

Dec. 26, 1961

H. T. SIMMONS
PUSH BUTTON TIMER

3,015,003

Filed March 27, 1959

3 Sheets-Sheet 1

FIG. 1

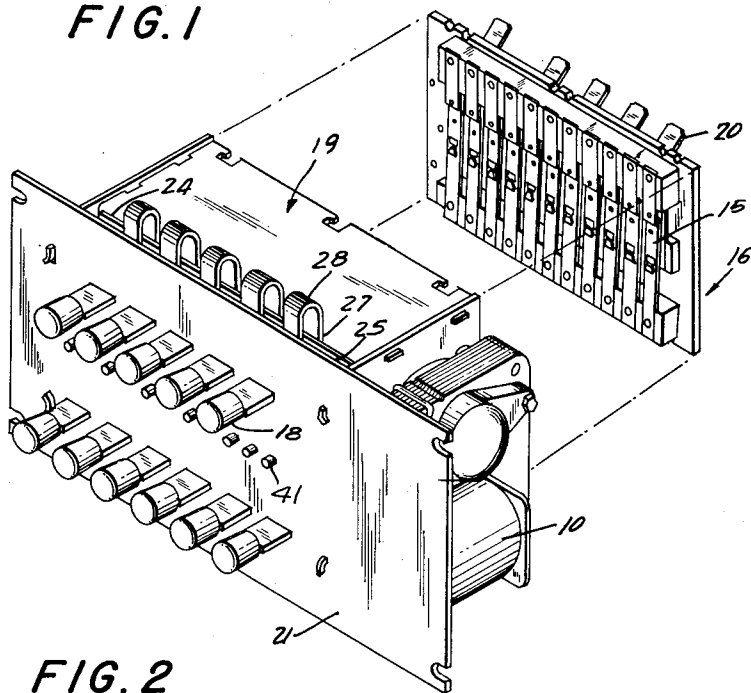
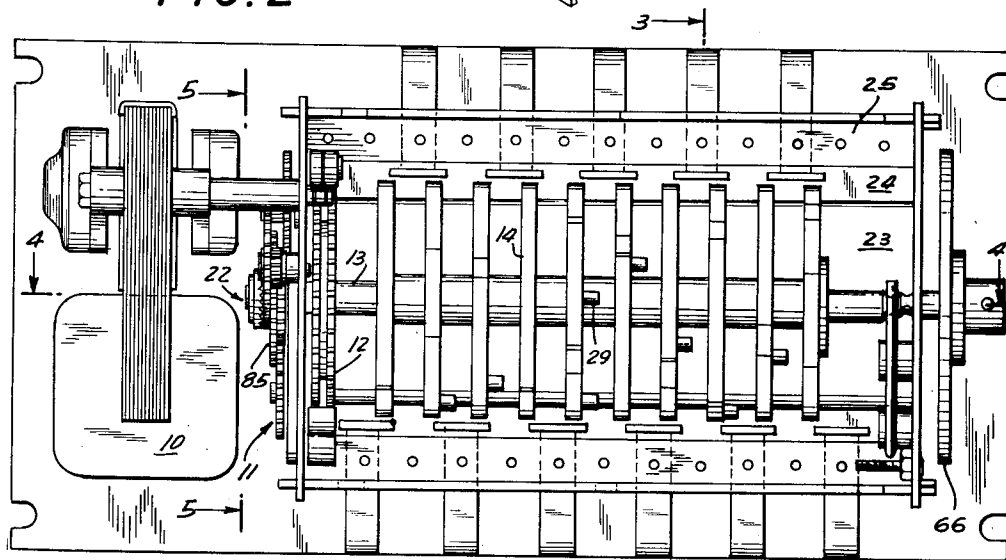


