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LAUNDRY MACHINE HAVING A DOOR-OPERATED TIMER

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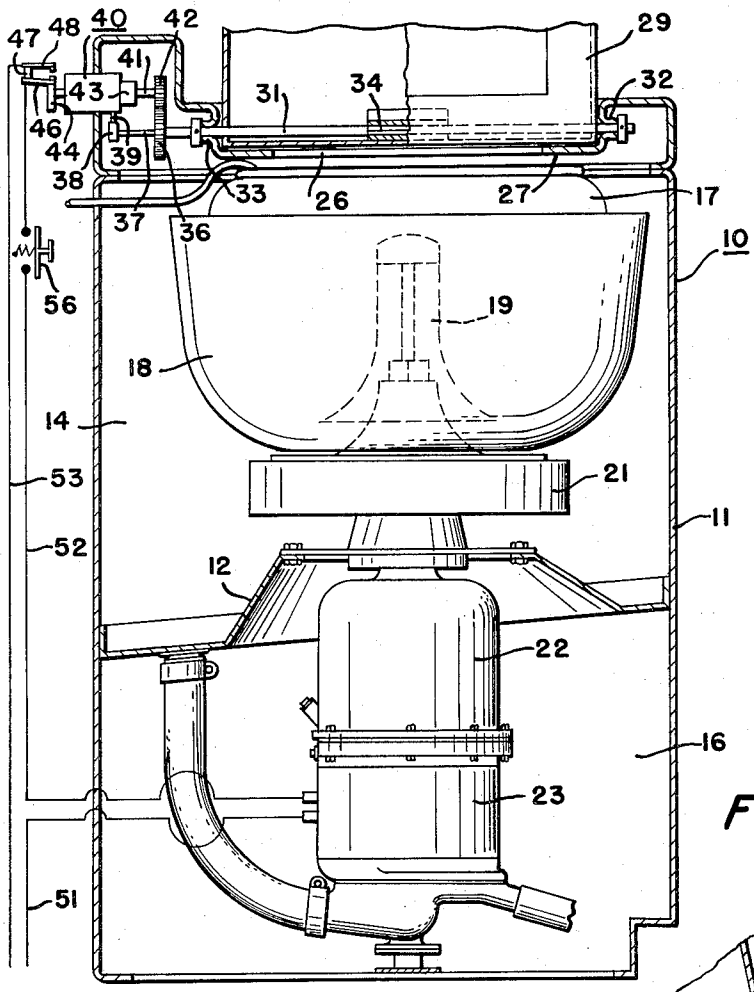


Fig. 2

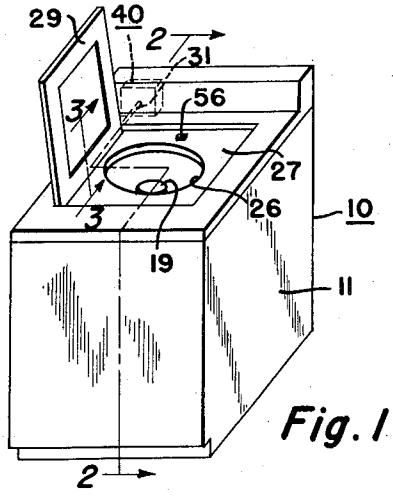


Fig. 1

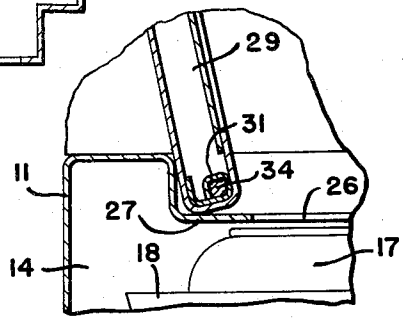


Fig. 3

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LAUNDRY MACHINE HAVING A DOOR-OPERATED TIMER

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This invention relates to clothes laundering machines and particularly to a method of and arrangement for instigating timed cycles of operation of a motor-driven element therein.

