Nov. 8, 1955 J. L. HARRIS 2,723,320

SWITCHING MECHANISM

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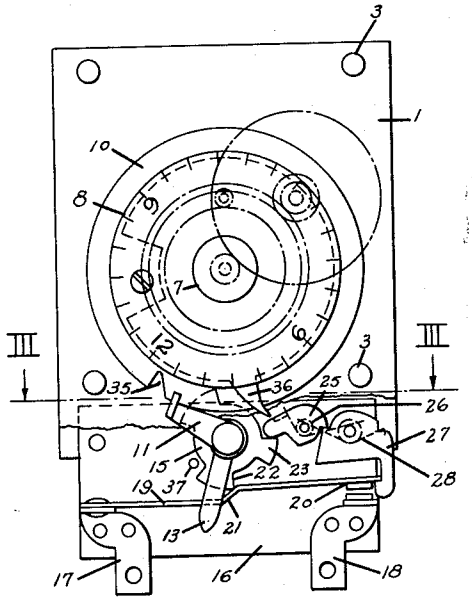


Fig-1

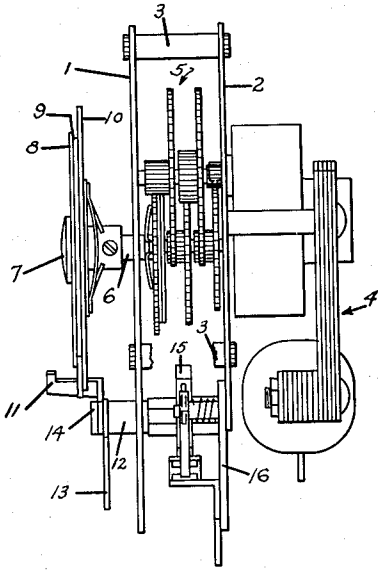


Fig-2

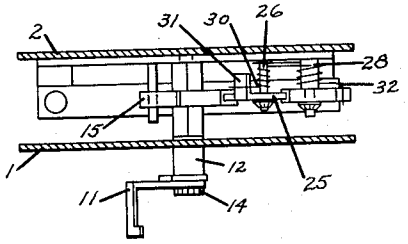


Fig-3

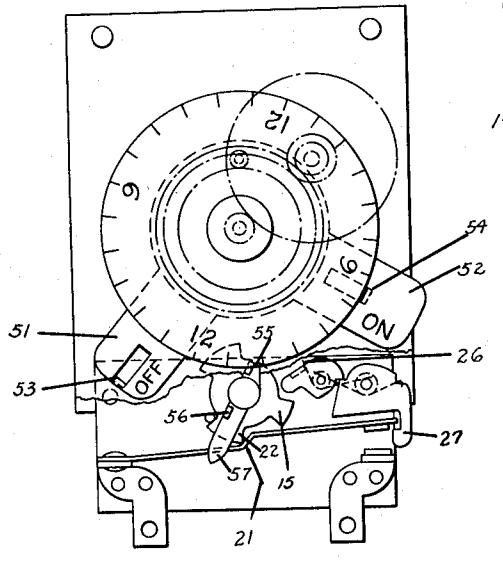


Fig-4

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SWITCHING MECHANISM

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4 Claims. (Cl. 200—39)

The present invention relates in general to switching mechanism and more particularly to switches adapted for operation by timing mechanisms.

The primary object of the invention is to provide a simple and positive switch which opens and closes with snap action even though operated by a device having an extremely slow motion.

A further object of the invention is to provide a switching mechanism having an operator normally biased in one direction but in which the biasing action may be discontinued at will to provide manual control.

Other objects will appear from the following description and appended claims.

For a full disclosure of the invention reference is made to the following detailed description and to the accompanying drawing in which: Figure 1 is a front view of a timing mechanism incorporating one form of switch embodying the invention and with parts broken away to show the switch construction. Figure 2 is a side view of the mechanism shown in Figure 1. Figure 3 is a sectional view taken on line III—III of Figure 1. Figure 4 is a view similar to Figure 1 showing the switch mechanism applied to a different form of timer.