FIG. 2



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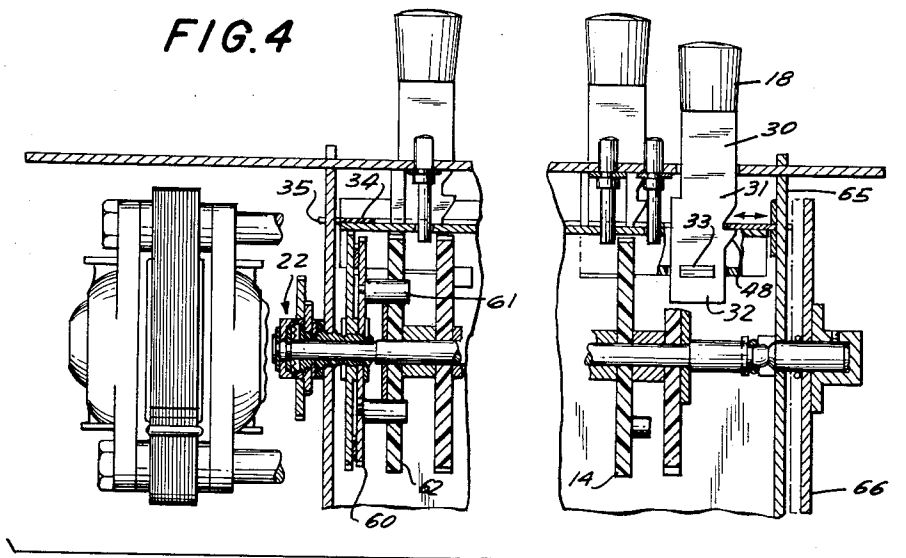
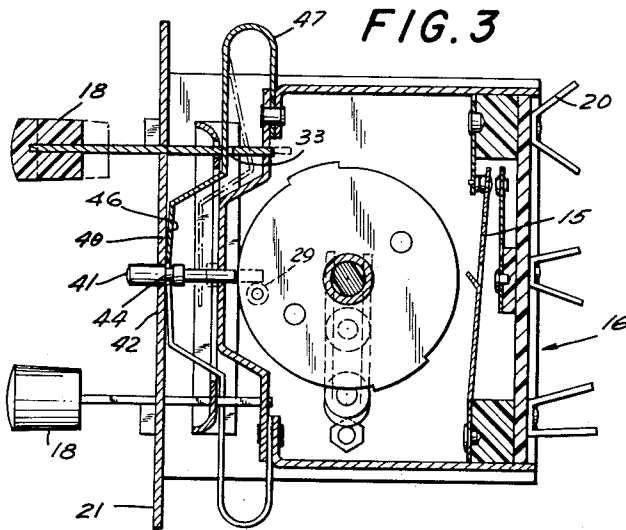
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3 Sheets-Sheet 2