I am aware of the fact that laundry machines such as domestic clothes washing and drying machines and combinations thereof have been provided with an electrically energizable clock timer or chronometrically operated timing device which is manually settable by the operator of a machine or apparatus to start or activate same for causing one or more timed cycles of operation of an electric motor-driven element or elements incorporated in the machine. These timers or timing devices, in addition to being expensive and complicated, are a frequent source of trouble creating many service calls and which trouble usually occurs at times clothes laundering acts are in progress. Such timers or timing devices are not infallible and consequently they have not been entirely satisfactory from the standpoint of appliance manufacturers and of overcoming provocation of paradoxical ill will on the part of users of domestic appliances equipped with same. I therefore contemplate the provision in or on domestic appliances and particularly clothes washing or drying apparatuses or machines of a simplified, inexpensive and more practical timing means or timer device for both starting and stopping an operative element therein to effect a timed cycle of operation of the element.

An object of my invention is to provide an improved, practical and substantially trouble-free clothes laundering apparatus or machine.

Another object of my invention is to provide a clothes laundering machine with a timing means or device which is rendered operative automatically to effect a timed cycle of operation of an element thereof by the act of opening a door of the machine leading to a clothes receiving chamber therein preparatory to placing the clothes in the chamber to be processed.

A further object of my invention is to provide in a clothes laundering machine a combined mechanical or spring wound timer and electric switch device, the timer of which is wound and rendered operative in response to opening a door of the machine for actuating a switch thereof to make and break an electric circuit leading to an electric motor driving an element in the machine so as to effect a timed cycle of operation of the element and energization of other components of the machine to carry out one or more functions of treating clothes placed therein.

It is a still further and more specific object of my invention to provide a laundry machine having a combined spring wound device as set forth in the foregoing object with additional means in the electric circuit thereof actuated in response to opening the door of its clothes receiving tub or chamber for breaking the circuit to the motor and temporarily interrupting actuation of the element operated or driven thereby when it is desired to inspect clothes contained in the chamber without lessening a timed cycle of operation of the element.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawing wherein a preferred embodiment of the present invention is clearly shown.

In the drawings:

FIGURE 1 is a front perspective view of a clothes washing machine having my invention embodied therein;

FIGURE 2 is a vertical sectional view of the washing machine taken along the line 2—2 of FIGURE 1 with certain elements thereof shown in elevation having a schematic arrangement of my combined timer control and switch with the switch connected in an electric circuit diagrammatically illustrated; and

FIGURE 3 is an enlarged fragmentary sectional view taken along the line 3—3 of FIGURE 1 showing the door of the washing machine locked to its hinge pin mounting.

Before proceeding with a description of the present disclosure, made primarily for the purpose of illustration, it is desired to point out that my invention is applicable to any appliances having an electric driven element which is adapted to complete a timed cycle of operation before being automatically stopped. In this respect my invention is particularly useful in laundry apparatus such as clothes washing and clothes drying machines wherein it is desirable for reasons hereinbefore stated to eliminate an electric clock timer. In these laundry machines the operative element may be a spinnable tub, a clothes agitator which is both rotated and reciprocated and/or a rotary clothes tumbling drum or the like. In order to simplify illustration of my invention, I prefer to show a washing machine including an operative element or agitator, an electric motor for driving same, a combined timer and electric switch device and a single electric circuit for the motor and device which is not complex. However, it is to be understood that the combined timer and switch device may be of a more complicated construction whereby it is settable in different positions to control a plurality of circuits in a multiple circuit electric system as is present in modern washing machines for effecting various cycles of operation of one or more operative elements therein.