Referring to Figures 1 and 2, reference character **1** indicates a front panel which supports a plate **2** by means of spacers **3**. The plate **2** carries a synchronous timing motor generally indicated as **4**. This motor drives a gear reduction unit **5**, which in turn rotates a shaft **6** which is mounted between plates **1** and **2**. The shaft **6** carries a hub **7** which supports a dial **8**, an "on" cam **9**, and an "off" cam **10**. The "on" and "off" cams **9** and **10** operate a cam follower **11** which is carried by a cam shaft **12** which is supported between plates **1** and **2**. The cam follower consists of an L-shaped member and is secured to the shaft along with a pointer **13** by means of a screw **14**. The cam shaft **12** supports a cam **15** between plates **1** and **2**. Preferably the portion of the cam shaft between plates **1** and **2** is hexagonal in shape as shown in Figure 2 for preventing relative rotation between the cam shaft and cam.

Mounted on the plate **2** is a switch panel **16** which supports a switch blade bracket **17** and a contact bracket **18**. The bracket **17** supports a switch blade **19** carrying a contact **20** which cooperates with a similar contact carried by the bracket **18**. As shown in Figure 1, the switch blade is provided with an offset portion **21** which is engaged by lobe **22** of the cam **15**. Lobe **23** of the cam engages a cam follower **25** which is supported on a stud **26** mounted on plate **2**. This cam follower in turn operates a latch **27**, which is supported on a stud **28** which in turn is mounted on plate **2**. As shown more clearly in Figure 3, the latch **25** is biased toward the cam by means of a torsion spring **30**. One end of this spring rides on the stud **28** and the other end bears against an inturned portion **31** of the cam follower. The latch **27** is provided with a biasing spring **32** which biases the latch toward the switch blade.

The invention is shown applied to a defroster control

for refrigerators, the function of which is to prevent operation of the refrigerator for several hours each night. Thus the "off" cam **10** is provided with a notch **35** into which the cam follower drops at a point indicated at 12:30 on the dial **8**. The "on" cam **9** has a finger **36** which raises the cam follower **11** off the periphery of cam **10** at a point indicated at approximately 4:30 on the dial **8**.

The dial and cams are driven in a clock-wise direction at a speed of one revolution a day. With the parts in the position shown, the cam follower **11** has just dropped in the notch **35** and again returned to the periphery of cam **10**. This action has opened the switch permitting the latch member **27** to come under blade **19** thus preventing contact **20** from engaging its cooperating stationary contact. The lobe **22** of the cam for this position of the cam follower is approximately at the top of the offset portion **21**. This has applied pressure to the switch blade **19** sufficiently to cause the contacts to engage. However, due to the latch member **27**, the contacts are restrained from engagement.

As the dial rotates, the projection **36** of the "on" cam comes under the cam follower **11**, causing counter-clockwise rotation of the cam **15**. This rotates the cam follower **25** in a clockwise direction which in turn rotates the latch **27** in a counter-clockwise direction. When the cam follower **11** is approximately half-way up the projection **36**, the latch **27** disengages the end of a switch blade **19**. The switch blade, due to its resiliency, snaps downwardly for causing the contacts to engage. Upon continued motion of the dial assembly, the projection **36** rides out from under cam follower **11** which permits this cam follower to be returned to the periphery of cam **10** by means of the cam follower spring **26**. The cam **15** returns to the position shown in Figure 1. However the contacts remain closed due to the latch **27** being out from under the end of switch blade **19**. The parts remain in this position until the notch **35** and "off" cam **10** comes under cam follower **11**. The cam follower drops into this notch with snap action thus permitting clockwise rotation of the cam **15**. The lobe **22** of this cam moves to the left, thus permitting blade **19** to move upwardly under its bias. This causes the contacts to open and permits the latch **27** to be returned to its position under the switch blade by means of spring **28**. As the dial assembly continues to rotate, the cam follower **11** rides up the inclined portion of the notch **35** which in turn causes the lobe **22** of the cam to ride up the inclined portion **21** of the switch blade. This returns the parts to the position shown in which the contact closing force has been applied to the switch blade and in which the contacts are prevented from closing by means of the latch **27**.

