

[54] **CONTROL DEVICE AND PARTS THEREFOR OR THE LIKE**

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Related U.S. Application Data

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[52] U.S. Cl. **74/3.5, 200/38 E**

[51] Int. Cl. **G05g 21/00**

[58] Field of Search 200/38 A, 38 FA, 200/38 FB, 38 E; 74/3.54, 3.52, 3.5

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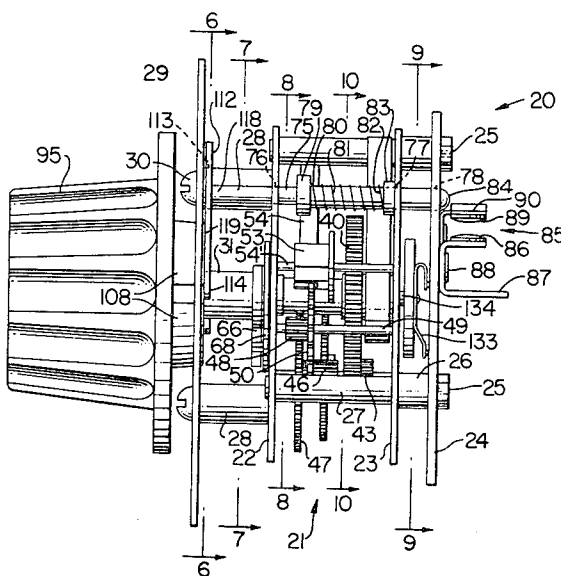
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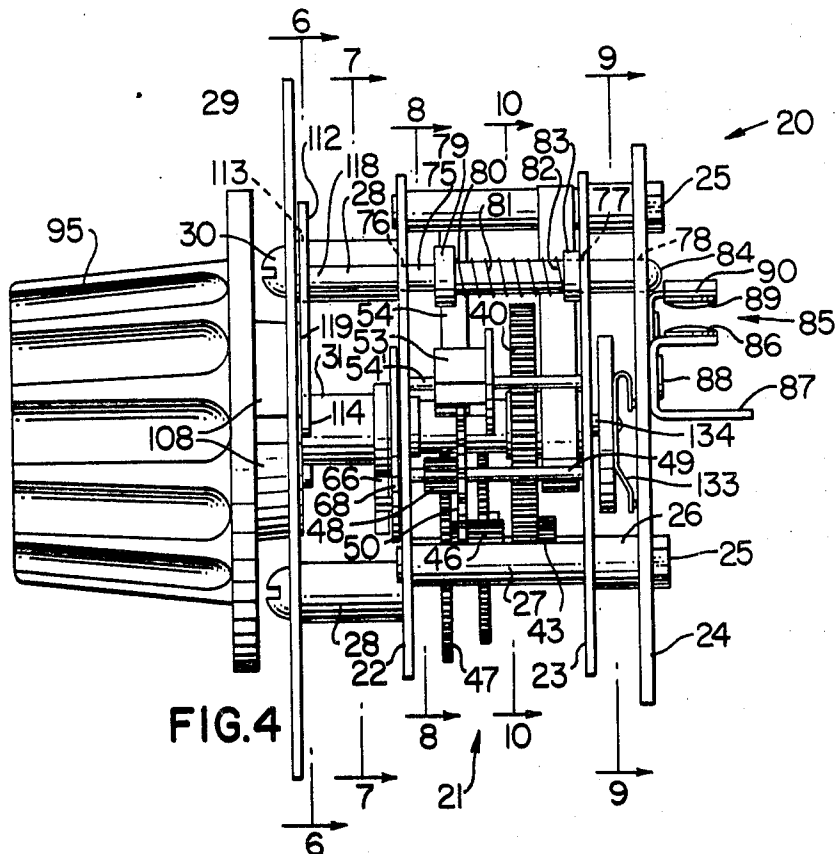
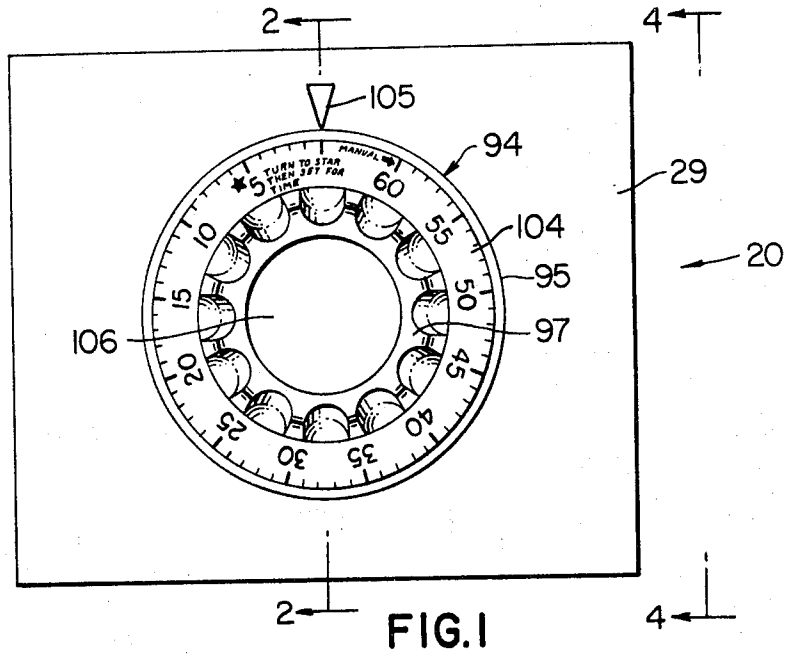
[57] **ABSTRACT**

A control device for actuating an actuator for a predetermined period of time by the turning of a control knob to a selected time period and, thereafter, initiating the running of the time period by depressing a push button member, or for providing a continuous actuation of the actuator by setting the control knob in a continuous on manual position thereof, or for providing momentary manual actuation of the actuator by manually depressing the push button member when the control knob is set in its off position, the control device having a latch member which in one position thereof latches the timer motor from operating and in another position thereof unlatches the timer motor while latching a plunger operator for the actuator in its actuating position in both the time operated condition of the control device and the continuous on condition thereof.

