June 8, 1965 W. L. LINN 3,188,409

MOTOR DRIVE, CAM ACTUATED ELECTRICAL MULTI-SWITCH WITH RATCHET ESCAPEMENT

Filed March 22, 1963

2 Sheets-Sheet 1

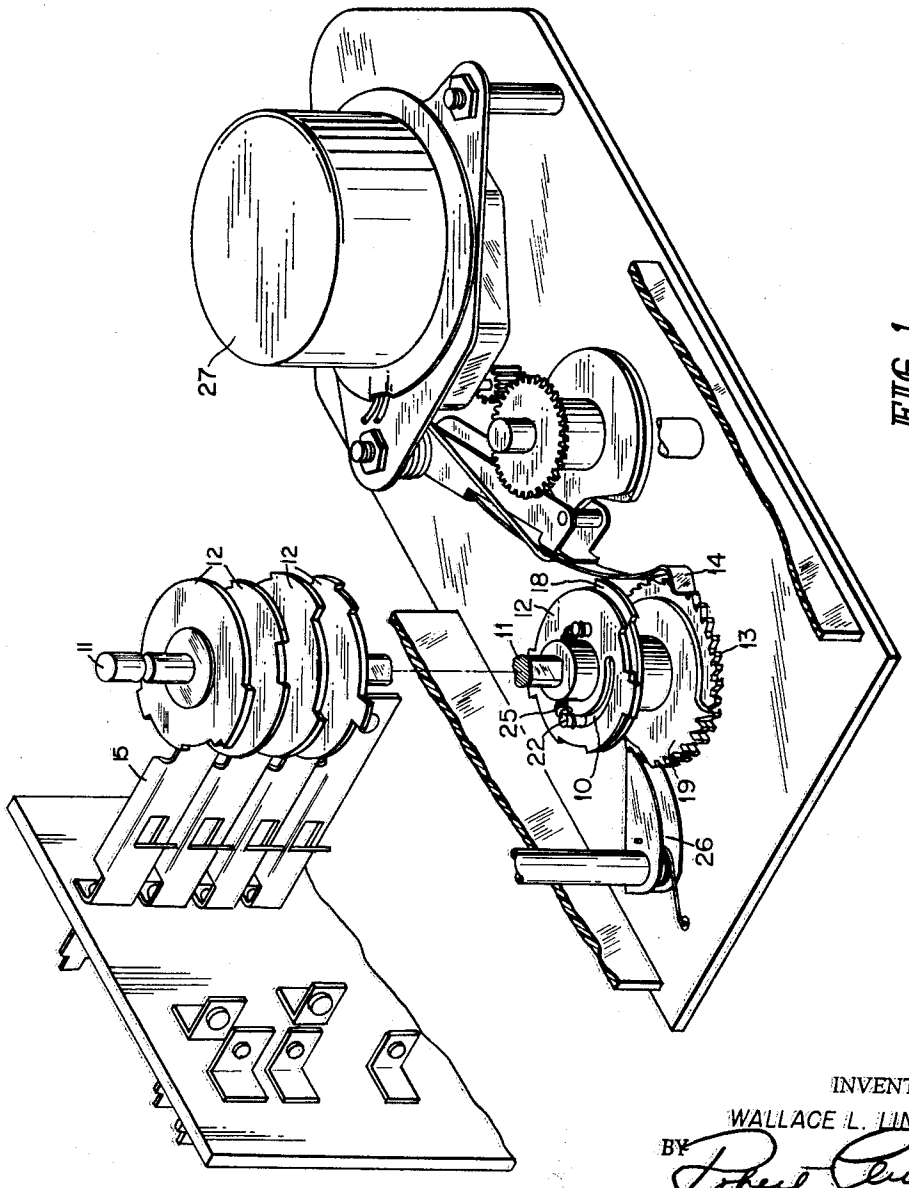


FIG. 1

INVENTOR.
WALLACE L. LINN
BY Robert Lunne
ATTORNEY

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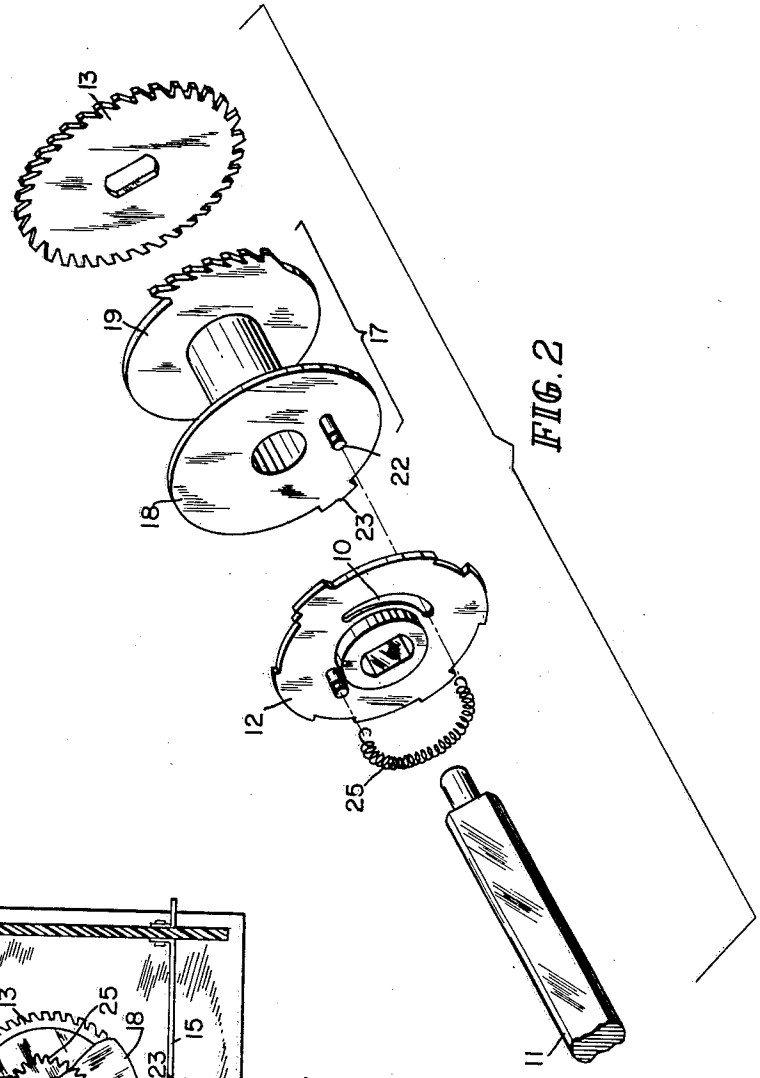


FIG. 2

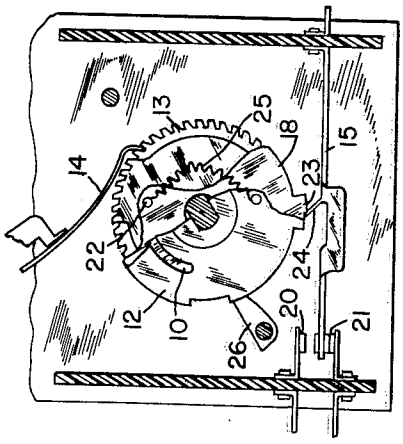


FIG. 3

INVENTOR.
WALLACE L. LINN
BY Robert Linn
ATTORNEY

United States Patent Office

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MOTOR DRIVE, CAM ACTUATED ELECTRICAL MULTI-SWITCH WITH RATCHET ESCAPEMENT

Wallace L. Linn, Indianapolis, Ind., assignor to P. R. Mallory & Co., Inc., Indianapolis, Ind., a corporation of Delaware

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7 Claims. (Cl. 200—38)

The present invention relates to electric timer switches and particularly to cam controlled switching devices, the same including means providing a controlled variable time period preceded by a constant time period for use in connection with, for example, clothes washing machines.

It is desirable in the operation of washing machines that provision be made for the adjustment or variation of one or more of the periods included in the washing cycle, since it is apparent that, because of the type of clothing acted upon, different time treatments may have to be initiated to obtain the proper cleaning of the clothes.

Therefore, it is an object of the present invention to provide a variable time period in the timing cycle of a washing machine or clothes dryer.

Another object of the invention is to provide an improved variable timer mechanism incorporated in the timer of a clothes washing machine or the like.

Still another object of the invention is to provide a variable time period preceding the constant time period in the cycle timer of an electric switch.

Yet another object of the present invention is to provide an improved timer switch as used in automatic washing and drying machines.

Still another object of the present invention is to provide in the cycle timer of a washing machine a floating assembly comprising a partial ratchet and split cam assembly for obtaining a variable time period in operation of the washing cycle of the machine.