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FIG. 5

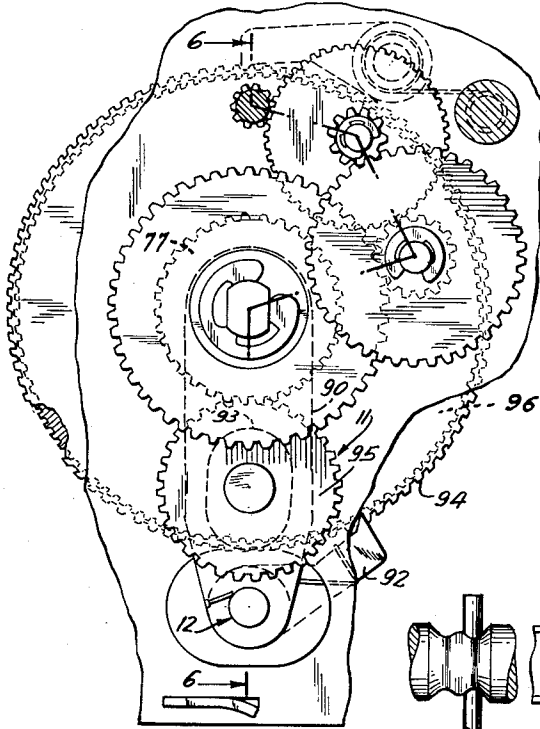


FIG. 6

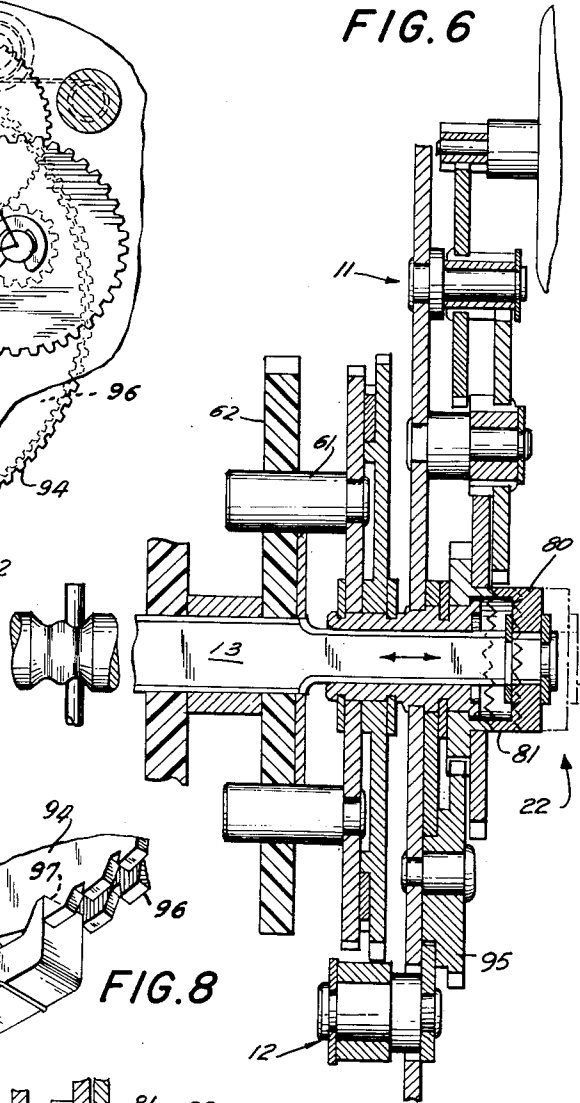


FIG. 7

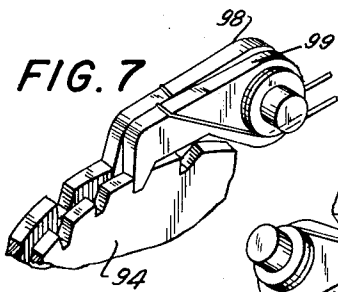


FIG. 8

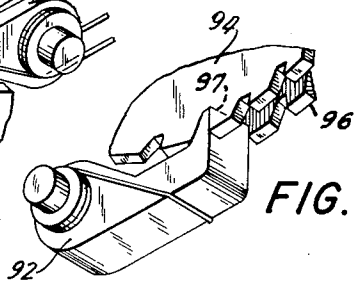
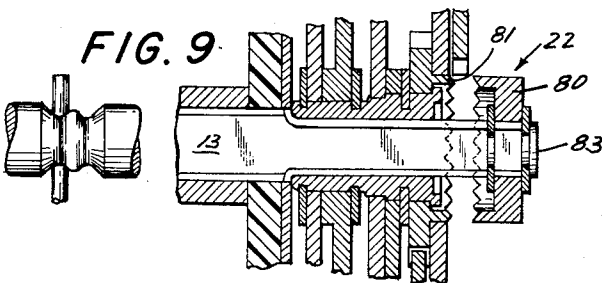


FIG. 9



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3,015,003

PUSH BUTTON TIMER

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19 Claims. (Cl. 200—38)

This invention relates to timer or program selector switches and has particular reference to such switches including means and methods for controlling the time sequence of operations embodied in devices such as domestic washing machines and other similar appliances. In the case of automatic washing machines, for example, it is possible to soak clothes, wash with soap and then to finally spin-dry the same in accordance with a definite program set forth in the construction of the switch. However, in many cases it is desirable to be able to adjust the length of time of the wash cycle, for example, so that the duration of said cycle may be variably adapted to correspond to the type of material and the character of the apparel under treatment. Moreover, in such a system it is desirable to pre-select a particular point in the cycle of operation so that the time for beginning the operation may be varied in accordance with the nature of the fabric being treated.

In such pre-selection it is important that the point of initiation of the timing cycle be obtained quickly by advancing the switch through the unused portion of the cycle. By selecting the proper time cycle by means of a push button, the present switch rotationally advances the cam shaft rapidly while electrically inactivating the circuits in the sequential program. At the selected initiating point, the switch, through the use of a clutching mechanism is placed into a slower speed and is coincidentally allowed to make the circuits in the sequential program electrically operative. Thus, by pressing the desired button, the shaft is speeded to the desired initiating point, whereupon the cams are rotated at a slower timing speed.

The present invention, therefore, is directed toward providing an automatically selecting, variable cycle, push button timer switch. In the present switch, depression of any of the buttons acts to quickly advance the mechanism to a desired starting point dependent upon the fabric undergoing treatment. This automatic selection of the initiating point in the timing cycle, by depressing a button, is accomplished by moving a key latch bar longitudinally. This lateral movement of the bar activates a clutching mechanism and opens a line switch so that the electrical circuits governing the operation of the washing machine components such as the motor and solenoids do not operate. However, the cam followers or contact engaging springs still engage their associated timing cams and are immediately operable when the line switch is closed by the disengagement of the clutch to initiate the timing cycle as pre-selected by the depressed push button. Thus, the operator automatically and positively selects the operation of any desired cycle for operating the electrical circuit connected thereto.

It is, therefore, an object of the present invention to provide an improved automatic, push-button operated program selector switch, for selectively controlling the sequential operation of associated electrical circuits.

Another object of the present invention is to provide push-button means in an automatic sequence timer switch for predeterminedly selecting the initiating point of a timing cycle.

Another object of the present invention is to provide in an improved push button timer switch, means for selectively determining the operating portion of one of the cycles incorporated in a sequential program.

Still another object of the present invention is to provide

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an automatic cam type, sequential timer switch for use in program controllable apparatus, and, wherein a cycle of said program has alterable time characteristics selectively determined by means of push buttons in accordance with the varying needs of the fabrics, etc. placed in the controlled apparatus.