6 Claims, 16 Drawing Figures



SHEET 1 OF 6



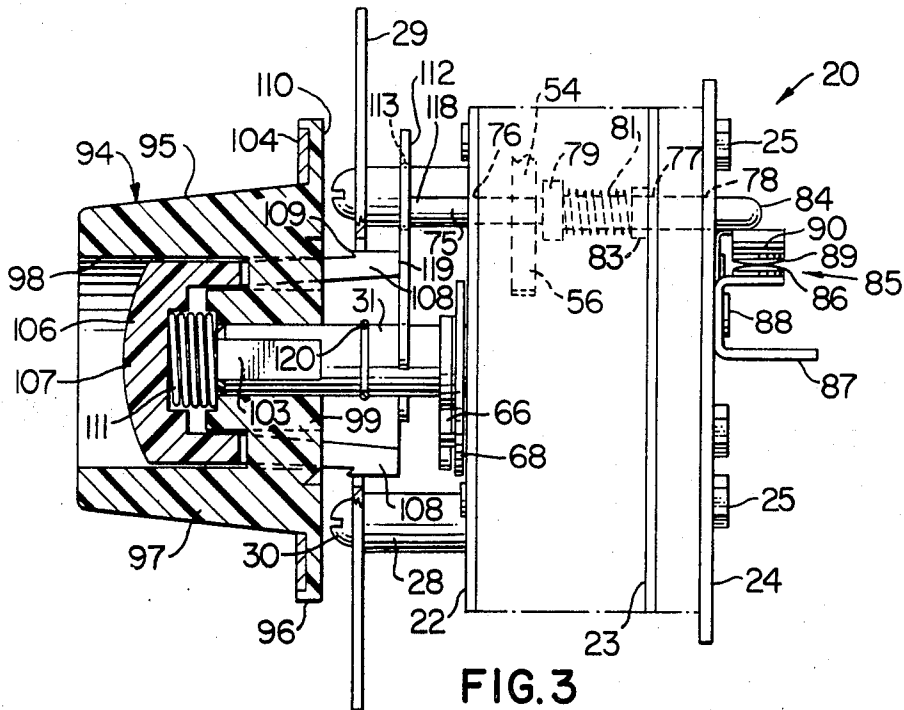


FIG. 3

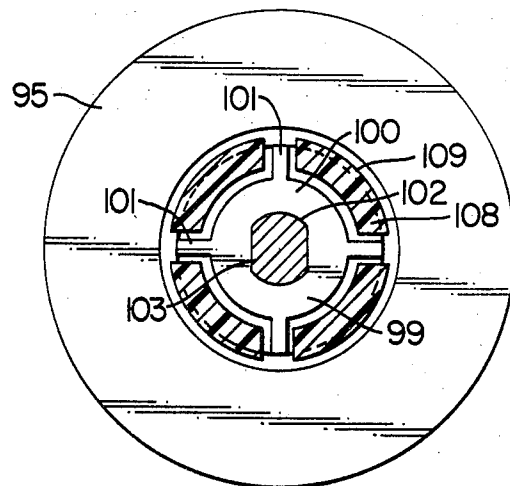


FIG. 5

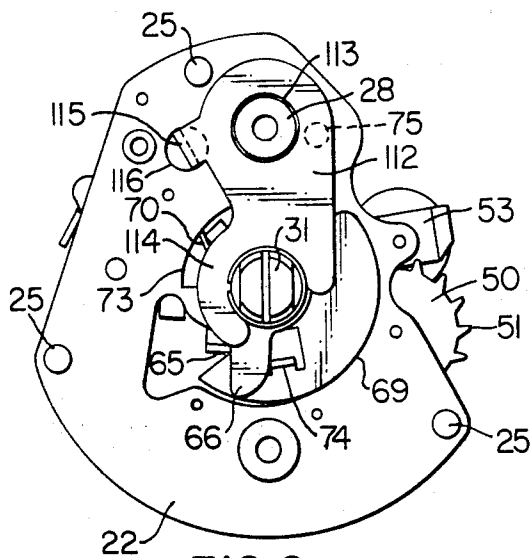


FIG. 6

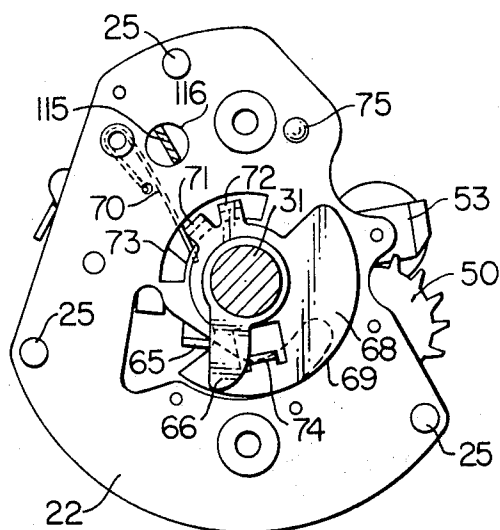


