Nov. 23, 1965 W. C. LUTZEN 3,219,769

SEQUENCING DEVICE

Original Filed May 19, 1961 2 Sheets-Sheet 1

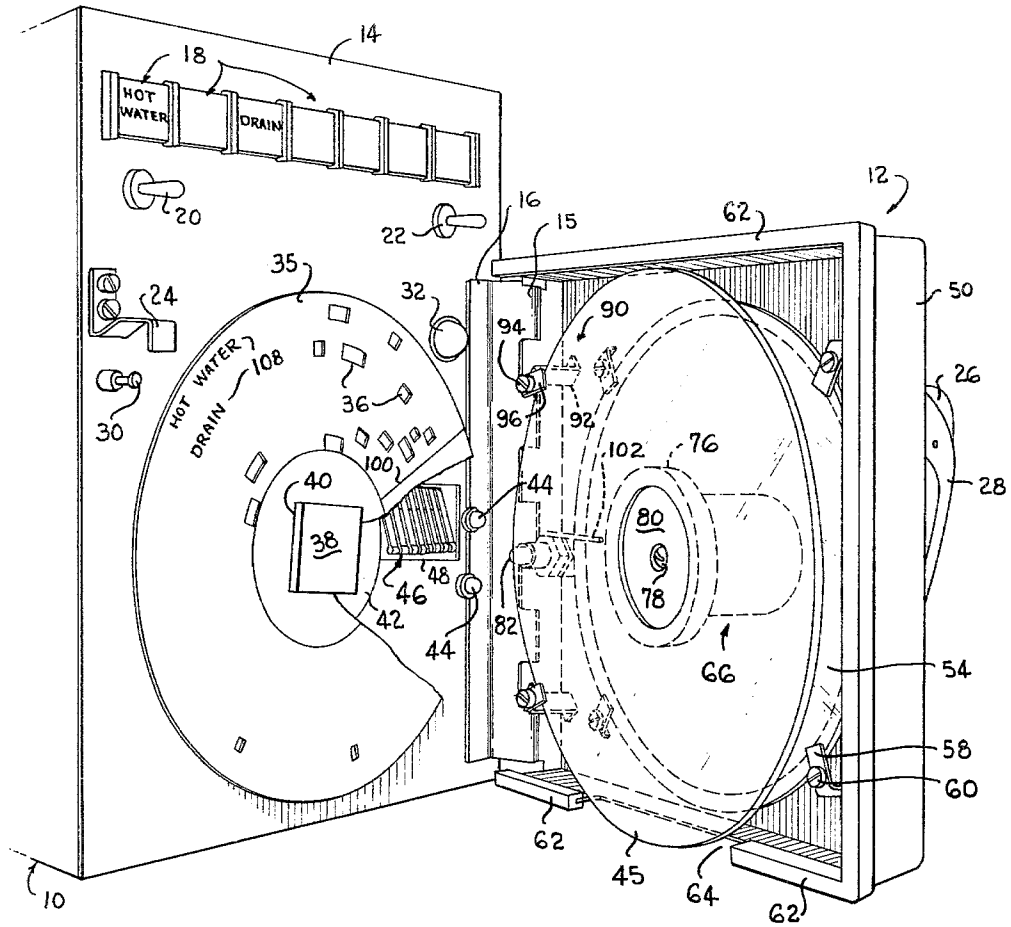


Fig. 1

INVENTOR.
WILLIAM C. LUTZEN
BY
Dominik, Hago & Worth
ATTORNEYS

Nov. 23, 1965 W. C. LUTZEN 3,219,769

SEQUENCING DEVICE

Original Filed May 19, 1961 2 Sheets-Sheet 2

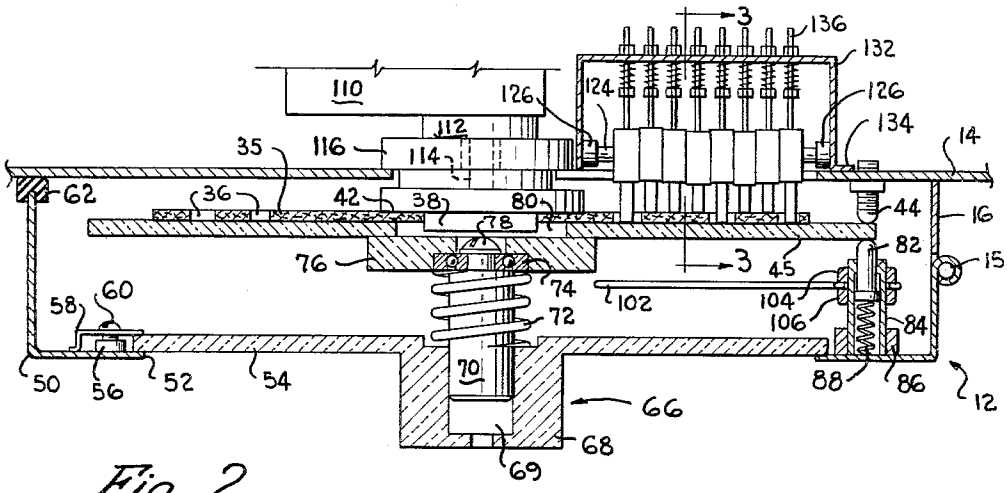


Fig. 2

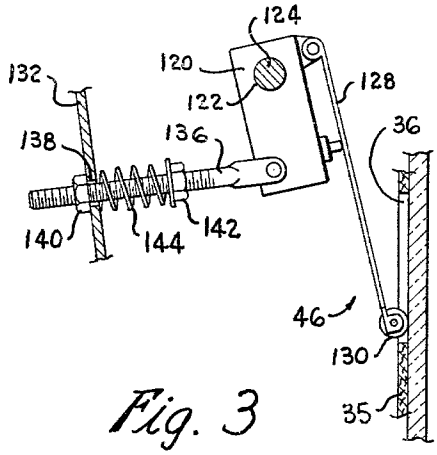


Fig. 3

INVENTOR.
WILLIAM C. LUTZEN
BY
Dominik, Lago & Worth
ATTORNEYS

United States Patent Office 3,219,769 Patented Nov. 23, 1965

3,219,769

SEQUENCING DEVICE

William C. Lutzen, 1407 N. 123rd St., Wauwatosa, Wis.

Continuation of application Ser. No. 111,346, May 19, 1961. This application Dec. 7, 1962, Ser. No. 243,713
11 Claims. (Cl. 200—46)

This application is a continuing application of a pending appilcation in the name of William C. Lutzen, Serial No. 111,346, filed May 19, 1961, and now abandoned.

This invention relates broadly to a device for ordering a sequence of events. The invention has more particularly reference to what is oftentimes called "timing switch" for making and/or breaking one or more electrical contacts in some predtermined sequence. The present invention is especially advantageous for use in selectively controlling the sequence of events in the cycle of a commercial laundry machine and for the present purposes is so described.

Laundering on a commercial scale of each of the many different fabrics made from fibers of natural, synthetic, and blends of natural-synthetic presents many new problems and aggravates many old problems. A different laundering process is required, for example, for cotton shop towels (ordinarily having a high grease and oil content) than for nylon articles of clothing. Variables in the laundering cycle include water temperatures, cleaning agents including detergents, wash times, number and time length of rinses, and variations in the sequence of various steps of washing, rinsing and draining.

A commercial laundry must be prepared to handle properly any given fabric which a customer brings to it for laundering. Automatic controls of the laundering cycle for such fabrics is extremely preferable because it provides the correct predetermined sequence of operations. However, the automatic control device itself should have some means to allow changing from one laundering cycle to another thereby to provide the proper laundering cycle as dictated by the fabric, and in some cases, by the materials which soil the fabric.

An object of the present invention is to provide a sequencing device so constructed as to permit changing from one cycle to another. To this end, the invention contemplates, in a timing switch construction, the use of an individual timing card for each cycle. In each card is cut slots each representing an event in a cycle. A plurality of timing cards are provided, each of which represents a different cycle by having a different arrangement of slots. The timing cards are interchangeable.

Another object of the invention is the provision of a sequencing device so contructed and arranged as to allow changing from one cycle to another by changing timing cards. In this connection the invention provides a construction for enclosing the device, which construction inludes means for gaining access to the mechanism to mount, remove, and/or exchange timing cards. Briefly stated, the construction includes a cabinet enclosing the switch mechanism and having an access door. The timing card is removably supported on the mechanism within the cabinet. The cabinet includes a unique access door construction having mechanism to cooperate with the remainder of the apparatus in the support and/or positioning of the timing card.