Another object of the present invention is to provide in an automatic, push-button timer device, including a plurality of electrical circuits, means for activating said circuits by cams, the period of activation of said electrical circuits being selected by push buttons, and being variable in time, said periods being positively determinable and indexable.

Another object of the present invention is to provide clutch means in a push button timer switch for de-activating electrical control circuits using a plurality of cams contactors, the position of said cams during electrical inactivation being rapidly forwarded to an initiating point for activation of said circuits during a slower subsequent rotation of said cams.

Still another object of the present invention is to provide a push button switch directing the variable actuation period of a plurality of electrical circuits by determining a selected rotational position for a series of cams to close electrical contacts by means of cam followers related thereto, the advancement of said cams toward such a position being speeded up during the electrical deactivation of said circuits with said cam followers riding on said cam therewith.

Another object of the present invention is to provide an electrical circuit timing mechanism for operating associated apparatus according to a sequential time program and wherein a rotating cam is angularly adjustable in accordance with a selected position determined by a push button mechanism; said mechanism causing the rapid rotation of said cam to said selected position while electrically inactivating the cam switches connected thereto, and upon arriving at said predetermined rotational position of said cam, the speed of rotation of said cam is changed to that timing frequency usual for electrically activating said switches.

Another object of the present invention and the nature thereof will become apparent from the following description considered in connection with the accompanying figures of the drawing, and wherein like reference characters describe elements of similar function therein and wherein the scope of the invention is determined rather from the dependent claims.

In the drawings:

FIG. 1 is a pictorial view of an embodiment of the present, variable, push-button switch, with the contact and terminal panel board spaced therefrom;

FIG. 2 is a rear elevational view of the subject invention, with the terminal board absent, said view adapted to show the constructional and cooperative arrangement of the individual elements of the push-button sequence timer switch as governed by the shaft driven cams thereof;

FIG. 3 is a view in section taken along line 3—3 of FIG. 2 particularly directed toward showing a push button selector element as defining the rotational position of the timing cams;

FIG. 4 is a longitudinal section, taken along line 4—4 of FIG. 2, showing portions broken away of the motor, shafts, clutch, cams buttons and pins of the present invention;

FIG. 5 is a view taken along line 5—5 of FIG. 2 useful in depicting the incremental advancement mechanism driving the timer cams of the invention;

FIG. 6 is a view taken along line 6—6 of FIG. 5 showing the advancement and clutching mechanism providing variable speed rotation of the cam carrying shaft of the instant switch;

FIGS. 7 and 8 are amplified sectional views of the pawls and gear elements included in the advancement mechanism used in the present invention; and

FIG. 9 is an amplified view of the clutch used in obtaining variable speed for the cam carrying shaft of the present invention.

Generally speaking, the present invention describes a push-button sequential timer switch in which each button determines the initiating point in a variable washing operation. The switch includes timing means incorporating a motor, a pawl and gear mechanism and shaft means for intermittently, rotatably advancing a series of cams mounted on the shaft. The cams control a group of spring contact arms for closing the contacts connected to electrical circuits governing the washing operations. The duration of washing operation depends upon the angular position at which a cam surface is designed to move a contact spring arm to close electrical circuits.

In the present switch, the depression of a push button selects in advance an initiating position for beginning a determined portion of one of said washing operations. A stopping pin is moved by the selector push button into the path of a cam having a cooperating stop 29, to set up this initiating point. A variable speed effecting clutch having a plurality of interlocking members is arranged to advance the shaft at a comparatively rapid speed to the desired initiating point. The members of the clutch are interlocked by the depression of any of the selector buttons. When the stop member on the cam meets the depressed pin, the cam is held against rotation until the clutch members are disengaged by the action of the shaft still being turned by the motor. The separation of the clutch members allows the cams to move free of its push button depressed pin, and to be activated through an escapement at a much slower speed.