The invention, in another of its aspects, relates to novel features of the instrumentalities described herein for teaching the principal object of the invention and to the novel principles employed in the instrumentalities whether or not these features and principles may be used in the said object and/or in the said field.

Other objects of the 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.

Referring to the figures of the drawing:

FIGURE 1 is a perspective view of the drive mechanism of the present invention as adapted to illustrate the novel construction of the floating assembly used therein to provide a variable time period preceded by a constant time period effectuated by the switches.

FIGURE 2 is an exploded view showing part of the shaft assembly to illustrate the cooperative functioning of the partial ratchet and floating cam components included in the floating assembly of the present cycle timer switch and, as operating directly from a ratchet using a leaf spring driving mechanism.

FIGURE 3 is a cut-away view taken through the variable wash assembly of the timer switch.

The present invention finds its principal applications in cycle timing switches driven as by a clock motor of the electrical synchronous or constant speed type or the like and which has a manually movable control knob for the setting thereof. Most of these switches are designed to operate for a fixed period of time in each operation. By contrast with this usual type of switch, the present invention is a cycle timer switch which provides for a preliminary adjustment of a period in the cycle so as to correlate the said period to the particular requirements of the material being handled. The switch further provides a floating assembly type of construction which includes a partial ratchet and floating cam cooperatively functioning through the means of an inter-connected spring mechanism so as to encompass a variable time period which may be preceded by a constant time period. The selection of the duration of the variable period is accomplished by means of turning a shaft to a preselected position in accordance with dial markings determined from a fixed zero position. The floating assembly is attached to a shaft driven through an intermittent ratchet mechanism. The present invention of a cycle timer switch including a floating assembly means for providing a variable time period preceded by a constant time period for use in clothes washing machines, as described, is merely illustrative and not exhaustive in scope and since many widely different emmodiments of the invention may be made without departing from the scope thereof, it is intended that all matter contained in the foregoing description and shown on the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

Generally speaking, the invention consists of a main shaft to which is rigidly affixed any number of cams and a drive ratchet. Clockwise motion transmitted from the drive motor (timer motor) and drive spring to the ratchet and cams operate double throw switches which make and break contact according to a programmed time cycle. Also by moving the shaft approximately .089 inch axially, it is possible to open and/or close an additional switch (line switch) which controls the line current to any or all of the double throw switches. Pivoting on the same axis as the main shaft is a floating assembly consisting of one partial cam and a partial ratchet. The partial cam is positioned in its first index position (#1 fill position) and is adjacent to one of the aforementioned fixed cams and both control, in proper sequence, the same double throw switch. The fixed cam controls the constant time period only (bottom side of switch), and the floating cam controls the variable time period (top side of switch). Affixed to the floating cam is a pin which rides within a controlling slot in the fixed cam. The controlling slot determines the variable range. The floating hub, ratchet and cam assembly is held in its initial position due to the first tooth of the partial ratchet being restricted from moving clockwise by the drive spring and also by a restricting shoulder on the top lobe of the partial cam which hangs up on the lifter tab of the double throw cam spring. Unless the shaft is indexed axially to close the contacts of the line switch and actuate the timer drive motor at the initial setting, further rotation of the cam and shaft assembly within the range of the control slot will reduce the total time cycle of the switch. The number of teeth on the partial ratchet determine the number of impulses or index positions of the floating (variable) hub, ratchet and cam assembly. The tension spring applies a clockwise force to the floating hub, ratchet and cam assembly. The spring resets the floating variable assembly the instant that the partial ratchet disengages with the drive spring (leaf).

The operation of the timer switch is as follows:

(1) Assuming that cam shaft has just completed a full cycle and has automatically stopped at the "off" position of the dial.

(2) Manually turn the shaft to the predetermined position or time (markings on dial).

(3) As shaft is automatically/or manually manipulated axially, the line switch opens.

(4) At zero position or the first impulse position of the time chart or cycle, the first tooth of the partial ratchet advances clockwise until it rests against the drive spring

(leaf). At this point the restricting shoulder 23 on the top lobe of the partial cam 18 also hangs up against the lifter tab 24 of the double throw cam spring 15. The partial ratchet and cam assembly will remain in this position until either the shaft 11 is manipulated axially to start the timer motor 27 or until the shaft is rotated manually clockwise beyond the "variable" range of the controlling slot 10.

