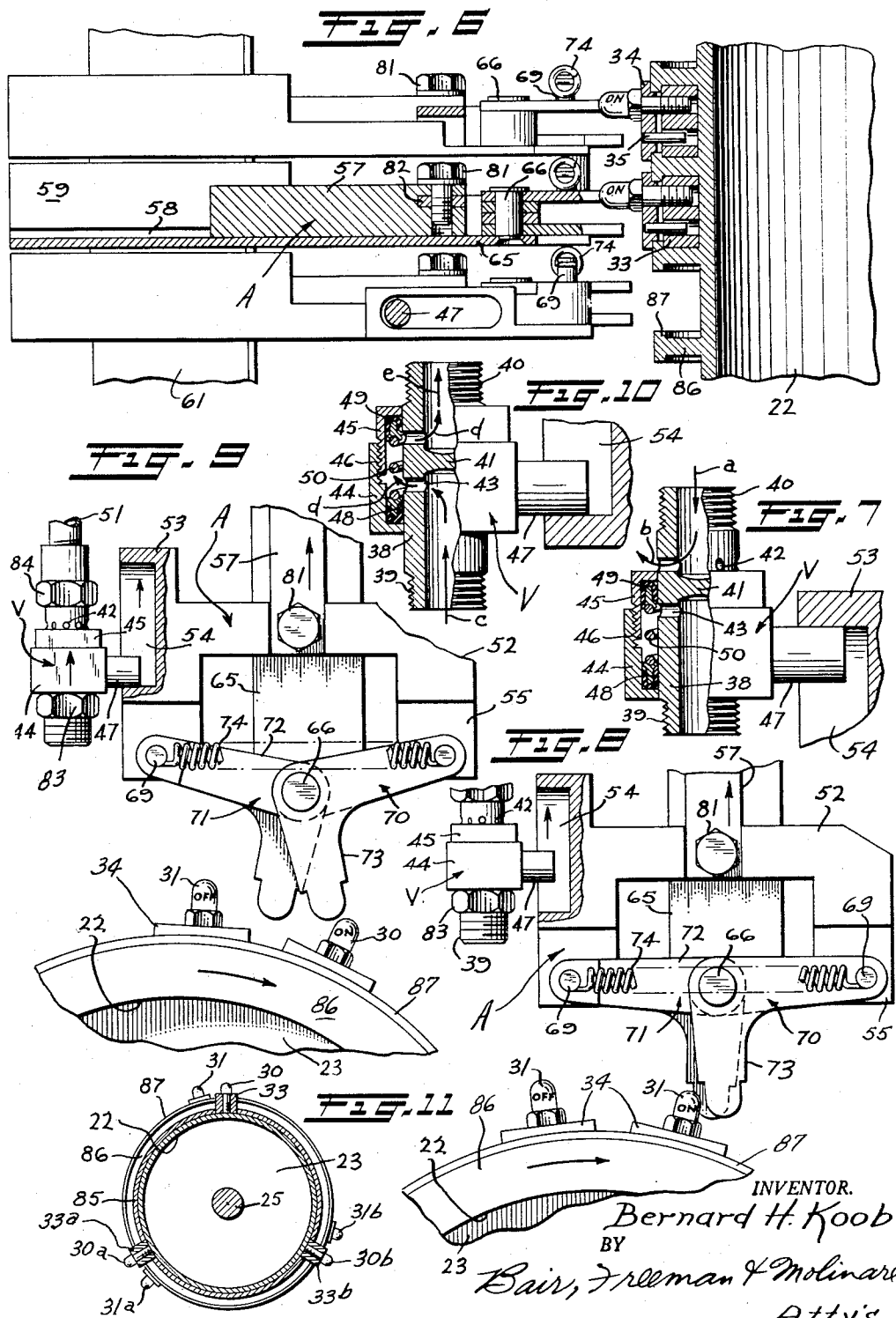
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2,881,803

TIMER FOR CONTAINER MANUFACTURING MACHINES

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6 Claims. (Cl. 137—634)

This invention relates to a timer for pneumatically operated machines such as container manufacturing machines for forming plastic bottles and the like or glassware, etc.