Referring now to the figures of the drawings and more specifically to FIGS. 1 and 2, the time switch mechanism illustrated comprises an electric motor 10, a gear train 11 driven thereby, a reciprocating pawl and double ratchet escapement 12 and a shaft 13 carrying a series of fixed cams such as 14 adapted to rotate therewith. A series of cam following contact arms such as 15 are mounted on a terminal panel board 16 comprising part of the switch housing 19 and engage the cams so as to be controlled thereby. The contact arms are connected to the electrical terminals 20 the circuits directing the sequential operations. A push button control panel 21 having a series of buttons 18 for initiating the sequential operations and automatically selecting the position of the cycle desired, is placed on the front of the casing parallel to the axis of the shaft driven by a suitable motor, here a $\frac{1}{175}$ H.P. motor. A clutching mechanism 22 for obtaining dual speeds i.e. a rapid search speed and a slower driving speed is an essential feature, hereof. Beneath the push button board 21 is a canopy or cover 23 having a step-like configuration including a top face and two extensions 24 integrally formed thereto. Each side wall of the housing has an adjacent abutting ledge 25 to which the flat extension 24 of the canopy may be joined. However, it is to be noted that the flat edge of the canopy has portions slightly raised, corresponding to the number of the push buttons present. Between the extensions of the canopy and the ledges of the side walls there is thus an opening having a thickness sufficient to allow a portion 27 of a flat spring 28 to pass therethrough. Each push button (FIG. 4) has a head portion 30, a cut-out hook portion 31 offset from the head, and a leg portion 32 having a slot 33 formed therein. A latching frame 34 having a pair of parallel latching bars slides above the canopy and is adapted to slide in and out of apertures formed in the end walls of the casing. Control of the side-wise extension is maintained by a pair of runners 35 integrally formed to each side of the latching frame. The runners then move laterally through the apertures to allow the sidewise movement of frame.

Each push button operates upon a sinuated, unitarily

formed flat holding spring 28 so as to place a stopping pin 41 in the path of a desired cam. This spring, as shown on FIG. 3, has a finger portion which is connected to each holding pin associated with a push button. The finger portion of the spring is held within a slot 44 formed in the pin. A portion of the spring then passes through the slot 33 formed in each button. Normally this has a substantially straight configuration, but when the button is depressed the spring is pressed down to take on an angular configuration as shown. The spring then forms an arc 47 and doubles back passing through the space formed between the ledges above described. The spring will thus push each pin down into the path of the associated cam and be retained there since, upon depression of the button, the hook 48 of the push button is locked by the latching bar, 34 (FIG. 4). A depression of another button, acting to slide the bar anew, will release the previous button.

Referring to FIG. 4, it is to be noted, the shaft upon which the timing cams are mounted has also been constructed to have a lateral movement upon depression of the push button. This is also important in obtaining the desired clutching action so as to vary the speed of the timer from a fast searching speed, to a slower speed which will drive the escapement of the device to give a step by step rotational movement to the timer cams. One of the escapement ratchets 60 is adapted to drive the timing cams by using prong-like extensions 61 which fall into apertures formed in the first fixed timing cam 62. Since this cam is fixed to the shaft, all the other cams will be rotated in conjunction therewith. To obtain the lateral movement there is placed outside the end bearing plate 65 for the shaft, a circular push plate 66. As the button is depressed, two of the latch plate sliders are moved against the push plate, and the shaft is slid to close the member of the clutch so that a fast search is obtained.

The clutch is used to obtain a fast search speed when it has its members engaged, and to obtain the lower timing speed when it is disengaged is shown in FIGS. 6 and 9. The clutch comprises two parts 80, 81 each having a crown shape and having a plurality of teeth facing each other and adapted to intermesh. One section is fixedly retained at the end 83 of the driving shaft 13 and moves with the shaft when it slides laterally; the other is centrally mounted within one of the gears of the gear train which drives the intermittent advancing mechanism. When the clutch faces are disengaged the speed of the gears will be at a lower order than when the clutch faces are engaged. It is to be noted that on fast search, when the clutch is engaged, the take off speed of one of the large gears 77 is applied to the shaft so as to drive the same. The gear train, per se, does not move axially.

On disengagement of the clutch, the take off speed for driving the shaft is obtained through the intermittent advancement mechanism 12. This applies a step by step advancement to the shaft so as to drive the timing cams. In FIGS. 5, 7 and 8 the advancement mechanism is shown. A thin, moveable, rectangular bar 90 is pivotally mounted on an end wall of the switch housing, underneath the gear set. At the lower end of the bar, which is slightly tapered, a pivotable pawl 92 is mounted. The bar also has a longitudinal cut-out 93 formed therethrough, into which is placed a projection 43 staked to the last gear 95 of the gear set. As this gear is rotated, the projection moves up and down in the bar's slot so that the bar is swung in a pendulum-like arc to move the pawl, held by a spring, against the adjacent ratchet wheels. These ratchet wheels 94, 96, one slightly larger than the other, are coupled by means of projections 61 to drive the timing cam 14. The coupling prongs 61 are connected to the smaller ratchet wheel 95, and it is this smaller wheel that moves the cams. The larger ratchet wheel 96 has teeth circumferentially formed. However, at determined points about the wheel, a deep slot 97 is formed between the teeth. Since the large wheel raises the pawl above the teeth of the second,

smaller wheel, the second wheel will only be activated when its teeth correspond to one of the deep grooves of the large wheel. When this occurs the pawl, which is wide enough to cover the widths of both wheels, will move the smaller wheel too. Thus, the step by step advancement of the cams depends on how many deep slots are present in the larger wheel, for, only then will the smaller wheel be incrementally moved. This aspect is shown in FIGS. 5 and 8. In FIG. 7, a pair of back up pawls 98, 99, are resiliently biased and arranged to keep the individual wheels from backing up. The advancement mechanism thus provides the necessary incremental advance of the timing cams.