Referring now to the drawings, I show in FIGURE 1 thereof a clothes washing apparatus or machine including, in general, a cabinet **10** having a casing or housing **11** provided with a plurality of walls forming or defining a chamber in the cabinet. A trough-like partition divides the interior of the chamber in cabinet **10** into an upper compartment **14** and a lower compartment **16**. A rotatable or centrifugal basket composed of an inner perforated cup **17** and an outer imperforate cup **18**, welded together, is adapted to retain liquid while the basket is stationary and to discharge the liquid over the top rim thereof when the basket is rotated. An operative element or reciprocating clothes agitator **19** is located within the centrifugal basket and is consequently contained in the chamber of cabinet **10** formed by walls of housing **11**. A basket counterbalancing means **21** is provided in cabinet **10** and this means is connected to a mechanism within a casing **22** driven by an electric motor within a casing **23** bolted or otherwise suitably secured to casing **22**. The mechanism in casing **22** includes means usually effective to produce rotation of the basket, composed of cups **18** and **17**, when the electric motor in casing **23** is energized and rotated in one direction and to reciprocate element or agitator **19** when the motor is energized and rotated in the other direction. While I have, for the sake of simplification as hereinbefore mentioned, shown an electric circuit which energizes motor in casing **23** to cause operation or reciprocation only of element or agitator **19**, it is to be understood that energization of the electric motor in casing **23** may, through the mechanism within casing **23**, transmit rotary motion to the clothes basket, cups **17** and **18**, or it may rotate a clothes receiving drum of a clothes drying machine. The general structure, other components such as water fill

and water removal means of the washing machine herein disclosed, together with the operative element thereof, may be of a type shown and more fully described in the patent to Clark #2,366,236 dated January 2, 1945 and assigned to the assignee of this application. This type of washing machine in the patent just referred to is well known to those skilled in the art and hence no further or detailed description thereof is deemed necessary herein.

In accordance with my invention I desire to eliminate the electrically driven clock timer or timing device shown in the Clark patent from the machine herein disclosed. Such timers are well known to those skilled in the art since they are more or less standard equipment in present-day washing machines and are shown and fully described in several patents, for example, Clark #2,502,823 April 4, 1950; Candor #2,608,252 August 26, 1952; Manecke #2,654,961; and Clark #2,846,766. In my clothes washing machine the chamber within cabinet **10**, formed by walls of housing **11**, is provided with an opening **26** (see FIGURE 1) centrally within a depressed portion **27** at the top of the cabinet. Opening **26** affords access to the chamber in cabinet **10** and particularly to the clothes basket defined by cups **17** and **18**. A door or lid **29** is hingedly mounted on cabinet **10** for vertical swinging movement relative thereto and normally closes the chamber access opening **26**. This door **29** may be hollow and the space between its inner and outer panels, can, if desired, contain any suitable insulating material. The hinge means for door or lid **29** has a round hinge pin, rod or shaft **31**, rotatably anchored to housing **11** at the pivot points **32** (see FIGURE 2). A central part of hinge pin or shaft **31** is square as at **34** and a bracket welded or otherwise suitably secured to door **29**, or a portion of the door itself, may be bent around the square part **34** of pin **31** and locked thereto so as to rotate this hinge pin or shaft with a swinging movement of door **29**. An extension of pin or shaft **31** has secured thereto a gear **36** and a further extension **37** thereof has a cam **38** mounted thereon. Gear **36** and cam **38** are rotatable with the pin or shaft **31** upon a swinging movement of door **29** and cam **38** engages a spring biased plunger **39** forming a part of a timer to now be generally described.

