July 31, 1951 E. W. SWAYZE 2,562,481

TIMER MECHANISM

Filed Dec. 22, 1947

FIG. 1.

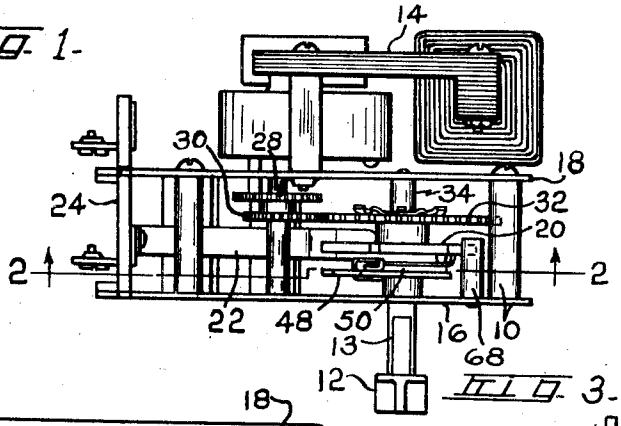


FIG. 2.

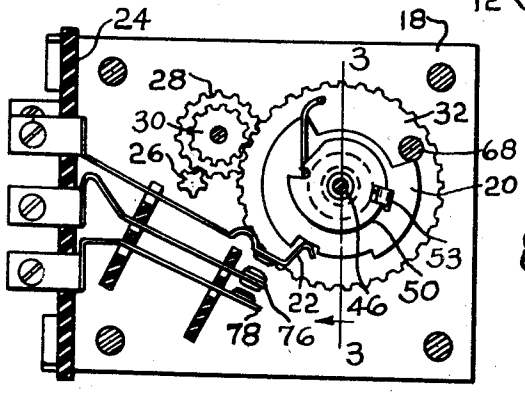


FIG. 3.

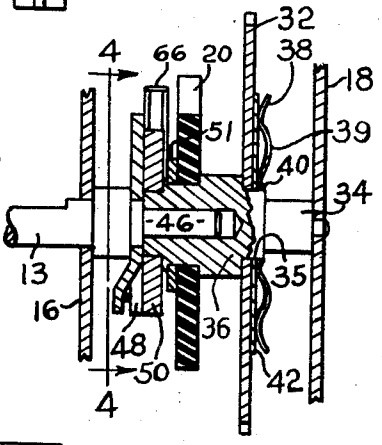


FIG. 4.

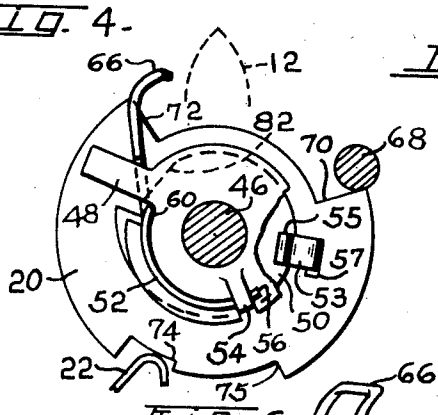


FIG. 5.

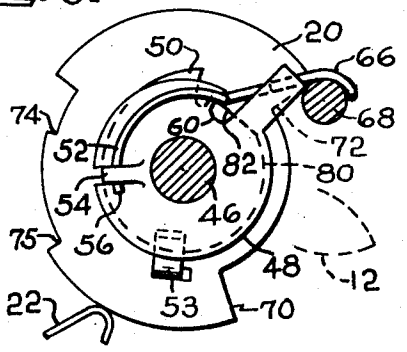
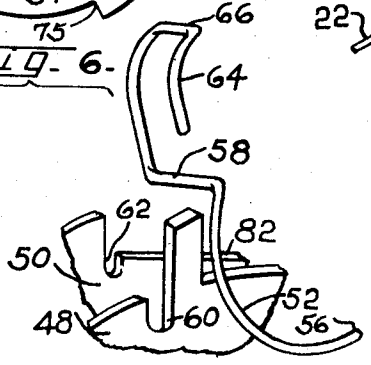


FIG. 6.



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TIMER MECHANISM

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8 Claims. (Cl. 161—1)

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This invention relates to timing mechanism, and more particularly to a timing mechanism, the operation of which is initiated manually.