The operation of the timer, as described above, will now be more clearly evident. Upon the pressing of a fabric selection button, a positive physical stop is established to initiate a timing cycle for the desired fabric. Each button moves the latching bar side-wise. This lateral movement also presses out the timer cam shaft. Two things occur as the timer cam shifts. First, a line switch (not shown) opens so that the washing machine components will not operate. Secondly, the cam shaft shift engages the tapered clutch, through this clutch the timer is driven at high speed, i.e. $\frac{1}{2}$ r.p.m. The shifting shaft also laterally moves the cams and by so doing places the cam lugs in a plane that also contains a depressed fabric pin. As the cam shaft rotates at relatively high speed, the fabric stop or initiating pin is encountered by a cam lug or pin. As the two stops tangentially meet the timer motor drive continues and the clutches tend to disengage. This disengagement causes the timer shaft to move back in laterally. As the clutch continues to become disengaged the timer shaft moves sidewise until the cam lugs are free of the depressed stop pin moved by a push button. This then allows the cam shaft to rotate at a step by step advancement dictated by the reciprocating advancement mechanism. As noted, previously, the reciprocating drive has a high speed feature added thereto. The high speed is accomplished by a direct gear drive from the motor which in turn drives through the two angularly toothed clutch members when they are engaged. During normal slow speed operation the clutch is disengaged. However, when the clutch members are engaged, the cam shaft is driven at a high search speed. A complete 360° search is available in two seconds and during that time the reciprocating action of the advancement mechanism is "over run" and has no effect on the timing cams. When the "search" is over and the clutch is disengaged, the advancement mechanism takes over to turn the cams in a step by step manner in accordance with a predetermined timing cycle.

The variable time push button switch of the present invention is intended to be illustrative only of the scope thereof and since different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matters contained in the above description or shown in the accompanying drawing shall be interpreted as exemplary and not in a limiting sense.

What is claimed is:

1. In a washing machine, a switch control means moveable to positions causing corresponding washing operations, timing means for advancing said control means through sequential positions and thereby causing a timed sequence of operations, selector means operable to select in advance an initiating position for beginning a determined portion of one of said operations, a variable speed producing clutch mechanism for advancing said control means at a comparatively rapid speed to said initiating position, said clutch mechanism being mechanically moved by said selector means, and physical means stopping said control means at said initiating point, said clutch mechanism then effecting a second speed through a step by step advancement mechanism for advancing said control means through said determined portion of said operation.

2. In a washing machine, switch control means moveable to positions causing corresponding washing opera-

tions by activating individual switches, timing means for advancing said switch control means through sequential positions and thereby causing a timed sequence of operations, push button selector means operable to select in advance an initiating position for beginning a determined portion of one of said operations, a variable speed producing clutch mechanism for advancing said switch control means at a comparatively rapid speed to said initiating position, said clutch mechanism being mechanically moved by said push-button selector means, and physical means stopping said switch control means at said initiating point, said clutch mechanism then effecting a second speed through a step by step advancement mechanism for advancing said switch control means through said determined portion of said operation.

3. In a washing machine, a cam means on a shaft for being rotatably moveable to positions for causing the activation of corresponding washing operations, timing means for incrementally advancing said shaft and cams through sequential positions and thereby causing a timed sequence of operations, selector means operable to select in advance an initiating position for said cams for beginning a determined portion of one of said operations, a variable speed producing clutch mechanism for rotatably advancing said shaft at a comparatively rapid speed to said initiating position, said clutch mechanism being mechanically moved by said selector means, and physical means on said cams for stopping said shaft at said initiating point, said clutch mechanism then effecting a second speed through a step by step advancement mechanism for advancing said control means through said determined portion of said operation.

4. In a washing machine, cam means on a shaft rotatably moveable to positions causing the activation of switches directing a series of corresponding washing operations, timing means for advancing said cam means through sequential positions and thereby causing a timed sequence of washing operations, selector means operable to select in advance an initiating position for beginning a determined portion of one of said washing operations, a variable speed producing clutch mechanism having a plurality of interlocking members for advancing said cam means at a comparatively rapid speed to said initiating position, said clutch members being mechanically interlocked by said selector means, and physical means on said cams for stopping said shaft at said initiating point, said clutch members then separating to effect a second speed for advancing said cam through said determined portion of said operation.