In a defroster control it is desirable occasionally to prevent defrosting on certain nights such as when ice-cream is being stored in the freezing compartment. When the user wishes to skip a defrost cycle, the pointer **13** is moved to the right as far as permitted by the stop pin **37** which limits the motion of the cam **15**. During this movement of the cam **15** the end of the cam follower **25** rides from the side of the lobe **23** to the top thereof. This neutralizes the biasing action of the cam follower **25** on the cam which permits the parts to remain in this position in which the contacts **20** are closed. When the user wishes to return to automatic defrost operation, the pointer **13** is moved back to the position shown, in which the biasing action of the cam follower spring **26** maintains the cam follower in an engagement with the "on" and "off" cams **9** and **10**.

Referring to Figure 4 the switch is operated by means of "on" and "off" pointers **51** and **52** which are provided with inwardly extending tongues **53** and **54** respectively. These tongues engage out-turned portions **55** and **56** of a

pointer 57 which is mounted on the shaft 12. Thus, as the "on" pointer 52 rotates past the pointer 57, the lug 54 engages the lug 55 of the pointer, causing counter-clockwise rotation of the cam 15. This rotation of the cam first drives the switch blade downwardly and then releases the latch 27 which permits the contacts to close with snap action. The parts are proportioned so that the lobe 22 of the cam rides beyond the top of the offset portion 21 of the switch blade. Thus the biasing action of the switch blade on the cam becomes neutralized, and the cam remains in the "on" position. As the "off" pointer 51 passes the pointer 57, the tongue 53 thereof engages the projection 56 causing clockwise rotation of the cam shaft. When the lobe 22 rides out to the offset portion 21 of the switch blade, a component of force appears, which causes rotation of the cam by the biasing action of the switch blade. This causes snap action rotation of the cam which permits snap action upward movement of the switch blade for disengaging the contacts.

It will be observed that the switching mechanism of Figure 4 is identical in construction with that shown in Figure 1 with the exception that the cam follower spring 26' is formed so as to reduce the travel of the cam follower caused by this spring. This eliminates the spring return action by the cam follower so that the parts may remain in the "on" position.

From the foregoing it will be apparent that the present invention provides a simple and positive snap action switching mechanism which may be used in a variety of applications. While a preferred form of the invention has been disclosed it will be apparent that many modifications may be made without departing from the spirit and scope of the invention. It is desired, therefore, to be limited only by the scope of the appended claims.

I claim:

1. In a switch construction, the combination of, a switch blade anchored at one end and carrying a first contact, a second contact cooperating with said first contact, an operator arranged to engage the blade on the side thereof opposite the contacts for forcing the same into engagement, the switch blade being biased toward said operator, a latch arranged to engage the blade at a point substantially spaced from said operator and prevent engagement of said contacts by said operator, and means operated with said operator for releasing said latch when the operator reaches a pre-determined position when moving in contact engaging direction.

2. In a switch construction, the combination of a switch blade anchored at one end and carrying a first contact, a second contact cooperating with said first contact, said switch blade having an offset portion, a rotatable cam having a segment constructed and arranged to engage and ride up the offset portion for applying pressure to the blade in contact engaging direction, a latch arranged to engage the blade at a point substantially spaced from the offset portion and prevent engagement of the contacts, and means operated by said cam for releasing said latch.

3. In a switch construction, the combination of a switch blade anchored at one end and carrying a first contact, a second contact cooperating with said first contact, an operator arranged to engage the blade on the side thereof opposite the contacts for forcing the same into engagement, the switch blade being biased toward said operator, a latch arranged to engage the blade at a point substantially spaced from said operator and prevent engagement of said contacts by said operator, and a cam follower arranged to ride the cam at a point spaced from the switch blade, said cam follower also being arranged to engage and operate the latch for releasing the same at a predetermined position of said cam.

4. In a switch construction, the combination of a switch blade anchored at one end and carrying a first contact, a second contact cooperating with said first contact, an operator arranged to engage the blade on the side thereof opposite the contacts for forcing the same into engagement, the switch blade being biased toward said operator, a latch arranged to engage the blade at a point substantially spaced from said operator and prevent engagement of said contacts by said operator, and a cam follower arranged to ride the cam at a point spaced from the switch blade, said cam follower also being arranged to engage and operate the latch for releasing the same at a predetermined position of said cam, said cam follower being provided with a spring for biasing the cam in contact opening direction, said cam and cam follower being proportioned so as to neutralize the biasing offset of the cam follower on the cam when the cam is rotated beyond a pre-determined angular position.

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