FIG. 7

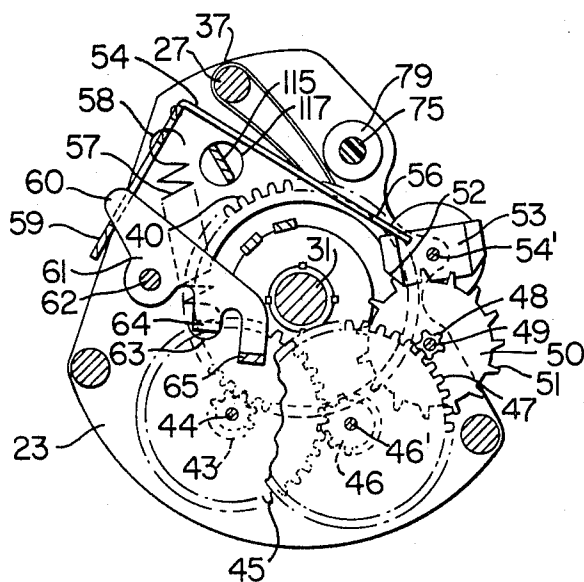


FIG. 8

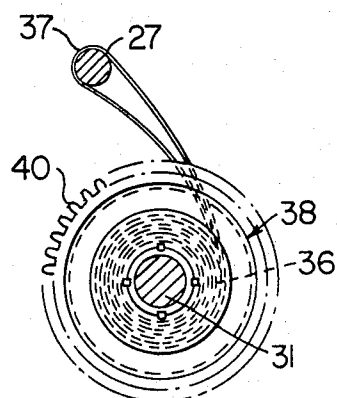
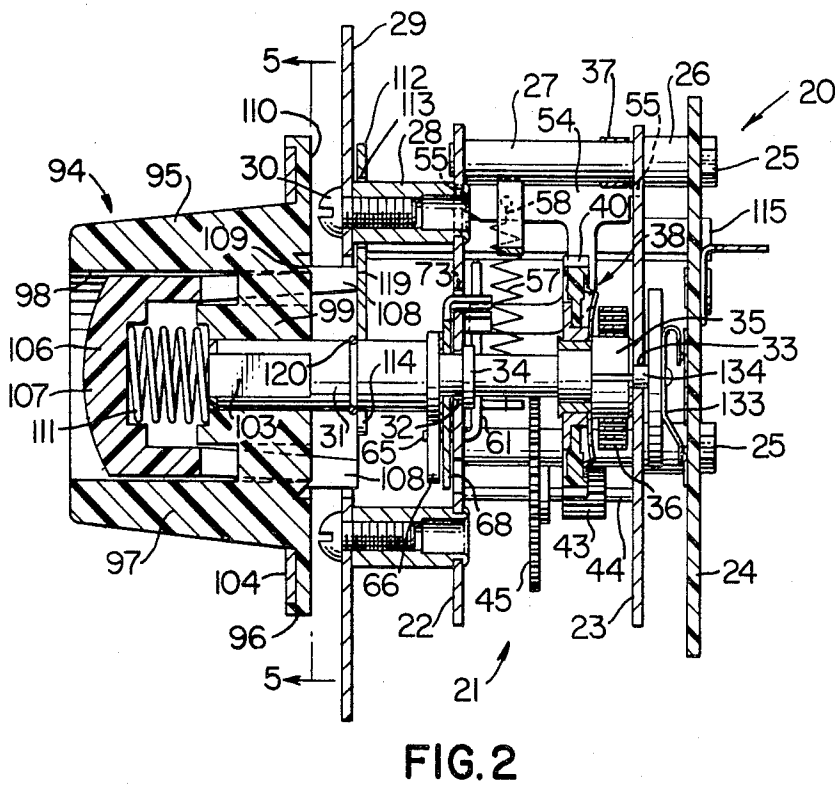
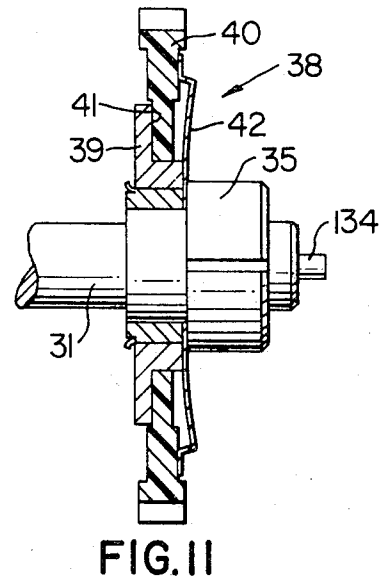
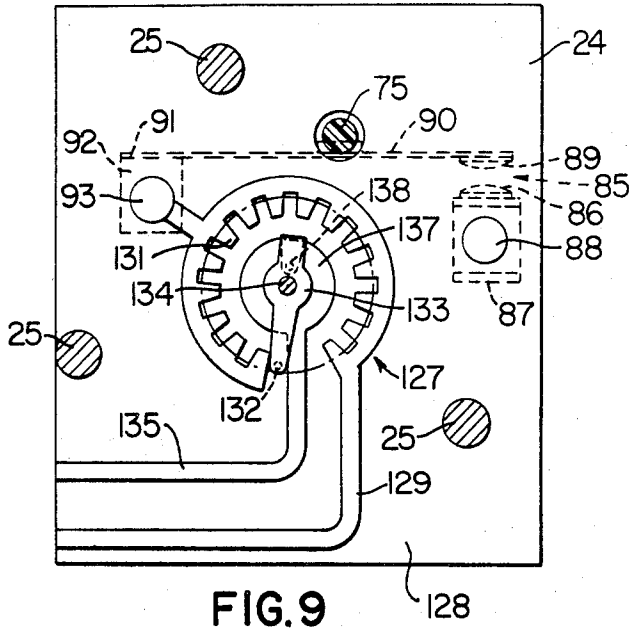