5. In a sequential programming device, a plurality of cams for activating a series of associated switches, said cams being fixed on a shaft to rotate therewith to activate said switches at predetermined times, a motor driving said cam shaft through a set of gears, a pair of interlockable clutch members, one of said members attached to said shaft, said other member placed face to face therewith in one of said gears of said set, means for placing said clutch members into a separated position and an engaged position, respectively, said engaged position allowing said motor to move said shaft at a substantially high speed, said separated position effecting a step by step rotation of said cams at a substantially lower speed.

6. In a sequential programming device, a plurality of cams for activating a series of associated switches, each of said cams being fixed on a shaft to rotate therewith to activate an associated switch for a predetermined time, a motor having a pinion, a set of gears being driven by said pinion at a determined rate, a pair of cup shaped members having facing surfaces in the form of teeth placed axially adjacent each other, one of said members situated in said shaft at an end thereof, the other of said members placed in a gear of said gear set, selector means adapted to laterally move said clutch members into engagement while said switches are electrically open and said motor is running, said shaft being driven through said gear at a com-

paratively rapid rate to an initiating point where said clutch members are separated, said gears moved by said pinion then acting on an intermittent advancement mechanism to turn said shaft in a step by step, lower rate, with said switches associated with said cams being in an electrically operable condition.

7. In a washing machine, cam means on a shaft rotatably moveable to positions causing the activation of switches directing series of corresponding operations, timing means including intermittently driven shaft means for advancing said cam means through sequential positions and thereby causing a timed sequence of washing operations, a series of push buttons, each operable to select in advance an initiating position for beginning a determined portion of one of said washing operations, a stop pin moved by said push-button to said initiating point, a variable speed producing clutch having a plurality of interlocking members for advancing said cam means at an comparatively rapid speed to said initiating position, said clutch members being mechanically interlocked by said push button, and means on said cams for making contact with said stop pins for retarding said cam means at said initiation point, said motor continuing to drive said shaft when said cam means are in said stopped position, said clutch members being separated thereby, said separation allowing said cam means to become free of said pins and to rotate at a lower speed.

8. In a washing machine, cam means on a shaft rotatably moveable to positions causing the activation of switches controlling a series of corresponding washing operations, timing means including a driving motor and a shaft attached thereto for advancing said cam means through sequential positions and thereby causing timed sequence of washing operations, selector means operable to select in advance an initiating position for beginning a determined portion of one of said washing operations, a stop pin placed by said selector means at said initiating position, a variable speed producing clutch for advancing said cam means at a comparatively rapid speed to said initiating position, said clutch having a plurality of interlocking members adapted to be placed into engagement by said selector means, and means on said cams for making contact with said aforesaid stop pins, said stop pins and said holding means retarding said cam at said initiation position, said motor continuing to turn said shaft when said cams are in said retarded position, said clutch members being separated by continued rotation of said shaft at said initiating position, said separation allowing said cams to fall free of said stop pins and to be rotated at a lower speed.

9. In a sequential programming mechanism, cam means on a shaft rotatably moveable to positions causing the activation of switches controlling a series of corresponding cyclic operations, timing means including a driving motor and a step by step advancement mechanism connected to said shaft for advancing said cam means through sequential positions and thereby causing a timed sequence of washing operations, said shaft having a driving gear thereon, selector means operable to select in advance an initiating position for beginning a determined portion of one of said washing operations, a stop pin placed by said selector means at said initiating position, a variable speed producing clutch for advancing said cam means at comparatively rapid speed to said initiating position, said clutch having a plurality of interlocking members adapted to be placed into engagement by said selector means, and holding means on said cams for making contact with said stop pins moved through said selector means, said stop pins and said holding means retarding said cam at said initiating position, said motor continuing to turn said driving gear and clutch when said cams are in said retarded position, said clutch members being separated by continued rotation of said driving gear and clutch, said separation allowing said cams to draw free of said stop pins and to be rotated at a lower speed.

10. In a programming mechanism as in claim 9, said selector means comprising a series of depressable push buttons, latching means moved laterally by said depressed buttons, said buttons after depression being held thereby, a flat spring attached thereto containing a pin moved vertically therewith, said pin being placed in the path of said holding means on said cam to retard the same.