The operator of the laundering operation occasionally inspects to determine what event in the cycle is taking place, eg., rinsing. The operator also has occasion to repeat and/or speed up certain cycle events, e.g., when the fabric is excessively dirty an extra washing operation is indicated or when the fabric is unusually clean or being rewashed a shortened washing operation is indicated.

Another object of the invention is to provide a sequencing device that, at least, displays the event or events currently in action.

A further object of the invention is to provide a sequencing device constructed to receive and detchably support any of a plurality of interchangeable timing cards.

Among objects of the inventon is a novel access door construction wihch supports the timing card during operation in such a way that the card is readily detachable.

Still another object of the invention is novel access door construction which positionally relates a flexible member, such as a timing card, to mechanism located adjacent the door.

Still another object of the invention is a novel access door construction which positionally relates a flexible member, such as a timing card, to mechanism located adjacent the door while visually displaying the flexible member.

A related object is the provision of a timer cabinet or housing construction wherein the door cooperates with the timing card and other structure to position the timing card adjacent switches actuated thereby and wherein the door combines with the timing card to form what is called a "face cam."

Another object is the provision of novel mode of adjustably mounting switches to coact with the timing card.

Other objects, advantages and features will become apparent from the following description and drawings wherein:

FIG. 1 is a perspective view of an instrument cabinet with its door open and the timing card partly cut away to show a switch bank and timing card positioning means.

FIG. 2 is a top cross section taken on a horizontal plane through the axis of the timershaft of FIG. 1 showing the pressure plate mounting in cross section, manner of receiving mounting block in plate central recess, and relation of timing card to all including positioning means on the shaft, door and panel.

FIG. 3 is a vertical cross section along 3—3 of FIG. 2 to illustrate a preferred manner of adjustably mounting micro-switches.

The present invention contemplates the use of a thin card, preferably in the form of a disc having annular arcuate slots therein. Means are provided to rotate the card about an axis so that the arcuate slots engage micro-switches. The ends of the slots preferably coincide with a radius and define the means to manipulate the respective switch engaged by the slot ends. The micro-switches are then actuated to either open or close an electrical contact in response to engagement by the card slot ends. One or more events are capable of being controlled in a timed fashion by this means.

The disc or timing card is preferably of a flexible material and can be either metal, plastic, cardboard, or the like. It can be either an electrical conductor or non-

conductor. Preferably, the disc is of a laminated structure, having cellophane on each face thereof with cardboard in the middle. The cardboard can be of the well-known "chip board" variety. The various arcuate slots are cut in the timing disc to extend perpherally about the axis of rotation. The lengths of the individual slots determine the length of time that a particular switch is maintained in a closed or open position.

In the preferred embodiment, the timing disc is mounted to rotate relative to a cabinet housing in which the rotating means is supported. The card being of thin flexible material is supported by a unique mechanism mounted on the door of the cabinet or housing. The support structure is of such nature that the timing disc or timing card is precisely positioned relative to the switches so that the various slots are brought into positive engagement and disengagement with the switches.

Referring now to the drawings, and particularly to FIG. 1, there is shown a cabinet housing **10** having a door designated generally as **12**. The housing includes the panel **14** on the front face thereof. The door is pivotally supported relative to the face by the hinges **15** which are in turn spaced an appropriate amount away from the panel **14** by brackets **16** (see FIG. 2).

The panel **14** supports a number of elements of collateral interest. As shown in FIG. 1, a bank of switches generically denoted as **18** is disposed at the top of the panel for manual actuation or control of selected events. The switches are disposed so that the door **12** does not have to be opened by the operator in order to have access to them. Additionally, toggle switches **20** and **22** are provided for respectively turning on the power to the electrical system and for turning on the timer motor, respectively.

A door latch **24** is secured to the panel and cooperates with latching means **26** mounted on the door handle **28** in order to latch the door in place when the latter is closed against the cabinet. A plunger safety switch **30** is also mounted to extend through the panel and to engage the inner face of the door. The purpose of the plunger switch is to shut off the timer motor at any time the door is opened. In this fashion, the particular process being controlled is brought to a halt when the door is opened.

One or more signal lights **32** are also mounted on the panel.