FIG. 10



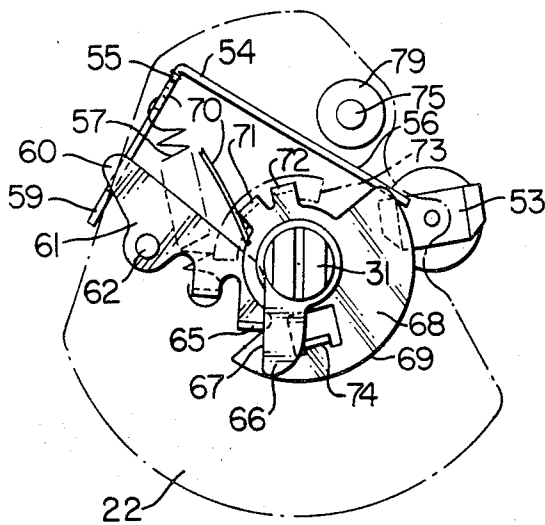


FIG. 12

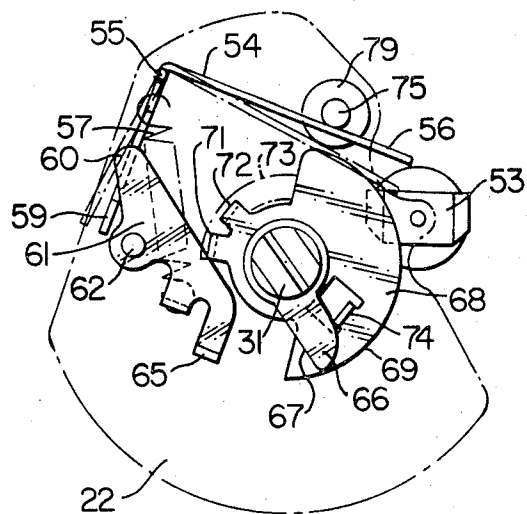


FIG. 14

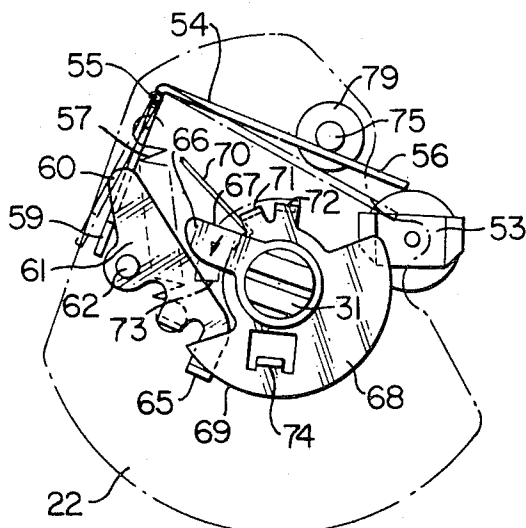


FIG. 13

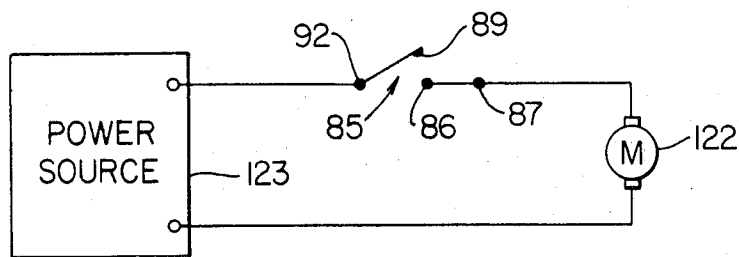


FIG. 15

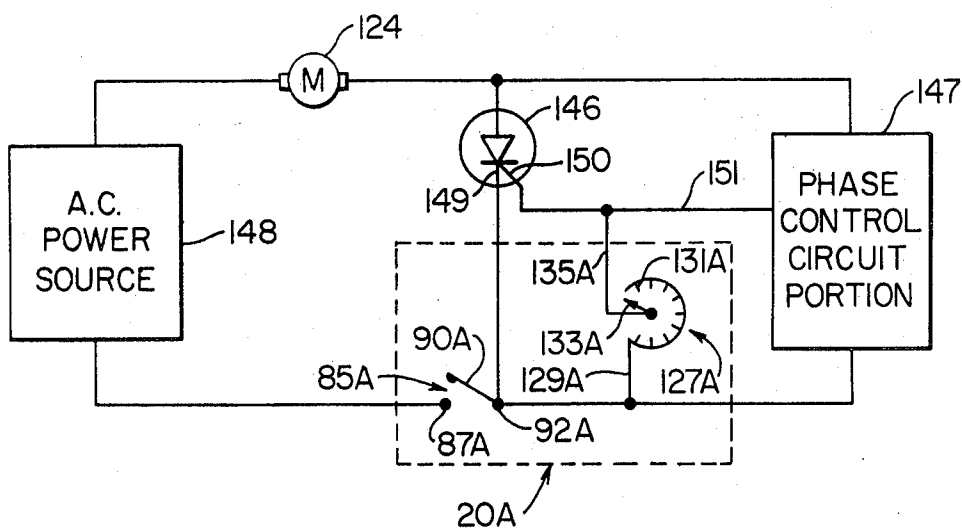


FIG. 16

CONTROL DEVICE AND PARTS THEREFOR OR THE LIKE

This application is a divisional patent application of its copending parent application, Ser. No. 801,559, filed Feb. 24, 1969, now U.S. Pat. No. 3,612,789, and is assigned to the same assignee to whom the parent application is assigned.

This invention relates to an improved control device and to improved parts for such a control device or the like. This invention also relates to an improved control system utilizing such a control device or the like.

It is well known that a timer actuated control device has been provided wherein it is desired to select a predetermined short period of time that the control device is to operate an actuator and that the start of the time period for the timer should take place substantially simultaneous with the initial actuation of the actuator so as to provide an accurate time period of operation of the device being controlled by the control device. For example, such a control device is particularly adapted for controlling a household blender or the like where the actual time period of operation of the blender can be accurately controlled.

Accordingly, it is one feature of this invention to provide an improved control device that will provide the above function and will also permit momentary manual actuation of the actuator thereof in a simple manner so that a person can manually jog or activate the device being controlled thereby.

In particular, one embodiment of this invention provides a control device having a frame means carrying a windup timer mechanism and an electrical switch with the windup mechanism being operatively interconnected to a control knob. A movable plunger is carried by the frame means and will close the electrical switch when moved to one position thereof upon the depressing of a push button member of the control knob construction, the frame means carrying a movable latch member when in one position thereof latches the timer mechanism from operating and permitting movement of the movable plunger. However, when the control knob construction is set in its manual continuous on position or when the push button member is depressed in a time setting of the control knob construction, the latch member is moved from its latching engagement with the timer mechanism and into a position to latch the plunger in its position that closes the electrical switch until the latch member is moved back to its latching position with the timer mechanism when the control knob construction is returned to its "off" position by either manual or timed movement thereof.

Another feature shown in one embodiment of this invention is to provide such a control device with a second switch which opens and closes a circuit in a predetermined pattern during the time period of operation of the control device.

Therefore, it is an object of this invention to provide an improved control device having one or more of the novel features set forth above or hereinafter shown or described.

Another object of this invention is to provide an improved control system having one or more of the novel features set forth above or hereinafter shown or described.

Other objects, uses and advantages of this invention are apparent from a reading of this description which

proceeds with reference to the accompanying drawings forming a part thereof and wherein:

FIG. 1 is a front view of the improved control device of this invention.

FIG. 2 is a cross-sectional view of the control device of FIG. 1 and is taken substantially on line 2—2 of FIG. 1.

FIG. 3 is a view similar to FIG. 2 except that part of the control device is shown in elevation and the control knob construction is in another operating position thereof.

FIG. 4 is a side view of the control device of FIG. 1 and is taken in the direction of lines 4—4 of FIG. 1.

FIG. 5 is a cross-sectional view of the control knob construction and is taken on line 5—5 of FIG. 2.

FIG. 6 is a cross-sectional view of the control device of FIG. 1 and is taken on line 6—6 of FIG. 4.

FIG. 7 is a cross-sectional view of the control device of FIG. 4 and is taken on line 7—7 thereof.

FIG. 8 is a cross-sectional view of the control device of FIG. 4 and is taken on line 8—8 thereof.

FIG. 9 is a cross-sectional view of the control device of FIG. 4 and is taken substantially on line 9—9 thereof.

FIG. 10 is a cross-sectional view taken substantially on line 10—10 of FIG. 4 with background structure removed to illustrate the clutch and timer spring means of the control device of FIG. 1.

FIG. 11 is an enlarged fragmentary, cross-sectional view of the friction clutch means of the control device of FIG. 2.

FIG. 12 is a view similar to FIG. 1 with a plate portion of FIG. 7 being shown in phantom to illustrate the operation of certain parts therebehind.

FIG. 13 is a view similar to FIG. 12 and illustrates the structure in a timer running position thereof.

FIG. 14 is a view similar to FIG. 12 and illustrates the structure in the continuous on condition thereof.

FIG. 15 is a schematic circuit diagram incorporating the control device of FIG. 2 to control the operation of a motor.

FIG. 16 is a schematic circuit diagram of an electronic motor control circuit incorporating the control device of FIG. 2.

While the various features of this invention are hereinafter described and illustrated as being particularly adaptable for controlling the operation of a motor means for a household blender or the like, it is to be understood that the various features of this invention can be utilized singly or in any combination thereof to provide control means for other devices as desired.

Therefore, this invention is not to be limited to only the embodiments illustrated in the drawings, because the drawings are merely utilized to illustrate one of the wide variety of uses of this invention.

Referring now to FIG. 1—4, the improved control device of this invention is generally indicated by the reference numeral 20 and comprises a frame means 21 having a plurality of plates 22, 23 and 24 secured in stacked spaced relation by cooperating fastening means 25 and spacing means 26 and 27 as illustrated, the plate 22 carrying internally threaded spacing means 28 against which a control panel 29 can be fastened by suitable fastening means 30.