11. In a sequential programming mechanism, cam means on a shaft rotatably moveable to positions causing the activation of switches controlling a series of corresponding cyclic operations, timing means including a driving motor and a step by step advancement mechanism connected to said shaft for advancing said cam means through sequential positions and thereby causing a timed sequence of washing operations, said shaft having a driving gear thereon, said advancement mechanism including a reciprocating bar moving a driving pawl riding on a pair of concentric ratchets, one of said ratchets remaining stationary until a space between its teeth coincides with a deep space in its adjacent ratchet, both of said ratchets being moveable to advance said cam means, selector means operable to select in advance an initiating position for beginning a determined portion of one of said washing operations, a stop pin placed by said selector means at said initiating position, a variable speed producing clutch for advancing said cam means at comparatively rapid speed to said initiating position, said clutch having a plurality of interlocking members adapted to be placed into engagement by said selector means and holding means on said cams for making contact with said stop pins moved through said selector means, said stop pins and said holding means retarding said cam at said initiation position, said motor continuing to turn said drive gear and clutch when said cams are in said retarded position, said clutch members being separated by continued rotation of said drive gear and clutch at said initiating point, said separation allowing said cams to fall free of said stop pins and to be rotated at a lower speed.

12. In a push button program timing device for providing a fast search speed and a lower speed at a determined initiating point in said program, a clutch mechanism comprising a pair of crown gears facing each other, a plurality of cams mounted on a rotatable shaft, said cams activating contactors for closing electrical circuits determining said program, a gear train connected to and driven by an electric motor, one of said crown gears placed concentrically in said gear train, said other crown gear mounted on said cam shaft, a step by step advancement mechanism connected to said gear train, means activated by said push button for placing said crown gears into direct engagement for rotating said cam shaft at a speed greater than that derived from said advancement mechanism, and means for separating said crown gears at said determined initiating point to allow said cam shaft to be rotated in a step by step fashion.

13. In a washing machine, a switch control means moveable to positions causing corresponding washing operations, timing means for advancing said control means including a series of cams, selector means operable to select in advance an initiating position for beginning a determined portion of one of said operations, a variable speed producing means for advancing said control means at an advanced rate to said initiating position, spring means for cooperating with said selector means for stopping said control means at said initiated point, said spring means comprising a unitarily formed flat spring, a holding pin associated with said selector means to define said initiating position, said pin connected to said spring to be activated upon depression of said selector means, said spring being angulated thereby and moving said stop pin.

14. A push button operated spring holding means for placing a stop pin in the path of a cam included in a timing device contained in a casing, said cam having a stop member, said spring means having a flat portion connected to said casing of said device, a bowed parallel spring portion integrally joined thereto and connected to

said push button, an offset portion integrally joined to said parallel portion and being connected to a stop pin associated with said button, whereby upon depression of said button said spring is angularly moved to place said stop pin in the path of said stop member on said cam of said device to retard the same.

15. A push button operated spring holding means as in claim 14 wherein a slot is formed in said stop pin and wherein said spring means includes a finger portion falling into said slot so as to move said pin upon depression of said button.

16. A push button operated spring holding means as in claim 15 wherein said push button is held in the parallel portion of said spring and wherein the finger means of said spring is bifurcated at its free end to grip said slot of said stop pin.

17. A push button operated one-piece cantilever spring for placing a stop pin in the path of a cam included in a sequential timing device contained in a casing, said cam having a stop member, an end of said spring fixedly connected to said casing and extending out therefrom, a curved portion connected to said end, said curved portion being bent back on itself to join a straight portion of said spring, said straight portion thus lying in a plane parallel to said fixed end of said spring, said straight parallel portion being connected to said push button, another portion of said spring connected to said straight portion and offset at an angle thereto, said offset portion connected to a second end portion extending in a plane substantially parallel to said fixed end portion, said second end portion joined to said stop pin, whereby upon depressing said push button said straight portion of said spring is angulated and moved to place said stop pin in the path of said stop means of said cam.

18. A push button operated cantilever spring for placing a stop pin in the path of a cam included in a timing device contained in a casing, said cam having stop means, an end of said spring means connected to said casing

and extending out therefrom, a curved portion connected thereto, said curved portion bent back to join a straight portion of said spring lying in a plane parallel to said end of said spring, said parallel portion being held by said push button, an offset portion of said spring connected thereto, said offset portion connected to a second end portion extending in a plane substantially parallel to said end portion connected to said casing, said second end portion joined to said stop pin, whereby upon depressing said push button said straight portion of said spring is angulated and pushed forward to place said stop pin in the path of said stop means of said cam.

19. A push button operated one-piece cantilever spring for placing a stop pin in the path of a cam included in a sequential timing device contained in a casing, said cam having a stop member, an end of said spring fixedly connected to said casing and extending out therefrom, a curved portion connected to said end, said curved portion being bent back on itself to join a straight portion of said spring, said straight portion thus lying in a plane parallel to said fixed end of said spring, said straight portion being connected to said push button, another portion of said spring connected to said straight portion and offset at an angle thereto, said offset portion connected to a second end portion extending in a plane substantially parallel to said fixed end portion, said second end portion joined to said stop pin, whereby upon depressing said push button said straight portion of said spring is angulated and moved to place said stop pin in the path of said stop means of said cam.

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