(5) After turning the shaft 11 to the proper time setting shown on the timer dial, it must be manipulated axially to close the line switch which turns the timer motor 27 "on". Actuation of the time motor 27 causes the drive spring 14 to advance the partial ratchet 19 and the fixed drive ratchet 13 in a sequence of one tooth increments.

(6) The timer motor 27 is now transferring power to the cam and shaft assembly as well as the floating assembly 17. The floating variable cam 18 advances clockwise under the lifter tab 24 of the double throw cam spring 15 and allows the double throw cam spring to make contact with the top spring 20 for a specific number of time indexes or intervals. A sufficient number of teeth are on the partial ratchet 19 to assure the proper number of fill intervals before it completely disengages from the drive spring (leaf) 14.

(7) After advancement of the floating assembly 17 until the last tooth of the partial ratchet 19 is disengaged, the tension spring 25 pulls the floating partial ratchet and cam assembly in a clockwise direction to its "reset" position (limited by the control slot 10).

(8) The cam and shaft assembly completes the balance of the prescribed time cycle to the "off" position, automatically stops and is ready for the next setting and cycle.

(9) The cam and shaft asssembly is prevented from rotating counterclockwise by a non-backing spring loaded pawl 26.

What is claimed is:

1. A variable timing device comprising: a drive means; a shaft driven by said drive means; a plurality of cams coupled to said shaft; a plurality of movable switch elements actuated by said cams; a floating assembly being loosely fitted on said shaft to have a floating characteristic thereon, said floating assembly comprising a variable cam and a partial ratchet fixedly coupled in spaced parallel relationship by a hub means; said variable cam having a shoulder; a spring means fixedly coupled between one of said plurality of cams and said floating assembly for providing lost motion coupling therebetween; an initial position between said one of said plurality of cams and said floating assembly; and a means engageable with said shoulder for retaining said floating assembly at a predetermined position as said plurality of cams are displaced thereby storing energy in said spring means, said drive means actuating said floating assembly until said floating assembly disengages said drive means thereby releasing said energy stored in said spring means causing said floating assembly to return to its initial position with said one cam, said floatin gassembly providing an additional variable time period.

2. A variable timing device comprising: a drive means; a shaft driven by said drive means; a plurality of cams coupled to said shaft; a plurality of movable switch elements actuated by said cams; a floating assembly being loosely fitted on said shaft to have a floating characteristic thereon, said floating assembly comprising a variable cam and a partial ratchet fixedly coupled in spaced parallel relationship by a hub means, said variable cam having a pin and a shoulder, said pin cooperating with one of said plurality of cams; a spring means fixedly coupled between said one cam of said plurality of cams and said floating assembly for providing lost motion coupling therebetween; an initial position between said one of said plurality of cams and said floating assembly; and a means engageable with said shoulder for retaining said floating assembly at a predetermined position as said plurality of cams are displaced thereby storing energy in said spring means, said drive means actuating said floating assembly until said floating assembly disengages said drive means thereby releasing said energy stored in said spring means causing said floating assembly to return to its initial position with said one cam, said floating assembly providing an additional variable time period.

3. A variable timing device comprising; a drive means; a shaft driven by said drive means; a plurality of cams coupled to said shaft; a plurality of movable switch elements actuated by said cams; a floating assembly being loosely fitted on said shaft to have a floating characteristic thereon, said floating assembly comprising a variable cam and a partial ratchet fixedly coupled in spaced parallel relationship by a hub means, said variable cam having a pin and a shoulder, said pin cooperating with one of said plurality of cams; a torsion spring means fixedly coupled between said one cam of said plurality of cams and said floating assembly for providing lost motion coupling therebetween; an initial position between said one of said plurality of cams and said floating assembly; and a means engageable with said shoulder for retaining said floating assembly at a predetermined position as said plurality of cams are displaced thereby storing energy in said torsion spring means, said drive means actuating said floating assembly until said floating assembly disengages said drive means thereby releasing said energy stored in said torsion spring means causing said floating assembly to return to its initial position with said one cam, said floating assembly providing an additional variable time period.