In timing devices of the type described which may be initially set in a starting position manually and thereafter be caused to operate through a cycle by a clock or the equivalent, there is danger of the operator interfering with the precision timing cycle through abnormal or forced manipulation of the manual setting or starting means. Such timers are in general delicate in construction and it is not practical to construct them so as to withstand unintentional manual control which might disturb the precision timing cycle beyond that necessary for setting. Yet disturbance of the cycle of operation by unintentional manipulation of the manual control may effect disturbing irregularity in the timing cycle.

It is accordingly an object of the present invention to provide a timer control whose operation is manually initiated, and in which unintentional interference with the timer operation is inherently prevented once the timer is manually set to begin its timing cycle.

Another object of the invention is to provide a timer control which is relatively small in size, light in weight, and which nevertheless affords the advantage of preventing manual interference with its operation through unwarranted manipulation of the manual starting mechanism.

Still another object of the invention is to provide in conjunction with a time controlled cam operated switch, a manual control for initiating operation of the timer and setting the cam which shall be positively released from the cam upon the positioning of the cam in proper position for timer operation.

The above and other novel features of the invention will appear more fully hereinafter from the following detailed description when taken in conjunction with the accompanying drawings. It is expressly understood, however, that the drawings are employed for purposes of illustration only, and are not designed as a definition of the limits of the invention, reference being had for this purpose to the appended claims.

In the drawings, wherein like reference characters indicate like parts:

Figure 1 is a top plan view of the timer assembly;

Figure 2 is a section taken substantially on the line 2—2 of Figure 1;

Figure 3 is an enlarged fragmentary sectional view taken substantially on the line 3—3 of Figure 2;

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Figure 4 is a section taken substantially on the line 4—4 of Figure 3;

Figure 5 is a sectional view similar to Figure 4, with the parts moved to the "on" position; and

Figure 6 is a perspective view of the clutch spring and the cooperating notches of the coupling members.

Referring to Figure 1, there is shown a frame 10 having, projecting from the front thereof, a manual control knob 12 and control shaft 13, supporting on the rear thereof, an electric timing clock motor 14. Between the side plates 16 and 18 of the frame is positioned a cam 20 cooperating with a switch-operating spring finger 22, the latter being mounted upon a transverse insulating member 24 carried by the plates 16 and 18. The timer motor 14 is adapted to drive through a train of gears, including pinion 26, gears 28 and 30, a large gear 32 mounted upon a shaft 34. The gear 32 (see Figure 3) is rotatably mounted upon an annular shoulder 35 formed on the shaft hub 36. The cam member 20, being preferably formed from insulating material in the disclosed embodiment is keyed to the hub 36. The gear 32 is frictionally held upon the hub shoulder 35 by a spider spring 38 having resilient arms 39, the spring being rigidly secured upon the shoulder 35 by a riveting over of the end of the hub as at 40. The spider spring bears against a friction disk 42 and thereby provides a uniform light friction drive between the clock-driven gear 32 and the cam 20.

In order to provide for the rotation of the cam 20 to a starting position, manual means are provided to rotate the cam and its hub 36 relative to the gear 32. Such rotation may be effected without damage to the clock 14 by reason of the light friction drive which permits slippage for this purpose. The mechanism provided for setting the cam at starting position comprises the knob carrying shaft 13, the end 46 of which is piloted within the hub 36, and a releasable clutch device, which acts to prevent manual interference with the timer drive to the cam 20 when the cam is once set in the starting position.

The releasable clutch, which is adapted to connect shaft 13 and the cam 20, is such that the shaft 13 is immediately disconnected from the cam 20 upon movement of the cam 20 to the starting position. To secure this end, there are provided adjacent notched disk clutch elements 48 and 50, the former being fixed for rotation with the shaft 13 and the latter being keyed to the hub 36. The disk 51, fixed to hub 36, is provided with a radial lug, formed with a knee por-

tion 53 and an axial extending end portion, the knee portion lying in a notch 55 of the disk 50 and the hub end extending into a slot 57 formed in the cam 20 to key the cam to the hub.