One object of the invention is to provide a timer so designed that the operation of the timing valves thereof is initiated by a timer drum and the valves thereafter operate at a predetermined speed independent of the speed of the timing drum, thereby making the adjustment of the timer a simpler job and more reliable inasmuch as, regardless of the speed of the drum, the valve will operate at substantially the same angular position of the drum instead of sooner when the drum rotates fast, and later when it rotates slower, as in the usual type of timer.

Another object is to provide a timer that includes valve actuators which are moved by the timer drum to predetermined positions whereupon they quickly complete their movement, always at the same speed independent of the drum speed, to either turn the valve on or off, thus correlating the position of actuation of the valve more closely to the angle indicating graduations on the timer drum.

Still another object is to provide an arrangement in which there are dual sets of valve actuating buttons, one to turn the valve on and the other to turn it off, and each one merely moves a valve actuator to a predetermined position slightly over-center so that an over-center or toggle spring may complete the movement of the valve to either the "on" or "off" position quickly, independent of the speed of rotation of the timer drum.

A further object is to provide a valve arrangement which may directly control pneumatically operated instrumentalities of a container manufacturing machine or the like without the timer actuating merely pilot valves which through "spool valves" actuate the mechanisms, thus considerably reducing the parts involved in a complete operating machine.

Still a further object is to provide a valve actuator comprising a slide having a pair of toggle levers for actuating the same, the slide being connected by a lost motion connection to the valve and a timer drum being provided with an "on" button and an "off" button for coacting with the respective toggle levers to slide the slide in one direction upon coaction of the "on" button with one of the levers, and in the other direction upon coaction of the "off" button with the other lever.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my timer for container manufacturing machines, whereby the objects above contemplated are attained, as hereinafter more fully set forth, pointed out in my claims and illustrated in detail on the accompanying drawings, wherein:

Fig. 1 is a plan view of a timer embodying my present invention with portions broken away and other portions shown in horizontal section;

Figs. 2 and 3 are perspective views of bell cranks

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which are used to actuate valves of the timer from "on" and "off" buttons of a timer drum of my timer;

Fig. 4 is a side elevation partly in vertical section through the timer drum and partly in vertical section on the line 4—4 of Fig. 1 showing details of the timer;

Fig. 5 is a continuation of the lower end of Fig. 4;

Fig. 6 is a detailed vertical sectional view on the line 6—6 of Fig. 1;

Fig. 7 is an enlarged horizontal sectional view on the line 7—7 of Fig. 4 showing the details of one of the timer valves, the valve being shown in the "off" position the same as Fig. 1;

Fig. 8 is a view thereof similar to Fig. 1 and on the same scale showing the valve still in the "off" position, but the mechanism for actuating it on the move toward "on" position;

Fig. 9 is a plan view of the valve and the actuating mechanism therefor still on the move toward "on" position;

Fig. 10 is a view similar to Fig. 7 showing the parts in the final "on" position of the valve; and

Fig. 11 is a horizontal sectional view on a reduced scale, showing a modified timing drum construction.

On the accompanying drawings I have used the reference numeral 15, to indicate a suitable base on which my timer is mounted. A manifold 16 in the form of a vertical cylinder extends upwardly therefrom, having a bottom end 17 and a top end 18 welded thereto. A boss 19 is welded on one side of the manifold 16 adjacent the lower end thereof to receive a compressed air inlet pipe 20 and a moisture drain plug 21 (see Fig. 5).

I show a timer drum in the form of a vertical cylinder 22 having a bottom end 23 and a top end 24 welded therein. The ends 23 and 24 are also welded to a vertical drive shaft 25 rotatable in a lower bearing 26 and an upper bearing 27 (see Figs. 5 and 4, respectively). The bearing 27 is mounted on a frame member 28, while the bearing 26 is mounted on the base 15.