A control shaft 31 is rotatably mounted to the frame means 21 through suitable openings 32 and 33 in the plates 22 and 23 as illustrated in FIG. 2 and is held from

axial movement relative thereto by enlargements 34 and 35 respectively abutting against the inside surfaces of the plates 22 and 23. The enlargement 35 of the control shaft 31 is secured to one end of a loosely coiled windup spring 36 in a conventional manner as illustrated in FIGS. 2 and 10, the other end 37 of the windup spring 36 being looped around one of the spacer means 27 as illustrated in FIG. 10.

In this manner, when the control shaft 31 is rotated in a clockwise direction in FIG. 10 in a manner herein-after described, such clockwise rotation of the control shaft 31 stores up energy in the winding of the spring means 36 about the shaft 31 so that the spring 36 tends to drive the shaft 31 back in a counterclockwise direction in FIG. 10 through the energy being stored in the windup operation thereof.

A friction clutch means 38 is carried on the control shaft 31 intermediate the enlargements 34 and 35 thereof and is best illustrated in FIG. 11, the friction clutch 38 comprising a disc-like member 39 fixed to the control shaft 31 in any suitable manner and a plastic pinion gear 40 urged into frictional engagement with the side 41 of the disc-like member 39 by a bowed spring means 42. In this manner, the control shaft 31 can be manually rotated relative to the gear 40 when the gear 40 is locked from rotational movement and the spring means 42 will cause the gear 40 to rotate in unison with the control shaft 31 when the gear 40 is not locked from rotational movement.

In particular, the gear 40 is disposed in meshing relation with a pinion gear 43 rotatably mounted to the frame means 21 by a shaft means 44, the shaft means 44 carrying another gear 45 which is disposed in meshing relation with a pinion gear 46, FIG. 4, carried on suitable shaft means 46' rotatably mounted to the frame means 21 with that shaft means 46' carrying another gear 47 disposed in meshing relation with a pinion gear 48 carried on a shaft means 49 that is rotatably mounted to the frame means 21. The shaft means 49 carries a gear 50 that has angularly disposed teeth 51, FIG. 8, which are adapted to cam against a slanting surface 52 of a ratchet member 53 rotatably mounted to the frame means 21 on a shaft means 54' whereby the gear 50 is free to rotate about the shaft 49 if the ratchet member 53 is not constrained from rocking back and forth on its shaft 54'.

Therefore, it can be seen that if the ratchet member 53 is constrained from ratcheting relative to the gear 50, the gear train from the gear 50 back to the gear 40 is likewise constrained so that the gear 40 cannot be rotated. Thus, even if the timer spring 36 has been wound up by the operator rotating the control shaft 31 in a clockwise direction in FIG. 10 to store up energy in the spring 36, such windup movement of the shaft 31 relative to the locked gear 40 being permitted by the friction clutch 38, the stored energy in the windup spring 36 cannot drive the control shaft 31 back to its unwound condition because the friction clutch 38 is stronger than the windup spring 36 and as long as the gear 40 is constrained from movement by the ratchet member 53, the timer spring 36 cannot drive the control shaft 31 back in a counterclockwise direction in FIG. 10.

A latch member 54 has opposed ears 55 received in suitable openings in the opposed plates 22 and 23 to pivotally mount the latch member 54 thereto, the latch member 54 having one arm 56 adapted to engage

against the ratchet member 53 in the manner illustrated in FIG. 8 to prevent ratcheting movement of the ratchet member 53 and, thus, to latch the gear 40 and shaft 31 from being rotated by the timer spring 36. However, the frame means 21 carries a tension spring 57 having one end 58 interconnected to the latch member 54 to normally tend to pivot the latch member 54 in a counterclockwise direction in FIG. 8 to move the arm 56 out of constraining engagement with the ratchet member 53. The latch member 54 has another arm 59 disposed transversely relative to the arm 56 and is adapted to be engaged by a cam portion 60 of a cam member 61 rotatably mounted to the frame means 21 by shaft means 62 carried by the plate means 22 and 23 whereby when the cam member 61 is disposed in the position illustrated in FIG. 8, the same cams the arm 59 in a manner to hold the latch member 54 in the position illustrated in FIG. 8 in opposition to the force of the tension spring 57 to constrain movement of the latch member 53 and, thus, to lock the gear 40 of the control shaft 31 from rotational movement.

The tension spring 57 has its other end 63 interconnected to a tang 64 of the cam member 61 so as to always tend to rotate the cam member 61 in a counterclockwise direction in FIG. 8 to tend to maintain the latch member 54 in a position to constrain movement of the ratchet member 53. However, the cam member 61 is provided with another tang 65 which is adapted to be engaged by a cam member 66 carried on the control shaft 31 to rotate in unison therewith.

For example, with the control shaft 31 disposed in the off position illustrated in FIG. 12, the cam member 66 has a cam surface 67 disposed in such a position that the tension spring 57 is adapted to maintain the cam member 61 in a position to hold the latch member 54 in its constraining engagement with the ratchet member 53. However, when the control shaft 31 is rotated in a clockwise direction in FIG. 12 to select a predetermined time setting for the control device 20, the cam surface 67 of the cam member 66 acts against the tang 65 of the cam member 61 to rotate the same in a clockwise direction from the position illustrated in FIG. 12 to the position illustrated in FIG. 13 which will permit the latch member 54 to be moved from the dash line position of FIG. 13 to the full line position illustrated in FIG. 13 in a manner hereinafter described and will also permit another cam member 68 which is loosely mounted for rotation on the control shaft 31 to be moved into the position illustrated in FIG. 13 so that a high side 69 of the cam member 68 will bear against the tang 65 of the cam member 61 to hold the same in the position of FIG. 13 so that the latch member 54 can move to the full line position of FIG. 13 in a manner hereinafter described even though the cam member 66 has now been moved by the control shaft 31 further in a clockwise direction beyond the tang 65 of the cam member 61. The cam member 68 is normally urged in a clockwise direction by a hairpin spring 70 carried by the frame means 21 and bearing against a tang 71 of the cam member 68. However, another tang 72 of the cam member 68 projects through a slot 73 in the plate 22 to limit the clockwise movement of the cam member 68 by the spring 70.

The cam member 68 also has another tang 74 against which the cam member 66 engages to move the cam member 68 to the off position illustrated in FIG. 12 and, thus, out of engagement with the tang 65 of the

cam member 61 to permit the cam member 61 to move to the position illustrated in FIG. 3 and 12 and hold the latch member 54 in constrained relation with the ratchet member 53.

Should the control shaft 31 be rotated in a counterclockwise direction from the position illustrated in FIG. 12 to the position illustrated in FIG. 14 for a purpose hereinafter described, the cam member 66 abutting against the tang 74 of the cam member 68 moves the cam member 68 in a counterclockwise direction in opposition to the force of the spring 70 whereby the tang 71 of the cam member 68 bears against the cam member 61 and moves the same in a clockwise direction to permit the latch member 54 to be moved to the full line position of FIG. 14 out of constrained relation with the latch member 53 for a purpose hereinafter described.