The previously mentioned timing card is illustrated in FIGS. 1, 2 and 3 as the disc **35**. A plurality of peripherally extending slots **36** are cut in the disc. Means are provided for detachably mounting the disc in such fashion that when the door is opened to the position shown in FIG. 1, the operator can merely lift the disc off the mounting means. In the illustrated embodiment, the means for detachably supporting the timing card **35** comprises a square shaft **38** which fits snugly into a corresponding square hole **40** whereby the timing card rotates in unison with the shaft. The timing card is positioned axially on the shaft by a shoulder **42** which is mounted on the shaft. In this fashion, the shoulder **42** positions the timing card at its central portion with respect to the panel **14** and also with respect to the door, as described below with particular reference to FIG. 2.

Another positioning means is disposed radially outwardly from the shaft and is preferably supported from the panel. This particular positioning means comprises the pair of vertically spaced-apart rounded studs **44**. As best seen in FIG. 2, the studs are located at a radius such that they do not contact the timing card, but instead contact the pressure plate **45** which is mounted on the door. The studs have a rounded end and frictionally engage the pressure plate. Preferably the studs are made of plastic such as Lucite, nylon, Teflon or the like. The two studs **44** are spaced apart in such fashion that they straddle the bank of switch actuators **46** which are preferably arranged linearly along a radius and extend through a hole **48** in the panel. The switches and their mounting

are described further below in connection with FIGS. 2 and 3.

The door assembly or door body **12** comprises a frame member **50** on which the handle **28**, the pressure plate **45**, and associated mechanism is mounted. The door frame **50** can be most simply described as a shallow box-like structure with a hole **52** cut in one side of the box so that a window **54** can be mounted in the hole. Referring also to FIG. 2, the window is mounted by any suitable means, the illustrated means including nuts **56** welded to the door frame at a plurality of places around the hole **52**, and the bracket **58** screwed into place with the bolt **60**. The bracket **58** is angle shaped and serves to clamp the window **54** against the frame **50**, as best seen in FIG. 2. The window **54** is preferably made of Lucite, but may also be made of other suitable transparent materials, including glass.

The gasket **62** is affixed to the door, and extends completely therearound in order that a sealing engagement against the panel **14** can be effected. However, a notch **64** is cut in the bottom of the door so that the pressure plate **45** can depend or extend therethrough whereby the operator can manually rotate the pressure plate in making adjustments, as hereinafter described.

Referring now to both FIGS. 1 and 2, there is shown a means connected between the pressure plate and the door for rotatably supporting the plate on the inside of the door whereby the plate rotates in a plane that is generally parallel to the door. Such means is generically denoted as the assembly **66** and further includes a bearing block **68** that is mounted in a generally central region of the window **54**. The bearing block can likewise be constructed of plastic. A hole **69** is drilled through the block, and a stud **70** is slidably mounted in the hole. A helical spring **72** surrounds the stud **70**, and when the door **12** is closed as seen in FIG. 2, the spring is in compression to thereby urge the pressure plate away from the door and toward the panel.

A ball bearing assembly **74** is mounted with its outer race secured in a recess in the bearing plate **76**. The bearing plate is fixedly secured to the pressure plate **45** by any suitable means, or can be machined or cast in one piece with the pressure plate. In the present embodiment, a plurality of screws (not shown) are used to secure the pressure plate to the bearing plate. A bolt **78** and its corresponding underlying washer secure the inner race of the ball bearing to the stud **70**.

The just-described construction sets forth the means by which the plate is revolvably supported from the door. When the door is closed, as seen in FIG. 2, the outwardly extending square shaft **38** is received in a recess **80** which is at the central region of the pressure plate. With this arrangement, the spring **72** biases the entire pressure plate away from the door and toward the panel so that the timing card **35** is frictionally engaged by the face of the pressure plate **45** (referring to that face toward the viewer as seen in FIG. 1). This enables aligning the pressure plate with the timing card; the switches; with the various switching means; and with the means for aligning and positioning the card and/or the pressure plate, including the shaft shoulder **42**, the studs **44**, and the next-described means for engaging the plate to position it for rotation and to bias the pressure plate toward the locating means which includes the shaft shoulder **42** and the studs **44**.