A mechanically or spring wound combined timing means, timer or timing and electric switch device indicated at **40** includes a spring tensioned rotatable shaft **41** having a part thereof protruding outwardly from each of its sides. A gear **42** is mounted on timer shaft **41** and meshes with or is geared to gear **36** on hinge pin or shaft **31**. A slip clutch, indicated by the numeral **43**, forms a part of timer device **40** and is employed for preventing too tight or overwinding of a spring therein upon successive opening movements of door **29**. The opposite end of shaft **41** of combined device **40** projecting out of the other side thereof has a cam **44** mounted thereon for rotation therewith. The cam **44** is of such a shape or configuration as to permit a spring contact cam following arm **46** of electric switch portion **47** of the combined timer and switch device to rest or remain in a recessed or dwell part thereof while door **29** of washing machine cabinet **10** is closed, opened and/or during its swinging movement for normally maintaining the contact arm **46** separated from a stationary contact arm **48** of switch **47**. Cam **44** has a lobe or raised portion thereon which is so arranged as to be immediately rotated by shaft **41**, upon activation and release of the spring in device **40**, for closing contact arm **46** against contact arm **48** to make an electric circuit through switch **47** of the combined device. The slip clutch **43** also permits reverse rotation of shaft **41** of device **40** to rotate cam **44** thereon so as to actuate switch **47** when the cabinet door **29** is closed after being swung open. Switch portion **47** of the combined device **40** is interposed in a circuit for conducting electric current to the motor in casing **23**. This electric circuit includes a wire conductor **51** leading from one side of a source of electric current supply to the motor, a wire conductor **52** leading from the motor to contact arm **46** of switch **47** and a wire conductor **53** leading from switch contact arm **48** to the other side of a power main. A second spring biased button switch **56** is interposed in the electric circuit, wire **52**, and this switch is adapted to be opened in response to an opening swinging movement of door **29**. The second spring biased button switch **56** is mounted on an apron part of the depressed portion **27** (see FIGURE 1) on the top of cabinet **10** for engagement by door **29** when same is closed to make contact with or through the wire **52** leading from motor **23** to switch portion **47** of combined device **40**. Spring wound devices such as combined device **40**, the slip clutch **43**, and electric switch portion **47** thereof are conventional in the art and their functions or operations are well known, hence no detailed description thereof is necessary herein.

In the present disclosure the lid or door **29** of washing machine cabinet **10** is swung open through an arc of substantially 90° and soiled clothes to be washed therein are placed in cup **17** within the chamber of the cabinet. This opening swinging movement of door **29** rotates hinge pin or shaft **31**, gear **36** and cam **38** in a counterclockwise direction as viewed in FIGURES 1 and 3. Gear **36** rotates gear **42** of the combined device **40** and rotation of shaft **41** by gear **42** winds a spring in the device **40** to a predetermined tension for causing a timed operation thereof. Cam **38** is also rotated simultaneously with rotation of gear **36** by the 90° opening movement of door **29** and plunger **39**, which previously rested in a dwell or recessed portion of cam **38**, is thereby moved, by a raised peripheral portion of cam **38**, into the casing of device **40** for momentarily locking the spring in the device against rotating its shaft **41**. As before stated, contact arm **46** of switch **47** is separated from its stationary contact arm **48** during opening swinging movement of door **29**. Combined device **40** is at this time held or cocked, in a wound condition ready to be uncocked for activating same to close contact arms **46** and **48** of switch **47** as soon as door **29** of cabinet **10** of the washing machine is swung back through the 90° arc into closed position. At this time, the second spring pressed button electric switch **56** is also open by virtue of door **29** being moved out of engagement therewith. The clothes washing apparatus or machine is now idle with the electric circuit thereof broken at two points therein and when door **29** of cabinet **10** is swung shut or closed hinge pin or shaft **31** rotates back through its substantially 90° arc. This closing movement of door **29** and consequently return rotation of pin or shaft **31** rotates a raised peripheral portion of cam **38** past spring biased plunger **39** and the plunger moves out of casing of device **40**, into engagement with a recessed or dwell portion of cam **38**, to unlock the wound spring in device **40**. Closing movement of door **29** also closes the button switch **56** to make the circuit therethrough in wire **52**. The slip clutch **43** then permits the wound spring in device **40** to reversely rotate shaft **41** thereof, without rotating gear **42**, which shaft **41** in turn rotates the lobe or raised portion of cam **44** to shift the cam following spring arm contact **46** of switch **47** into engagement with stationary contact arm **48** thus, since switch **56** has been closed, making the electric circuit through wires **51**, **52** and **53** to the motor in casing **23**. Although a water filling means is not shown in the present disclosure, it is to be understood that the making of the electric circuit also, at least momentarily, energizes suitable means to cause water to enter the clothes basket, cups **17** and **18**, for a clothes washing operation. Energization of motor **23** rotates the motor in one direction which reciprocates or causes operation of agitator **19** through the mechanism contained in casing **22**. Since device **40** is operating under the influence of the previously wound spring therein