As illustrated in FIG. 4, a rod or plunger 75 is carried by the frame means 21 by passing through suitable aligned openings 76, 77 and 78 in the plates 22, 23 and 24, the plunger 75 carrying an enlargement 79 against which one end 80 of a compression spring 81 bears whereas the other end 82 of the compression spring 81 bears against a stationary member 83 of the plate 23. In this manner the compression spring 81 tends to maintain the plunger or rod 75 in the position illustrated in FIG. 4 where a rounded end 84 of the plunger 75 is out of engagement with an actuator 85 carried by the plate 24.

In the embodiment of the control device 20 illustrated in the drawings, the actuator 85 comprises an electrical switch that has a fixed contact 86 carried on a terminal means 87 fastened to the plate 24 by fastening means 88. The switch 85 includes a movable contact 89 carried on a flexible blade 90 that has one end 91 (FIG. 9) fastened to a terminal means 92 secured to the plate 24 by suitable fastening means 93.

The natural bias of the spring blade 90 is to hold the movable contact 89 out of electrical contact with the contact 86. However, when the plunger 75 is moved from the position of FIG. 4 to the position of FIG. 3 in opposition to the force of the compression spring 81 in a manner hereinafter described, the rounded end 84 of the plunger 75 cams against the spring blade 90 to move the spring blade 90 downwardly to place the contact 89 into electrical contact with the contact 86 and hold the same thereagainst as long as the plunger 75 is disposed in the position illustrated in FIG. 3 whereby the switch means 85 will be in the closed position. Subsequent movement of the plunger 75 back to the position illustrated in FIG. 4 permits the spring blade 90 to move upwardly to move the contact 89 out of contact with the contact 86 so as to open the switch construction 85.

Since the spring blade 90 is a current carrying spring blade, the rod 75 is formed from suitable electrically insulating material, such as plastic or the like. However, it is to be understood that the actuator 85 could be itself a plunger operated electrical switch so that the end 84 of the plunger 75 could operate against an on off insulated plunger of an electrical switch unit whereby the plunger 75 could be formed of metal.

A control knob construction, generally indicated by the reference numeral 94, is provided for control device 20 and is of the type disclosed and claimed in a co-pending patent application, Ser. No. 801,648, filed Feb. 24, 1969, now U.S. Pat. No. 3,528,315.

In particular, the control knob construction 94 comprises an outer dial member 95 having a plate-like portion 96 at one end thereof and a knob construction 97 at the other end thereof, the outer dial member 95 having an opening means 98 passing concentrically therethrough and defining a web structure 99 spanning the opening means 98. The web structure 99 as illustrated in FIG. 5 includes a central portion 100 interconnected to the remaining of the outer dial member 95 by a plurality of radially disposed integral fins 101, the central web portion 100 having an opening 102 passing therethrough of a configuration to receive the end 103 of the control shaft 31 in a press-fit relation to spline the shaft 31 and the outer dial member 95 together to rotate in unison. The plate-like portion 96 of the outer dial member 95 carries an annular dial indicator 104 as illustrated in FIG. 1 which indicates the position of the control shaft 31 relative to an indicating mark 105 on the control panel 29.

A push button member 106 is provided for the control knob construction 94 and has a closed end portion 107 provided with a plurality of circumferentially arranged legs 108 that are adapted to respectively pass through the opening 98 of the outer dial member 95 between the fins 101 thereof as illustrated in FIG. 5 and have outwardly directed tongues 109 thereof snap fit radially outwardly beyond the side 110 of the outer dial member 95 as illustrated in FIG. 2 to interconnect the push button member 106 to the outer dial member 95 while still permitting axial movement therebetween between the positions of FIGS. 2 and 3, a compression spring 111 being disposed between the push button member 106 and the outer dial member 95 to tend to hold the push button member 106 in the position illustrated in FIG. 2.

Therefore, it can be seen that the push button member 106 can be axially moved relative to the outer dial member 95 and through the constraining relation of the legs 108 and the fins 101, the push button member 106 rotates in unison with the dial member 95 for a purpose hereinafter described.

As illustrated in FIGS. 2 and 6, a plate-like member 112 has an opening 113 passing therethrough and telescopically receiving a spacer 28 of the frame means 21, the plate-like member 112 having a yoke portion 114 partially surrounding the control shaft 31 to prevent rotational movement of the plate-like member 112 relative to the spacer 28. The plate-like member 112 has an elongated tang 115 that is adapted to project through aligned openings 116 and 117 formed respectively in the plates 22 and 23 of the frame means 21 so as to prevent any pivoting movement of the plate-like member 112 relative to the longitudinal axis of the spacer 28.

As illustrated in FIG. 3 and 4, the plate-like member 112 is adapted to abut against the left-hand end 118 of the plunger 75 as well as to abut against the right-hand ends 119 of the legs 108 of the push button member 106, the control shaft 31 carrying a split ring means 120 to limit relative movement of the plate-like member 112 relative to the control shaft 31 to the left under the force of the compression spring 81 of the plunger 75.

When the push button member 106 is pushed inwardly from the position illustrated in FIG. 2 to the position illustrated in FIG. 3, it can be seen that the plate 112 is moved to the right and carries the plunger 75

therewith in opposition to the force of the compression spring 81 whereby the enlargement 79 on the plunger 75 passes to the right of the arm 56 of the latch member 54 so that when the plunger is in the position of FIG. 3 to actuate the actuator 85, and the latch member 54 is moved to the full line position of either FIG. 13 or FIG. 14, the plunger 75 cannot return to the left under the force of the compression spring 81 even though the push button member 106 is released and moved back to the left by the compression spring 111 because the enlargement 79 of the plunger 75 is now prevented from moving back to the left in FIG. 3 by the latch member 54 for a purpose hereinafter described.

The control device 20 described to this point can be connected to control energization of a load such as an electric motor. FIG. 15 is a schematic circuit showing control 20 connected to control the operation of a motor 122. The electric motor 122 is connected to a power source 123 via the switch 85 provided by the control device 20. Thus, one side of the power source is connected to the terminal 92 of switch 85. The other terminal 87 of switch 85 is connected to one side of motor 122 and the other side of motor 122 is connected to the other side of the power source 123. The operation of motor 122 is thus under the control of switch 85 of control device 20.