The positioning means referred to includes the spring biased door stud **82** which is located radially outwardly from the axis of the pressure plate at a position such that the two studs **44** straddle the stud **82** along a vertical line. This is best realized when viewing the relationship of the parts as seen in FIG. 1. The purpose of the spring biased door stud **82** is to urge the pressure plate into engagement with the two studs **44** adjacent the edge of the pressure plate. This cooperates with the force of spring **72** urging the plate toward the shoulder **42** on the shaft so that the pressure plate, the timing card, and the

bank of switches **46** are all in alignment. The spring biased arrangement of the pressure plate provides a proper but flexible aligning construction whereby variations in the thickness of the timing card become immaterial. It will be observed that the area in which the alignment is most stringently maintained is that region where the bank of switches **46** contacts the timing card. This, of course, is where the alignment has to be maintained.

The spring biased stud **82** is mounted in a threaded tube **84** that is screwed into a nut **86** welded to the door. A helical spring **88** is maintained in compression so that the stud **82** is urged constantly away from the door and toward the studs **44** when the door is closed (see FIG. 2).

The means for engaging and positioning the pressure plate also includes the stop assemblies **90** (FIG. 1). The stop assemblies **90** each include a bracket **92** with a Z-shaped cross section which is welded to the door at one end. The flange on the other end of the bracket is threaded and a screw **94** threadedly engages the threaded flange to secure a stop leaf **96** against such flange. The stop leaves in turn engage the pressure plate at its periphery and are arranged to straddle or vertically flank the spring biased stud **82**. The stop leaves are spaced toward the panel **14** away from the front of the door **50** so that when the door is closed the studs **44** engage the pressure plate and push it backward by compressing the spring **88**. This disengages the pressure plate from the stop leaves **96**. The stop leaves **96** are arranged to prevent the pressure plate from being pushed entirely away from the door or door window by reason of the force exerted by the springs **72** and **88**.

The pressure plate **45** is supported on the door **50** by the above mechanism in such fashion that it is substantially coaxial with the shaft **40**, or with the shaft of which **38** is an extension. The door latch mechanism **24** maintains the relationship when the door is closed. If desired, the door latch mechanism can be magnetic, as by mounting a magnet on the inside of the door to engage magnetically the vertical face at the front of the bracket **24**.

In order that the operator can align the timing card for starting an operation, each timing card has a start line indicia **100** (FIG. 2). The indicia may be printed, scored, or similarly affixed to the timing card. In starting the operation, the operator brings the start line indicia **100** into alignment with the starting pointer **102** by turning the pressure plate at its lowermost end where it depends below the notch **64** in the door. The starting pointer extends radially of the pressure plate and timing card. The pointer is conveniently mounted on the threaded tube **84** in which the stud **82** is mounted. This is conveniently accomplished by securing the pointer between two nuts **104**, **106** which are threadedly engaged with the tube **84**.

As should be evident from the above construction, where the pressure plate and the window are both made of transparent material, the operator can observe the timing card and thereby tell from its relation to the pointer **102** just what step or steps are being carried out in the controlled process. It may be convenient to label the different annular tracks in which the respective slots **36** are cut. For example, two such labels **108** are shown. In this fashion, should the operator decide that certain steps need manual control or manual extension of time or other specialized attention, the operator can manually take over the operation by manipulating the appropriate ones of the switches **18**, which are similarly identified.

Referring now to FIG. 2, there are shown means for driving the timing card through its cycle of operation in a timed fashion. This includes the synchronous clock motor **110** of any conventional type and an associated gear box **112**, preferably with a worm gear drive, for adjusting the velocity of rotation. The output shaft **114** from the gear box supports the shoulder **42** and the square shaft **38**. The clock motor and gear box may advantageously be secured to the backside of the panel **14** by bolting the flanges **116** on the gear box to the rear of the panel **114**. As shown in FIG. 2, an appropriate aperture is provided for the shaft **114** to extend through the panel.

It is preferred that the gear box include a one way clutch of such nature that the synchronous motor can be manually turned in only one direction during those times that the operator is aligning the start line **100** with the pointer **102**. In such case, the direction of manual rotation should be the same as the direction in which the clock motor drives the timing card. In the illustrated embodiment, both such directions are clockwise, as the timing card is viewed in FIG. 1.