Adjacent the lower bearing I provide a drive sprocket 29. Any suitable means such as an electric motor and a variable speed drive (not shown) may be operatively connected to the sprocket 29 by a suitable chain (also not shown) for driving the timer at the various speeds desired to form glassware or the like of various sizes.

Adjustably associated with the drum 22 are a plurality of valve actuating buttons—"on" buttons 30 and "off" buttons 31. These buttons have threaded shanks 32 threaded into inner shoes 33 after passing through perforations of outer shoes 34. The inner and outer shoes 33 and 34 are located between vertically spaced flanges 36 extending outwardly from the drum 22 and terminating in peripheral enlargements 37. The upper and lower edges of the shoes 33 and 34 frictionally engage these enlargements, the shoes 34 being shouldered to fit between the enlargements and thereby align the shoes. Obviously, when the "on" or "off" buttons 30 or 31 are tightened they will retain the shoes frictionally in a desired position and may be changed in position by loosening the buttons and shifting the shoes to the desired angular positions indicated by graduations 78 and a pointer 79. The graduations 78 extend the full length of the timer drum, being located on the outer surfaces of the enlargements 37 and the angular degrees being indicated as shown on the upper left corner of the timer drum in Fig. 4. The shoes 34 are provided with vertical marks 80 to coact with the graduations 78.

A vertical valve boss 36 is welded to the manifold 16 and tapped at vertically spaced intervals for supporting elbows 37. Each elbow supports a valve shown generally at V. Each valve V comprises an inner sleeve 38 as best shown in Fig. 7 provided at its ends with male

threads 39 and 40 to coact with the elbows 37 and with fittings 84 of supply pipes 51. The inner sleeve 38 has a partition 41 and on opposite sides thereof exhaust ports 42 and supply ports 43.

An outer sleeve 44 is slidable on the inner sleeve 38 and includes an end cap 45 connected therewith by means of threads indicated at 46. The outer sleeve 44 has an actuating projection 47 and is packed relative to the inner sleeve 38 by packing rings 48 and 49 held in position by a spring 50.

A valve actuator shown generally at A is provided for each valve V and includes a cross bar 52, a head 53 having an elongated socket 54 therein for the projection 47, and a pair of steps 55. The socket 54 provides a lost motion connection between the actuator and the valve. Slots 56 are provided in the steps 55 for the purpose which will hereinafter appear.

A slide 57 is slidable in guide slots 58 of a mounting bracket 59. The slide 57 as shown in Fig. 6 has a notch 82 therein to receive the cross bar 52 of the valve actuator A and the cross bar is retained therein by a screw 81. The mounting bracket 59 has a groove 60 therein to locate the bracket in respect to a vertical angle 61 which is part of the framework of the timer. The angle 61 is secured to a vertical frame member 62 extending upwardly from the base 15. A holding clip 63 and a clamp screw 64 provide means to hold the mounting bracket 59 at a desired elevation with respect to the angle 61 and permits adjustment of the actuator A vertically to accommodate the valve V and the actuating buttons 30 and 31 therefor in an obvious manner.

The mounting bracket 59 has a plate-like extension 65 carrying a pivot stud 66. An "on" bell crank 70 and an "off" bell crank 71 are pivotally mounted thereon. The bell cranks 70 and 71 are identical except one is turned over relative to the other as shown in Figs. 2 and 3. Each has a long arm 72 and a short arm 73. The bend of the bell crank is provided with a pivot bore 67 and the long end with a pin hole 68. A pin 69 is pressed therein as shown in Fig. 4 and the lower ends of these pins ride in the slots 56 of the steps 55 of the actuators A while their upper ends are connected together by over-center springs 74. The bends of the bell cranks are bifurcated as shown at 75 in Figs. 2 and 3 so as to interfit with each other as shown in Figs. 4 and 6 on the pivot studs 66.

While one valve and one actuator together with its associated actuating mechanism has been described, it is obvious that there is provided a set of all these members for each of the grooves between the flanges 86 of the timer drum 22.