The operation of the control device 20 of this invention as described up to this point is as follows:

With the control device 10 of this invention in the off position of FIGS. 1 and 4, it can be seen that the actuator 85 is in its open position thereof so that no electrical current can be passed to the motor 122 of FIG. 15. Also in the off position of the control shaft 31, the cam member 66 of FIG. 12 is in a position to permit the tension spring 57 to hold the cam member 61 in its camming position against the arm 59 of the latch member so that the arm 56 of the latch member 54 is out of engagement with the enlargement 79 of the plunger 75 and is in engagement with the ratchet member 53 to lock the gear 40 and, thus, the shaft 31 in its off position even though there is still some stored energy in the timer spring 36 tending to rotate the control shaft 31 further in a counterclockwise direction.

Should the operator of the control device 20 desire to momentarily and manually actuate the switch 85 to pulse the motor 122, the operator can push inwardly on the push button 106 of the control knob construction 94 while the same is in the off position of FIGS. 1 and 2 whereby such inward movement of the push button member 106 against the force of the compression spring 111 will cause the plate 112 and plunger 75 to move to the right in FIG. 4 in opposition to the force of the compression spring 81 and act on the actuator or switch 85 to close the contact 89 against the contact 86 as long as the operator holds inwardly on the push button 106. Subsequent releasing of the push button member 106 will cause the push button 106 to return to the left in FIG. 2 under the force of the compression spring 111 and the compression spring 81 of the plunger 75 will move the plunger 75 and plate 112 back to the left to the position of FIG. 4 to permit spring blade 90 to move upward carrying the contact 89 away from the contact 86.

Thus, with the control knob construction 94 of this invention disposed in its off position, the actuator 85 can be manually and momentarily actuated by the push

button member 106 to complete the circuit to the motor 122 as shown in FIG. 15.

However, if it is desired to provide a continuous on condition of the motor 122, the operator grasps the knob portion 97 of the outer dial member 95 and rotates the same in a counterclockwise direction from the off position of FIG. 1 until the "manual" portion of the dial face 104 is adjacent the mark 105. As the control shaft 31 is being rotated in this counterclockwise direction of FIG. 1, the cam 66 of FIG. 12 is likewise rotated in a counterclockwise direction and through its engagement with the tang 74 of the cam member 68, the cam member 68 is rotated in a counterclockwise direction in opposition to the force of the spring 70 to cause the tang 71 thereof to engage against the cam member 61 to move the same away from the arm 59 of the latch member 54 whereby the tension spring 57 tends to rotate the latch member 54 in a counterclockwise direction. However, with the control knob set in its "manual" position and before the push button 106 is depressed, the latch member 54 cannot move out of latching engagement with plunger member 75 because the enlargement 79 of the plunger 75 is in the way as illustrated by the dash line position of the latch member 54 in FIG. 14.

After the control knob construction 94 is disposed in its "manual" position, the operator pushes inwardly on the plunger 106 whereby the plate 112 and plunger 75 are moved to the right as illustrated in FIG. 3 and when the enlargement 79 of the plunger 75 clears the arm 56 of the latch member 54, the tension spring 57 moves the latch member 54 in a counterclockwise direction to position the arm 56 thereof in overlapping relation with the enlargement 79 of the plunger 75. In this manner, when the push button 106 is released, the plunger 75 is latched in its righthand position of FIG. 3 by the latch member 54 so that the actuator 85 remains continuously actuated to close contacts 86 and 89 for as long as the control knob construction 94 remains in its "manual" position.

In this manner, the motor 122 connected as shown in FIG. 15 remains continuously on until the operator rotates the control knob 97 back to the off position of FIG. 1 whereby such clockwise movement of the control shaft 31 causes the cam member 66 to move from the position of FIG. 14 back to the position of FIG. 12 whereby the spring 70 causes the cam member 68 to move in a clockwise direction in unison with the cam member 66 so that the tension spring 57 can again cause counterclockwise movement of the cam member 61 to move the latch member 54 out of locking engagement with the enlargement 79 of the plunger 75 as illustrated in FIG. 12. Thus, the compression spring 81 will return the plunger 75 back to the position illustrated in FIG. 4 to permit the spring blade 90 of the actuator 85 to move upwardly carrying contact 89 away from the contact 86 to open the circuit to the motor 122.

When it is desired to provide a timing cycle of operation of the control device 20, the operator rotates the control knob 95 from the off position of FIG. 1 in a clockwise direction until the desired time period of operation on the dial face 104 is adjacent the mark 105 on the control panel 29. As the control knob 97 is being rotated in a clockwise direction to the desired time setting for the control device 20, it can be seen that the cam member 66 is moved in a clockwise direction in FIG. 12 to cam against the tang 65 of the cam member

61 to move the same in a clockwise direction a distance sufficient to permit the following cam member 68 to have its high portion 69 engage against the tang 65 of the cam member 61 to hold the cam member 61 in the position illustrated in FIG. 13 whereby the tension spring 57 tends to move the latch member 54 to the full line position of FIG. 13 while only actually moving the same to the dotted line position of FIG. 13 where the arm 56 is disposed in engagement against the enlargement 79 of the plunger 75. With the arm 56 of the latch member 54 in the dash line position of FIG. 13, the arm 56 still restrains the ratchet member 53 so that the gear 40 is locked to prevent rotation of the shaft 31 by the wound up timer spring 36.

With the control knob 97 now disposed in the desired time setting thereof, the operator pushes inwardly on the push button 106 so that the plate 112 and plunger 75 move to the right as illustrated in FIG. 3 whereby when the enlargement 79 of the plunger 75 clears the arm 56 of the latch member 54, the tension spring 57 moves the latch member 54 to the full line position of FIG. 13 to prevent the compression spring 81 from returning the plunger 75 when the push button 106 is released. With the plunger 75 now to the right as illustrated in FIG. 3, the actuator 85 is now actuated closing contacts 86 and 87 and the timer spring 36 begins to rotate the shaft 31 since the gear 40 is no longer locked from rotation by the latch member 54. With the contacts 86 and 89 closed, the motor 122 is energized and the timer spring 36 now substantially simultaneously begins to drive the control shaft 31 from the set time position thereof in a counterclockwise direction back to the off position of FIG. 1.

As the control shaft 31 is being driven back to the off position of FIG. 1 by the timer spring 36, the cam member 66 carried by the shaft 31 will engage against the tang 74 of the cam member 68 and cause the same to move in unison therewith in opposition to the force of the spring 70 so that when the cam member 66 clears the tang 65 of the cam member 61, the tension spring 57 will again cause the cam member 61 to move to the position illustrated in FIG. 12 and, thus, move the latch member 54 to the position illustrated in FIG. 12 whereby the arm 56 moves away from locking engagement with the enlargement 79 of the plunger 75 to permit the same to move back to the position of FIG. 4 to permit the contacts 86 and 89 of the actuator 85 to open with the latch member 54 simultaneously constraining movement of the ratchet member 53 to terminate the rotation of the control shaft 31 by the timer spring 36. At this position of the control shaft 31, the control knob construction 94 is in the off position illustrated in FIG. 1.