A novel means is provided for mounting the bank of switches generically denoted **46**. The particular mounting means enables adjusting the switches relative to the timing card and the pressure plate. This is illustrated in FIGS. 2 and 3, where there is seen a micro-switch having a body **102** through which is drilled a hole **122**. A shaft **124** fits snugly in the hole **122**, but permits rotation of the body **120** about the shaft. The shaft **124** is secured at each end in an appropriate bearing by any suitable means, such as a set screw. The bearings, securing means, and set screws are generically shown in FIG. 2 as **126**. It will be observed that each of the micro-switches has a lever arm **128** attached thereto, and that one end thereof extends into engagement with the timing card **35** (see FIG. 3). It is preferred that a roller **130** be provided at the timing card-engaging end of the lever. The roller **130** rolls into and out of the respective slots **36** cut in the timing card.

The micro-switches, along with the associated shaft and shaft securing means, are all mounted on a flanged channel shaped bracket **132** (see FIG. 2). The flanges **134** of the channel are used as a means for securing the bracket to the back of the panel. A threaded rod **136** is pivotally secured to the body **120** of the mounting switch and extends through an aperture **138** in the base of the bracket. Two spaced apart nuts, **140**, **142**, are respectively disposed along the threaded rod with the compression spring **144** and the base of the bracket **132** therebetween.

When it is desired to adjust the position of the roller **130** relative to the pressure plate **45**, it is only necessary to turn the nut **140** so that the threaded engagement with the rod **136** swings the entire micro-switch about the shaft **124**.

The bracket **132** is preferably secured to any suitable means such as screws to the back of the panel **14**. In this fashion, the entire switch bank can be removed for servicing or repairing any one of the respective switches.

The switches in the switch bank **46** are connected to control various relays, solenoid valves, and the like as may be indicated by the particular process under control. Preferably, the switches are connected in parallel circuits, each in series with the respective solenoid or relay controlled by the switch. Where desired to effect a manual control by the switch **18**, one of the switches **18** is connected in parallel with the particular micro-switch and in series with the solenoid, relay, etc. which is to be controlled either by the timing card or manually. The particular and specific electrical circuits are not the subject matter of this invention because such a wide variety of processes are susceptible to control with the disclosed sequencing device.

In review, it will be seen that the timing card **35** can be readily placed on the square shaft **38**. A detachable connection is thus provided, whereby the timing card is merely lifted off the square shaft **38** when it is desired to change to another timing card for a different process. At the same time, during operation the timing card is precisely held in place by reason of the door construction. More particularly, when the door is closed and brought to the position of FIG. 2, the pressure plate **45** moves into coaxial alignment with the square shaft **38** and the timing

card, at the same time receiving the square shaft **38** in the recess **80**. The pressure plate frictionally engages the timing card when the door body, or assembly, is moved to the closed position relative to the panel.

At the time the door is close, the pressure plate also engages the fixed studs **44** in such fashion that the plate moves away from the stop leaves **96** thereby further compressing the helical spring **88**; a similar action takes place at the center of the plate in compressing spring **72** and sliding the stud **70** in the hole **69**. This is a gentle compression and provides a frictional engagement between the plate and the studs **44, 82** during those times that the timer is in operation. During operation, the pressure plate rotates in unison with the timing card and the square shaft by reason of the frictional engagement of the timing card with the pressure plate.

The frictional engagement between the timing card and the pressure plate is promoted by the two respective springs **72** and **88**. The particular elignment required of the timing card with the bank of switches **46** is accomplished by reason of several factors: the alignment of the timing card with the shoulder **42**, the bias of spring **72** which maintains the engagement of the timing card and the pressure plate with the shoulder **42**, the frictional engagement with the plastic studs **44** and **82** at the periphery of the pressure plate, and by the arms **128** of the microswitches which are ordinarily biased by the structure of the switch outwardly to bring the roller **130** into rolling engagement with the timing card **35**.

Thus, it will be observed that the timing card is detachably mounted by the cooperation between the door assembly **12** and the aligning or positioning means comprising the shoulders **42**, the studs **44**, and the coacting portions of the door.

During operation, the particular length of time the switch is maintained in an operative or inoperative position is determined by the peripheral length between the radially extending edges of the respective slots **36**. It is ordinarily preferred to cut the length of the slots to define the period of time that a desired event takes place. As may be observed by the arrangement of slots in FIG. 1, a plurality of events can be controlled at the same time.