the electric circuit is maintained closed to actuate motor **23** for effecting a timed cycle of operation of element or agitator **19**. This timed cycle of operation or agitation of agitator **19** to carry out a washing period of clothes in machine **10** is of a duration corresponding to the intensity of winding of the spring in the mechanically wound combined timer and switch device **40**. Thus after the spring in device **40** has been uncocked and has completely unwound, the reverse rotation of shaft **41** and cam **44** thereon causes the cam following spring contact arm **46** of switch **47** to be biased into the recessed or dwell portion of cam **44**. The contact arms **46** and **48** then separate from one another to break the electric circuit to motor **23** and terminate the timed cycle of operation or agitation of element or agitator **19**. At any period during the timed cycle of operation of agitator **19** door **29** on cabinet **10** can be opened to inspect the clothes washing process and agitation of the agitator will be interrupted without reducing the predetermined duration of its timed operation. For example, after a timed cycle of operation of element **19** is initiated in response to opening and closing door **29** a subsequent opening of the door immediately causes cam **38** to push plunger **39** into the casing of device **40** to lock the spring therein and prevent continued reverse rotation of shaft **41** and cam **44**. This subsequent opening swinging movement of door **29** disengages button switch **56** and its spring shifts the switch to break the electric circuit through wire **52** to motor **23**. When door **29** is thereafter closed it shifts switch **56** into closed position to again make the momentarily broken electric circuit through wire **52**. This closing of door **29** also reversely rotates hinge pin shaft and cam **38** thereon and therefore releases plunger **39** to permit the combined timer-switch device **40** to again resume its timed making and breaking of the electric circuit and consequently the predetermined timed cycle of operation of element **19**. Thus device **40** is rendered operative to actuate switch **47** thereof by its connection or connecting means, slip clutch **43**, gears **36** and **42** and hinge pin or shaft **31** in response to a swinging movement of door **29** on cabinet or machine **10**. The rendering operative of combined device **40** may occur as frequently as various clothes washing, rinsing, spin drying and/or tumble drying cycles are desired by an opening swinging movement of the appliance door.

It should, from the foregoing, be apparent that I have provided an improved substantially infallible arrangement for effecting a timed cycle of operation of an operative element or agitator in laundry machines. The arrangement is such that laundry machines need not be equipped with an expensive and troublesome electrically operated timer device thus their manufacturing costs may be reduced. By employing a combined spring wound timer-switch device as herein disclosed its operation is positive and automatic in response to movement of a door on a laundry machine when clothes are to be processed therein to provide a timed cycle of operation of an element within the machine.

While the embodiment of the present invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. In combination, a clothes washing machine comprising a housing having walls defining a chamber therein containing an agitator driven by an electric motor, a circuit for conducting electric current from a source of supply thereof to said motor, a wall of said housing being provided with an opening affording access to said chamber, a door for the chamber access opening, said door being mounted on said housing for movement relative thereto, a mechanically wound timing device on said machine including a switch interposed in said circuit, means connecting said door to said device, said means being actuated in response to a movement of said door for winding said timing device, and said switch of the timing device making and breaking the electric circuit to said motor for effecting a timed cycle of operation of said agitator.

2. In combination, a clothes washing machine comprising a housing having walls defining a chamber therein containing an agitator driven by an electric motor, a circuit for conducting electric current from a source of supply thereof to said motor, a wall of said housing being provided with an opening affording access to said chamber, a door for the chamber access opening, said door being mounted on said housing for movement relative thereto, a mechanically wound timing device on said machine including a switch interposed in said circuit, means connecting said door to said device, said means being actuated in response to a movement of said door for winding said timing device, said switch of the timing device making and breaking the electric circuit to said motor for effecting a timed cycle of operation of said agitator, a second switch associated with said door and interposed in said circuit, and said second switch being actuated in response to an opening movement of said door for breaking the circuit to said motor while same is operating to interrupt a cycle of operation of the agitator.