Practical operation

Referring to Fig. 1, the valve V is shown in the "off" position. It is being held in that position by the over-center spring 74 tending to draw the pins 69 toward each other and thereby to pull the actuator A downwardly in this figure inasmuch as the pivot 66 is stationary. The outer sleeve 44 of the valve V is accordingly against the hexagon part 83 of the valve under the bias of the spring and air from the supply pipe is being bled to atmosphere as indicated by the arrows *a* and *b* in Fig. 7. The supply line 51 may extend to a suitable compressed air operated mechanism of a glass making machine or the like so that the valve in the "off" position of Fig. 7 bleeds the air therefrom to atmosphere.

The "on" pin 30 has just engaged the "on" bell crank 70 in Fig. 1 with which it is in vertical alignment (the "off" button 31 being in alignment with the "off" bell crank 71, and the drum 22 rotating clock-wise).

Engagement of the "on" button 30 with the short arm 73 of the "on" bell crank 70 will move the bell cranks to a central position (pins 69 and pivot 60 all in alignment) and slightly after that position as shown in Fig. 8 the spring will have passed over center so as to throw the actuator A the rest of the distance in the "on" direction.

As shown in Fig. 8, the upper limit of the socket 54 has departed from the projection 47 and its lower limit has not reached this projection because of the "lost motion" connection. Since the spring 74 has passed over-center (the axis of the pin 69 being above the axis of the pivot 66 on the drawing) the spring will contract and throw the actuator the rest of the way as to the position shown in Fig. 9. When the lower limit of the socket 54 engages the projection 47, just after the over-center position has been passed, it will start sliding the outer sleeve 44 of the valve V from the position of Fig. 8 and the spring will carry the actuator the rest of the way to the position shown in Fig. 9 and move the outer sleeve 44 away from the hexagon 83 until it stops against the hexagon 84 as in Fig. 10.

Thus, the valve is quickly actuated from one position to the other once it is started toward that position by the spring passing over-center. I am thus assured that the valve will be actuated always at the same angular position of the timing drum independent of the speed of rotation of the drum and this will occur in very narrow limits (the time of movement from the position shown in Fig. 9 to the position shown in Fig. 10 being but a minor percentage of the rotation of the drum). In former timers, where the valve is moved in proportion to the movement of a cam, this was not possible.

After the valve is moved to the "on" position of Fig. 10, the "off" button 31 shown in Fig. 9 engages the short arm 73 of the "off" lever 71 and, since this lever is reversed, relative to the "on" lever, the movement of the actuator A is now downward under the action of this button until the spring passes over-center and then the valve is quickly moved back to the initial "off" position shown in Fig. 1.

As shown in the Bridges Patents Nos. 2,254,992 and 2,307,564 there are many instrumentalities on a glass making machine requiring accurate timing as to their actuation and cessation of actuation with respect to the cycle of operations of the machine represented by one complete rotation of the drum 22. Each of these operations can be set on my timer by the proper angular adjustment of the "on" and "off" buttons 30 and 31, with respect to the drum, and with the aid of the graduations 78 and the pointer 79 in an obvious manner. My type of timer also eliminates the necessity of "spool valves" such as disclosed in the Bridges patents.

As shown in Fig. 11, two or more sets of buttons may be provided for each valve where it is desirable to reduce the speed of rotation of the timer. For instance, in Fig. 11 the rotation would be reduced to one-third or three revolutions per cycle. In that event the "on" buttons 30, 30a, and 30b would be at 120°, 270°, and 360°, and the graduations from 0° to 360° would be all within a 120° sector of the drum. For instance, the "off" buttons 31, 31a, and 31b might be set at the graduation indicated as 5°, and the three buttons are advantageously connected together for simultaneous adjustment by being connected together by a ring 85 to which the inner shoes 33, 33a, and 33b are welded or otherwise suitably connected.