A light spring wire having a semi-circular resilient portion 52 is secured to the disk 48 by suitable means such as an upstruck finger 54 clamping the end 56 of the spring wire securely to the disk 48. The other end of the spring wire is provided with an axially parallel extending section 58 adapted to be received in the notches 60 and 62 of the disks 48 and 50 to couple or key the disks for rotation together. The free end of the spring wire is extended and formed into a return bent loop 64 which is curved inwardly slightly as at 66, the curvature being such as to be adapted to engage a round stop pin or post 68 secured to the frame side plate 16 and ride over the stop pin, for the purpose of lifting the axial portion 58 from the notch 62 to release and disconnect the disks 48 and 50 from one another. By disconnecting the disks 48 and 50 in this manner, the clock is allowed without interference to drive the cam at a predetermined rate as may be desired through the friction drive and gear 32.

The cam 20 is notched as at 70 and 72 to engage the stop pin 68 to provide suitable stops to limit the over-all angular rotation of the cam 20. A suitable profile as at 74 is provided to engage the end of the leaf spring 22 to thereby flex the same to complete a contact with the contact leaves 76 and 78 as may be desired. The contact made by the spring leaf 22 and contact leaf 76 may close the circuit to the timer motor 14 upon moving the cam to the starting position as shown in Figure 5, and may open the circuit to the motor upon rotation by the motor back to the position shown in Figures 4 or 2. A circuit to another device may be broken by the change in profile 75, opening contacts 76 and 78. Such circuit may control the length of flow of water in a washing apparatus such as a dish washer or the like, where the quantity of water is to be accurately controlled by the lapse of a fixed period of time.

It will be observed that, upon the manual rotation of the shaft 44 and the disks 48 and 50 to the starting position shown in Figure 5, the end portion 66 of the spring wire is such as to engage the outer rounded surface of the post 68 and thereafter be cammed radially outward to lift the axial length 58 of the spring wire from the notches 60 and 62, as previously described. As soon as the wire is lifted from the notch 62, the resisting torque of the motor acting through the friction clutch 42 is disconnected from the manually rotated shaft 13 with the result that the operator will unconsciously rotate the shaft a few degrees further, bringing the curved portion of the spring 66 over the post 68 to a slightly hooked position such as will hold the manual control in the end position shown in Figure 5. The operator can thereafter manually return the hand control 12 to the starting position, but such action requires deliberation upon the part of the operator, and the resultant unhooking of the end 66 from the post 68. The mechanism is such that with the natural tendency of the operator, the clutch will be released, and there will be no tendency for the operator to in any way disturb the clock operation of the cam by the timing motor once such release takes effect. Thus, the timing motor, through its cam, may be accurately designed to control a function which must operate for a predetermined length of time for proper results.

Upon the deliberate return of the handle to the initial position, as would be proper at a time subsequent when it is desired to have the apparatus repeat its cycle, the shaft 13 is rotated counterclockwise, causing the axially directed section 58 of the spring wire to ride along the surface contour 80 of the disk 48 and over the sloping portion 82, whereupon the end position is reached and the axial portion 58 is dropped into the notches 60 and 62. The switch is thus placed in the initial position for actuation to the starting position, that is, movement of the switch parts from the position shown in Figure 4 to that shown in Figure 5. Thus normally, when starting, the operator will turn the knob to move the disk 48 from the position shown in dotted outline in Figure 5, where it was left on the previous operation, back to the position shown similarly in Figure 4, whence it is immediately returned to the position shown in Figure 5, unless, of course, in the meantime the knob has been turned back to the position of Figure 4, following previous timer actuation of the cam 20 back to the position shown in Figure 4.

While a timing clock has been shown and described, any source of substantially constant speed may be employed to drive the cam through a friction drive without altering the invention described. Additionally, the device may be used for various appliances and in various circuits, aside from use in a dish washing apparatus as suggested.

Although a single embodiment of the invention has been illustrated and described, it is to be understood that the invention is not limited thereto. As various changes in the construction and arrangement may be made without departing from the spirit of the invention, as will be apparent to those skilled in the art, reference will be had to the appended claims for a definition of the limits of the invention.