3. In combination, a clothes washing machine comprising a housing having walls defining a chamber therein containing an agitator driven by an electric motor, a circuit for conducting electric current from a source of supply thereof to said motor, a wall of said housing being provided with an opening affording access to said chamber, a door for the chamber access opening, said door being hingedly mounted on said housing for swinging movement relative thereto, a spring wound timer device on said machine including a switch interposed in said circuit, means forming a connection between said door and said device, said means being actuated in response to a swinging movement of said door for winding the spring of said timer device, and said switch of the timer device making and breaking the electric circuit to said motor for effecting a timed cycle of operation of said agitator.

4. In combination, a clothes washing machine comprising a housing having walls defining a chamber therein containing an agitator driven by an electric motor, a circuit for conducting electric current from a source of supply thereof to said motor, a wall of said housing being provided with an opening affording access to said chamber, a door for the chamber access opening, a hinge having a hinge pin mounting said door on said housing for swinging movement relative thereto, said door being secured to said hinge pin for rotating same with swinging of the door, a mechanically wound timing device on said machine including a switch interposed in said circuit, means connecting said door hinge pin to said device, said hinge pin actuating said means to wind the timing device in response to a swinging movement of said door, and said switch of the timing device making and breaking the electric circuit to said motor for effecting a timed cycle of operation of said agitator.

5. A laundry machine comprising in combination, a housing having walls defining a chamber in the machine containing an electric motor and an element driven thereby, a circuit for conducting electric current from a source of supply thereof to said motor, a wall of said housing being provided with an opening affording access to said chamber, a door for the chamber access opening, said door being mounted on said housing for movement relative thereto, a mechanically wound timing device on said machine including a switch interposed in said circuit, means connecting said door to said device, said means being actuated in response to a movement of said door for winding said timing device and rendering it operative to actuate said switch, and said switch making and breaking the electric circuit to said motor for effecting a timed cycle of operation of said element by said device.

6. A laundry machine comprising in combination, a

housing having walls defining a chamber in the machine containing an electric motor and an element driven thereby, a circuit for conducting electric current from a source of supply thereof to said motor, a wall of said housing being provided with an opening affording access to said chamber, a door for the chamber access opening, said door being mounted on said housing for movement relative thereto, a mechanically wound timing device on said machine including a switch interposed in said circuit, means connecting said door to said device, said means being actuated in response to a movement of said door for winding said timing device and rendering it operative to actuate said switch, said switch making and breaking the electric circuit to said motor for effecting a timed cycle of operation of said element by said device, a second switch associated with said door and interposed in said circuit, and said second switch being actuated in response to an opening movement of said door for breaking the circuit to said motor while same is operating to interrupt a cycle of operation of said element.

7. A laundry machine comprising in combination, a housing having walls defining a chamber in the machine containing an electric motor and an element driven thereby, a circuit for conducting electric current from a source of supply thereof to said motor, a wall of said housing being provided with an opening affording access to said chamber, a door for the chamber access opening, a hinge having a hinge pin mounting said door on said housing for swinging movement relative thereto, said door being secured to said hinge pin for rotating same with swinging of the door, a mechanically wound timing device on said machine including a switch interposed in

said circuit, means connecting said door hinge pin to said device, said hinge pin actuating said means in response to a swinging movement of said door for winding said timing device and rendering it operative to actuate said switch, and said switch making and breaking the electric circuit to said motor for effecting a timed cycle of operation of said element by said device.

8. A laundry machine comprising in combination, a housing having walls defining a chamber in the machine containing an electric motor and an element driven thereby, a circuit for conducting electric current from a source of supply thereof to said motor, a wall of said housing being provided with an opening affording access to said chamber, a door for the chamber access opening, said door being hingedly mounted on said housing for swinging movement relative thereto, a spring wound timer device on said machine including a switch interposed in said circuit, means forming a connection between said door and said device, said means being actuated in response to a swinging movement of said door for winding the spring of said timer device and rendering it operative to actuate said switch, and said switch making and breaking the electric circuit to said motor for effecting a timed cycle of operation of said element by said device.

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