As shown in FIGS. 2 and 9, the control device can have the plate 24 formed from material used for making printed circuits with a printed circuit means 127 on side 128 thereof which comprises a first line 129 arranged in a somewhat circular path with a portion connected to the terminal 92 that carries the spring blade 90 and movable contact 89. The line 129 is printed in such a manner that the same has radially inwardly directed spaced portions 131 adapted to be sequentially contacted by a wiper contact 132 on a spring blade 133 fastened to the end projection 134 of the control shaft 31. The printed circuit 127 includes a second line 135 having an inner circular portion 137 adapted to be con-

tacted by a wiper contact 138 on the other end of the spring blade 133.

In this manner, when the switch means 85 is closed after the control device has been set for a timed operation as heretofore described, it can be seen that the wiper blade 133 connects line 129 and 135 as the contact 132 comes into engagement with the projections 131 on the line 129 to provide an on and off switching action as the wiper blade 133 is being driven by the control shaft 31 during the timed operation of the control device 20.

FIG. 16 shows a typical electronic circuit for controlling the speed of operation of a motor modified to include the embodiment of control device 20 which has the printed circuit 127 and wiper blade 133 arrangement. The control device 20 is incorporated to periodically short out the gating signal of an SCR. The combination permits periodic energization of a motor during a timed period, manual momentary operation of the motor as well as operation for an indefinite untimed period. This combination is particularly suitable for controlling the operation of a food blender motor since the on-off action allows the ingredients being blended to be alternately mixed and settled during the selected timed operation of control 20.

The connection of the control device 20 in the circuit is readily identified since the connections and parts of control device 20 are referenced using the same reference numerals as were used when describing the control device 20 with the reference letter "A" following the reference numeral.

The electric motor 124 has one side connected to the anode 145 of a silicon controlled rectifier (SCR) 146 and to one side of a phase control circuit portion 147. The other side of the motor 124 is connected to one side of an alternating current power supply 148. The cathode 149 of SCR 146 is connected to terminal 92A of the control device 20A. The terminal 92A of switch 85A is also connected to the other side of the phase control circuit portion 147 and to the line 129A of the control device 20A. The blade 90A of switch 85A completes the circuit to the other side of the power source 148 via the connection made to connector 87A. The phase control circuit portion 147, which can take on many forms, supplies a gating signal to gate 150 of SCR 146 via the line 151. Line 151 also connects with line 135A of the control device 20A. The line 135A which connects with the wiper blade 133A is connected to line 151. Thus, as wiper blade 133A is rotated during a timed period it contacts the portions 131A of line 129A to short the gate 150 to the cathode 149 of the SCR 146.

FIG. 9 shows the position of wiper 133 when the control device 20 is in the off position. The corresponding position of the control knob 97 is shown in FIG. 1. As per the prior description given for the operation of control device 20, switch 85 can then be momentarily actuated to the closed position by pushing inwardly on the push button 106 of the control knob construction 94. Referring to FIG. 16, the wiper 133A is then out of contact with the portions 131A of line 129A so SCR 146 is under the control of the phase control circuit portion 147 causing the motor 127 to be energized each time the plunger 106 is pushed inwardly.

Similarly, when the knob control 97 is rotated counterclockwise to the "manual" position shown on the dial portion 104 in FIG. 1, the wiper 133 is moved

counterclockwise short of engagement with the initial portion 131 of line 129. This being the case, operation of the push button portion 106 inwardly causes the switch 85 to close until the control knob 97 is moved clockwise to the off position per FIG. 1. Referring to the circuit per FIG. 16, the circuit between the gate 151 of SCR 146 via wiper 133A to connection 92A is then open so the SCR 146 is under the control of the phase control circuit 147 when switch 85A is closed due to movement of the push button 106 inwardly following movement of the control knob 97 to the "manual" position indicated on the dial portion 104.

The wiper 133 and the printed circuit portion 127 comes into play when a timed period of operation is selected by movement of the control knob 97 clockwise for a desired period of operation. As has been explained earlier the timed period is then initiated by moving the push button 106 inwardly, causing the switch 85 to close. Referring to FIG. 9, movement of the control knob 97 clockwise causes the wiper 133 to be turned clockwise. Upon initiation of the timed period by actuation of the push button 106 the wiper 133 is carried counterclockwise by the end projection 134 of the control shaft 31, causing the wiper to periodically contact one of the portions 131 of the line 129 until timed period is terminated bringing the wiper 133 to the position shown in FIG. 9. Referring to FIG. 16 is can be seen that the wiper 133A when in contact with a portion 131A causes the gate signal on line 151 to be shorted to cathode 149 of the SCR 146 so the SCR 146 will not conduct while the wiper 133A is in contact with a portion 131A. The SCR 146 will, of course, conduct to energize the motor 124 each time the wiper 133A is between the portions 131A. Thus, during a timed period the motor 124 will be periodically energized in accordance with the spacings between the portions 131A.

It should be noted that the connection of the control device 20A functions to control only the gating current to provide an arrangement where the printed circuit 127A and wiper 133A need only be capable of carrying a small current level. The large current level demanded by the motor 124 is handled by the SCR 146 and the switch 85A. With this preferred arrangement the frictional forces involved as the wiper 133A is moved over the portions 131A can be made very small, thus minimizing the load placed on the driver mechanism of the control device 20.

Therefore, it can be seen that this invention not only provides an improved control device having many novel and unobvious features, but also this invention provides an improved control system and the like.

What is claimed is:

1. A control device comprising frame means, an actuator carried by said frame means, a movable plunger carried by said frame means to operatively engage and actuate said actuator when said plunger is moved from a first position thereof to a second position thereof, timer means carried by said frame means, latch means including a movable latch member carried by said frame means, said latch member when in one position thereof operatively latching said timer means from operation thereof and when in another position thereof operatively unlatching said timer means and being adapted to latch said plunger in said second position thereof, and control means carried by said frame means, said control means having a first means for setting said timer at a preselected time period and having a second means for moving said plunger from said first position to said second position thereof.

2. A control device as set forth in claim 1 wherein said plunger prevents said latch member from unlatching from said timer means when said plunger is in said first position thereof.

3. A control device as set forth in claim 1 wherein said second means of said control means can move said plunger from said first position thereof to said control position thereof independently of the position of said first means of said control means.

4. A control device as set forth in claim 1 wherein said first means includes a control shaft carried by said frame means and operatively interconnected to said first means of said control means and to said timer means.

5. A control device as set forth in claim 4 wherein said control shaft has actuator means for controlling movement of said latch member from said latching position for said timer means to said unlatching position for said timer means.

6. A control device as set forth in claim 5 wherein said control shaft must first move to at least one particular position thereof before said actuator means of said control shaft will permit said latch member to move to said other position thereof for latching said plunger in said second position thereof.

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