Some changes may be made in the construction and arrangement of my timer for container manufacturing machines and the steps of my method of manufacturing timers can be varied without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims any modified forms of structure, use of mechanical equivalents or use of equivalent method steps which may reasonably be included within their scope.

I claim as my invention:

1. A plurality of valves to be actuated by a timer drum having a pair of timer buttons, an actuator for each valve comprising a movable element having a lost motion connection with the valve, the valve having opposite limits of movement, toggle levers pivoted together at one end and to said movable element, and spring means con-

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necting the other ends of said toggle levers with each other for constraining said movable element to retain said valve at either of said limits, said spring means being of over-center type whereby said movable element may be moved past center and said spring means will thereupon cause said toggle levers to move it the rest of the way, the pair of timer buttons coacting with said toggle levers to move said movable element alternately in opposite directions.

2. A plurality of valves to be actuated by a timer drum, an actuator for each valve comprising a slide having a lost motion connection with the valve, the valve having opposite limits of movement, a pair of toggle levers pivoted together at one of their ends and to said slide, means guiding the other ends of said toggle levers in paths lateral to the direction of movement of said slide, spring means connecting said other ends with each other and thereby constraining said slide to retain said valve at either of said limits, said spring means being of over-center type whereby said toggle levers may be moved past center and said spring means will thereupon move them the rest of the way, and a pair of timer buttons on the timer drum for each valve and coacting with said toggle levers to initiate their movement alternately in opposite directions.

3. A plurality of valves to be actuated by a timer drum, an actuator for each valve comprising a slide having a lost motion connection with the valve, the valve having opposite limits of movement, spring means constraining said slide to retain said valve at either of said limits, a pair of levers pivotally mounted on said slide and having ends extending in opposite directions, said spring means connecting said ends together to pass over center relative to said pivotal mounting, and a pair of timer buttons on the timer drum coacting with said levers alternately to swing them about their pivot mountings in opposite directions and thereby move said slide to over center positions whereupon said spring means moves said slide the remaining distance to its limit of movement as determined by said valve in its opposite positions.

4. A plurality of valves to be actuated by a timer drum, an actuator for each valve comprising a slide, the valve having opposite limits of movement, spring means constraining said slide to either of said limits, a pair of levers pivotally mounted and having ends extending in opposite directions, said spring means connecting said ends together and the pivot for said pair of levers being operatively connected with said slide to move the same, and a pair of timer buttons on the timer drum coacting with each pair of said levers alternately to swing them about their pivot mountings in opposite directions, there-

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by initiating their movement, said spring means completing the movement thereof.

5. A plurality of valves to be actuated by a timer drum, an actuator for each valve comprising a slide having a lost motion connection with the valve, the valve having opposite limits of movement, spring means constraining said slide to retain said valve at either of said limits, a pair of levers pivotally mounted on said slide and having ends extending in opposite directions, said spring means connecting said ends together to pass over center relative to said pivotal mounting, said levers having actuating arms extending laterally therefrom and spaced axially of the timer drum, and a pair of timer buttons on the drum, one coacting with one of said actuating arms and the other coacting with the other actuating arm to alternately swing said levers about their pivot mountings in opposite directions and thereby move said slide to over center positions whereupon said spring means moves said slide the remaining distance to its limit of movement as determined by said valve in its opposite positions.

6. A plurality of valves to be actuated by a timer drum, an actuator for each valve comprising a slide having a lost motion connection with the valve, the valve having opposite limits of movement, spring means constraining said slide to retain said valve at either of said limits, a pair of levers pivotally mounted on said slide and having ends extending in opposite directions, slot and pin connections guiding said ends in paths substantially normal to the direction said slide moves, said spring means connecting said ends together to pass over center relative to said pivotal mounting, and a pair of timer buttons on the timer drum coacting with said levers alternately to swing them about their pivot mountings in opposite directions and thereby move said slide to over center positions whereupon said spring means moves said slide the remaining distance to its limit of movement as determined by said valve in its opposite positions.

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