4. A variable timing device comprising: a drive means; a shaft driven by said drive means; a plurality of cams coupled to said shaft; a plurality of movable switch elements actuated by said cams, one of said plurality of cams having an arcuate slot of determined extent formed therein, said cam having a first pin fixedly coupled thereto; a floating assembly being loosely fitted on said shaft to have a floating characteristic thereon, said floating assembly comprising a variable cam and a partial ratchet fixedly coupled in spaced parallel relationship by a hub means, said variable cam having a second pin and a shoulder, said second pin cooperating with said slot of said one cam of said plurality of cams; a torsion spring means fixedly coupled between said one cam and said floating assembly for providing lost motion coupling therebetween; an initial position between one of said plurality of cams and said floating assembly; and a means engageable with said shoulder for retaining said floating assembly at a predetermined position as said plurality of cams are displaced thereby storing energy in said torsion spring means, said drive means actuating said floating assembly until said floating assembly disengages said drive means thereby releasing said energy stored in said torsion spring means causing said floating assembly to return to its initial position with said one cam, said floating assembly providing an additional variable time period.

5. A variable timing device comprising: a drive means; a shaft driven by said drive means; a plurality of cams coupled to said shaft; a plurality of movable switch elements actuated by said cams, one of said plurality of cams having an arcuate slot of determined extent formed therein, said cam having a first pin fixedly coupled thereto; a floating assembly being loosely fitted on said shaft to have a floating characteristic thereon, said floating assembly comprising a variable cam and a partial ratchet fixedly coupled in spaced parallel relationship by a hub means, said variable cam having a second pin and a shoulder, said second pin fitted within said slot and movable therealong; a torsion spring means fixedly coupled between said one cam of said plurality of cams and said floating assembly for providing lost motion coupling therebetween; an initial position between said one of said plurality of cams and said floating assembly; and a means engageable with said shoulder for retaining said floating assembly at a predetermined position as said plurality of cams are displaced

thereby storing energy in said torsion spring means, said drive means actuating said floating assembly until said floating assembly disengages said drive means thereby releasing said energy stored in said torsion spring means causing said floating assembly to return to its initial position with said one cam, said floating assembly providing an additional variable time period.

6. A variable timing device comprising: a drive means; a shaft driven by said drive means; a plurality of cams coupled to said shaft; a plurality of movable switch elements actuated by said cams, one of said plurality of cams having an arcuate slot of determined extent formed therein, said cam having a first pin fixedly coupled thereto; a floating assembly being loosely fitted on said shaft to have a floating characteristic thereon, said floating assembly comprising a variable cam and a partial ratchet fixedly coupled in spaced parallel relationship by a hub means, said variable cam having a second pin and a shoulder, said second pin fitted witthin said slot and movable therealong; a torsion spring means fixedly coupled between said one cam of said plurality of cams and said floating assembly for providing lost motion coupling therebetween; an initial position between said one of said plurality of cams and said floating assembly; and a means engageable with said shoulder for retaining said floating assembly at a predetermined position as said plurality of cams are displaced thereby storing energy in said torsion spring means, said drive means actuating said partial ratchet of said floating assembly until said partial ratchet disengages said drive means thereby releasing said energy stored in said torsion spring means causing said floating assembly to return to its initial position with said one cam, said floating assembly providing an additional variable time period.

7. A variable timing device comprising: an intermittent drive means: a shaft rotatably driven by said drive means;

a plurality of cams fixedly coupled to said shaft; a plurality of movable switch elements sequentially actuated by said cams, one of said plurality of cams having an arcuate slot of determined extent formed therein, said cam having a first pin fixedly coupled thereto; a floating assembly being loosely fitted on said shaft to have a floating characteristic thereon, said floating assembly comprising a variable cam and a partial ratchet fixedly coupled in spaced parallel relationship by a hub means, said variable cam having a second pin and a shoulder, said second pin fitted within said slot and movable therealong; a torsion spring means fixedly coupled between said two pins for providing lost motion coupling between said one cam of said plurality of cams and said floating assembly; an initial position between said one of said plurality of cams and said floating assembly; and a tab lifter means engageable with said shoulder for retaining said floating assembly at a predetermined position as said plurality of cams are displaced thereby storing energy in said torsion spring means as said second pin is displaced in said slot of said one cam of said plurality of cams, said drive means actuating said partial ratchet of said floating assembly until said partial ratchet disengages said drive means thereby releasing said energy stored in said torsion spring means causing said floating assembly to return to its initial position with said one cam of said plurality of cams, said floating assembly providing an additional variable time period.

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BERNARD A. GILHEANY, *Primary Examiner.*

ROBERT K. SCHAEFER, *Examiner.*