What is claimed is:

1. In a timer mechanism, an electric timer clock, a switch operating cam, a friction drive connecting said clock with said cam for causing said cam to normally be driven by said clock, switch contacts operated by said cam, said cam being adapted to close said contacts when in one position, and to open said contacts after clock driven movement thereof to another position, manual means for moving said cam in an opposite direction to the clock movement thereof by slipping said friction drive, said means including a clutch between said cam and manual means, means for releasing said clutch upon reaching a preset position, and means for securing said manual means against retrograde movement operative upon release of said clutch.

2. In a timer mechanism, a motor, a switch operating cam, a friction drive connecting said motor with said cam for causing said cam to normally be driven by said motor, switch contacts operated by said cam, said cam being adapted to close said contacts when in one position, and to open said contacts after motor driven movement thereof to another position, manual means for moving said cam in an opposite direction to the motor movement thereof by slipping said friction drive, said means including a clutch between said cam and manual means, and means for releasing said clutch upon reaching a preset position.

3. In a timer mechanism, an electric time clock, a switch operating cam, a friction drive connecting said clock with said cam for causing said cam to normally be uniformly driven by said clock, switch contacts operated by said cam, said cam being adapted to close said contacts when in one position, and to open said contacts after clock driven movement thereof to another position, manual means for moving said cam in an opposite direction to the clock movement thereof by slipping said friction drive, said means including a clutch between said cam and manual means including adjacent notched disks and a radially disposable key adapted to lie axially in said notches, and means for releasing said clutch upon reaching a preset position by radially moving said key from one of said notches.

4. In a timer mechanism, an electric timer clock, a switch operating cam, a friction drive connecting said clock with said cam for causing said cam to normally be uniformly driven by said clock, switch contacts operated by said cam, said cam being adapted to close said contacts when in one position, and to open said contacts after clock driven movement thereof to another position, manual means for moving said cam in an opposite direction to the clock movement thereof by slipping said friction drive, said means including a clutch between said cam and manual means including adjacent notched disks and a radially disposable key adapted to lie axially in said notches, means for releasing said clutch upon reaching a preset position by radially moving said key from one of said notches, and means for securing said manual means against retrograde movement operative upon release of said clutch.

5. In a timer mechanism, an electric timer clock, a switch operating cam, a friction drive connecting said clock with said cam for causing said cam to normally be uniformly driven by said clock, switch contacts operated by said cam, said cam being adapted to close said contacts when in one position, and to open said contacts after clock driven movement thereof to another position, manual means for moving said cam in an opposite direction to the clock movement thereof by slipping said friction drive, said means including a clutch between said cam and manual means including adjacent notched disks and a radially disposable key adapted to lie axially in said notches, and means associated with said radially disposable key for securing said manual means against retrograde movement operative upon release of said clutch.

6. In a timer mechanism, a timer motor, rotatable means frictionally driven by said motor for proceeding through a prescribed cycle of operation, manual means for moving said rotatable means to a starting position, said manual means

including a releasable clutch connection to said rotatable means, said clutch comprising adjacent rotatable disks secured to said rotatable means and manual means respectively, each disk having a peripheral notch therein, and a resilient member carried by one of said disks and having an axially extending portion adapted to be radially movable within said notches, and means to radially move said portion out of the notch of the other member upon moving said rotatable means to said starting position.

7. In a timer mechanism, a timer motor, rotatable means frictionally driven by said motor for proceeding through a prescribed cycle of operation, manual means for moving said rotatable means to a starting position, said manual means including a releasable clutch connection to said rotatable means, said clutch comprising adjacent rotatable disks secured to said rotatable means and manual means respectively, each disk having a peripheral notch therein, and a resilient member carried by one of said disks and having an axially extending portion adapted to be radially movable within said notches, means to radially move said portion out of the notch of the other member upon moving said rotatable means to starting position, and independent means for holding said portion out of the said last named notch.

8. In a timer mechanism, a motor, a switch-operating cam, a friction drive connecting said motor with said cam for causing said cam to normally be driven by said motor, switch contacts operated by said cam, said cam being adapted to close said contacts when in one position, and to open said contacts in another position, said contacts being opened and closed after motor driven movement of said cam between said positions, manual means for moving said cam in an opposite direction to the motor movement thereof by slipping said friction drive, said means including a clutch between said cam and manual means, and means for releasing said clutch upon reaching a pre-set position.

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