It is also to be observed that the bank of switches **46** is preferably disposed in the region between the square shaft and the two studs **44**.

While the invention has been disclosed with respect to a particular environment, application, and a presently preferred construction, it is to be understood that it is not limited thereto, but includes all those modifications, changes, substitutions and equivalents, and the like which would be obvious to one skilled in the art but which also fall within the spirit of the following claims.

I claim:

1. In a sequence timer having a selectively interchangeable sequence controller disc mounted for rotation in a timer housing, a door construction for holding said controller disc in an operative position comprising

a door body mounted on said housing for movement from an open to a closed position,

a pressure plate,

means connected between said plate and said door for rotatably supporting said plate, on one side of said door, for rotation in a plane parallel to that of said door,

said plate engaging one surface of said disc when the door is in the closed position,

means mounted on said housing for engaging said plate to position said plate for rotation in a predetermined plane,

and means for urging said plate away from said door and into engagement with said disc and said engaging means whereby said disc is rotated in a predetermined plane.

2. In a cabinet for a timer having an interchangeable disc type sequence controller, a door construction for holding said disc controller in position comprising

a door body including a window of transparent material,

a pressure plate adapted to frictionally engage said controller and having at least a portion thereof constructed of transparent material,

means connected between said plate and said door for rotatably supporting said plate in alignment with and on one side of said door for rotation in a plane parallel to that of said window,

means for engaging said plate to position said plate in spaced apart relationship to said door for rotation in said plane, and

means for urging said plate away from said door and into engagement with said means for engaging whereby said plate, when rotated, is urged away from said door into engagement with said means for engaging to thereby rotate in said plane and to permit visual observation through the transparent portions of said door and said pressure plate.

3. In a cabinet, a door construction comprising the combination of

a door body,

a flat circular member defining a pressure plate,

means connected between said plate and said door for rotatably supporting said plate, on one side of said door, for rotation in a plane parallel to that of said door,

means for engaging said plate to position said plate for rotation in said plane and

means for urging said plate away from said door and into engagement with said means for engaging whereby said plate, when rotated, is urged away from said door into engagement with said means for engaging to thereby rotate in said plane.

4. In a cabinet, a door construction comprising a combination of

a door body,

a flat circular member defining a pressure plate,

means connected between said plate and said door for rotatably supporting said plate, on one side of said door, for rotation in a plane parallel to that of said door,

means mounted on said door and angularly spaced apart with reference to the center of said plate, for engaging said plate to position the same for rotaiton in said plane, and

means for urging said plate away from said door and into engagement with said means for engaging whereby said plate, when rotated, is urged away from said door into engagement with said means for engaging to thereby rotate in said plane.

5. A sequencing device comprising in combination

a flat panel

a shaft extending through said panel and supported to resolve relative to said panel

a thin generally circular member defining a timing card and having a plurality of timing slots cut therein, each slot extending circularly through a portion of an annular circular circumference

means on said shaft to detachably support said timing card for rotation in unison with said shaft

first positioning means disposed on said shaft for locating said timing card relative to said panel and axially on said means, the positioning means being disposed between said means and said panel in alignment with the next-said means

second positioning means disposed radially from said shaft and supported on said panel

a plurality of actuators for respective switching means and disposed between said first and second positioning means, each said actuator being disposed at a

radius from said shaft to be engaged by a predetermined one of said slots in said timing card
a door body
a flat pressure plate revolvably supported from said door body to rotate in a plane generally parallel to that of said door body
means supported from said door body for urging said plate away from said door body, and
means for removably supporting said door body in a closed position relative to said panel whereby said means for urging biases said plate into frictional engagement with said plate and also into a predetermined relationship with said first and second positioning means.

6. A sequencing device comprising in combination
a panel
a shaft extending away from one face of said panel and supported to revolve relatively thereto
means on said shaft to detachably support a member for rotation in unison with said shaft
first positioning means for locating such member relative to said one face and axially on said means to support
second positioning means disposed radially from said shaft and supported on said panel in alignment with said first positioning means
a door body
means for pivotally supporting said door body to restrain said door body for pivoting relative to said panel and in one position of the door body to bring the hereinafter defined pressure plate into alignment with said first and second positioning means
a flat pressure plate
means connected between said plate and said door for rotatably supporting said plate, on one side of said door, for rotation in a plane parallel to that of said door
means for engaging said plate to position said plate for rotation in said plane, and
means for urging said plate away from said door and into engagement with said means for engaging whereby positioning said door body in said one position aligns said pressure plate with said first and second positioning means so that a member when detachably supported on said shaft is frictionally engaged by said plate whereupon said plate and the member rotate in unison and the member is maintained in a predetermined position between said first and second positioning means on one hand and on the other hand said plate.

7. A sequencing device comprising in combination
a housing
a flat panel mounted in said housing
a shaft extending through said panel and supported to revolve relative to said panel
a thin generally circular member defining a timing card and having a plurality of timing slots cut therein, each slot extending circularly through a portion of an annular circular circumference
means on said shaft to detachably support said timing card for rotation in unison with said shaft
first positioning means disposed on said shaft for locating said timing card relative to said panel and axially on said means, the positioning means being disposed between said means and said panel in alignment with the next-said means
second positioning means disposed radially from said shaft and supported on said panel
a plurality of actuators for respective switching means and disposed in linear alignment along a radius between said first and second positioning means, each said actuator being disposed at a radius from said shaft to be engaged by a predetermined one of said slots in said timing card
a door body
a flat pressure plate revolvably supported from said door body to rotate in a plane generally parallel to that of said door body
means supported from said door body for urging said plate away from said door body and
means for hingedly supporting said door body from said housing in a closed position and relative to said panel whereby said means for urging biases said plate into frictional engagement with said card and also into a predetermined relationship with said first and second positioning means.

8. A sequencing device comprising in combination
a panel
a shaft extending away from one face of said panel and supported to revolve relatively thereto
means on said shaft to detachably support a member for rotation in unison with said shaft
first positioning means for locating such member relative to said one face and axially on said means
second positioning means disposed radially from said shaft and supported on said panel in alignment with said first positioning means
a door assembly having a transparent portion
means for pivotally supporting said door to restrain said door body for pivoting relative to said panel and in one position of the door body to bring the hereinafter defined pressure plate into alignment with said first and second positioning means
means connected between said plate and said door for rotatably supporting said plate, on one side of said door, for rotation in a plane parallel to that of said door
means for engaging said plate to position said plate for rotation in said plane and
means for urging said plate away from said door and into engagement with said means for engaging whereby positioning said door body in said one position aligns said pressure plate with said first and second positioning means so that a member when detachably supported on said shaft is frictionally engaged by said plate whereupon said plate and the member rotate in unison and the member is maintained in a predetermined position between said first and second positioning means on one hand and on the other hand said plate.

9. A sequencing device for controlling the operation of a number of function switches comprising
a housing,
a cover for said housing,
a shaft rotatably mounted in said housing,
a timing card blank,
mounting means on said shaft supporting said timing card blank for rotation with said shaft between said housing and said cover,
a plurality of actuators for said function switches mounted on said housing in a fixed position with respect to said mounting means and in a position to engage the surface of said blank facing said housing,
means for rotating said shaft, said blank having a number of slots selectively cut therein and aligned with individual actuators for controlling the same in a predetermined sequence.

10. A sequencing device according to claim 9 wherein, said cover has a pressure plate mounted to rotate freely thereon and is biased to engage the other surface of said blank when the cover is closed to thereby hold the blank on the support means.

11. A sequencing device for controlling the operation of a number of function switches comprising
a housing
a shaft rotatably mounted in said housing
means for driving said shaft at timing speed
a selectively interchangeable card mounted on and rotatable with said shaft,

a door having a pressure plate rotatably mounted thereon, said plate being biased to engage one entire surface of said card when the door is closed, so that the card rotates in a predetermined plane

a switch actuator for each function switch, said actuator being aligned on a line intersecting the axis of said shaft in a position to engage the surface of said card,

said card having a number of slots cut therein to sequentially engage said actuator in a predetermined

sequence as the shaft is rotated to actuate said switches in a prescribed program of operations.

References Cited by the Examiner

UNITED STATES PATENTS

2,003,852	6/1935	Beattie	200—46
2,639,340	5/1953	Gaite	200—46

KATHLEEN H. CLAFFY, *Primary Examiner.*

ROBERT K. SCHAEFER, *Examiner.*