Dec. 23, 1947. C. R. KRONOFF 2,433,225

ELECTRIC SWITCH CONTROLLING MECHANISM

Filed March 19, 1947

FIG. 1

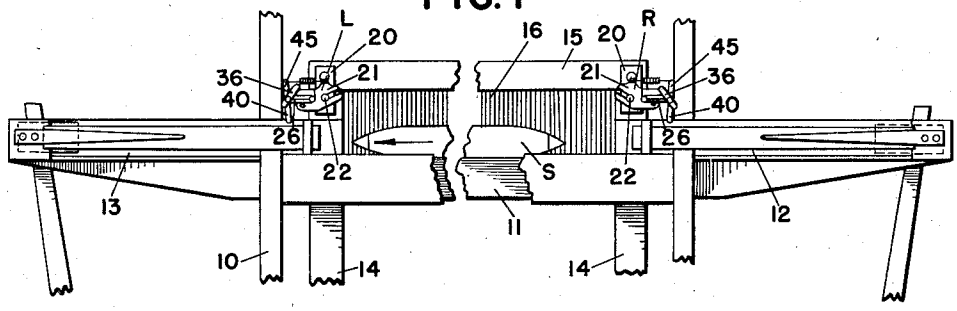


FIG. 2

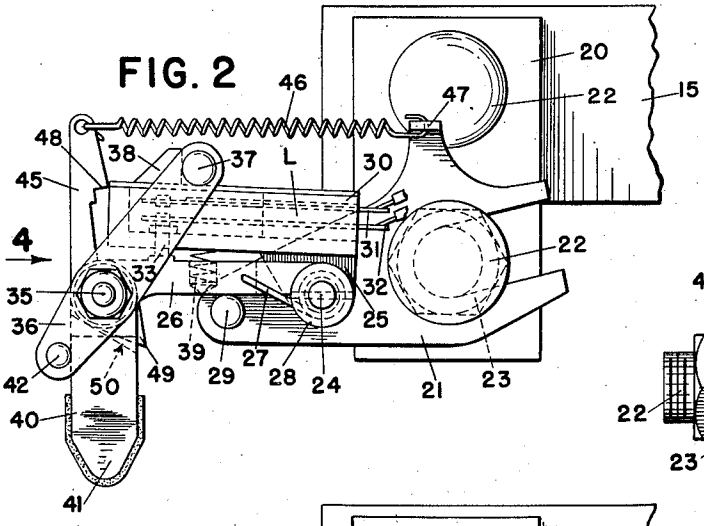


FIG. 4

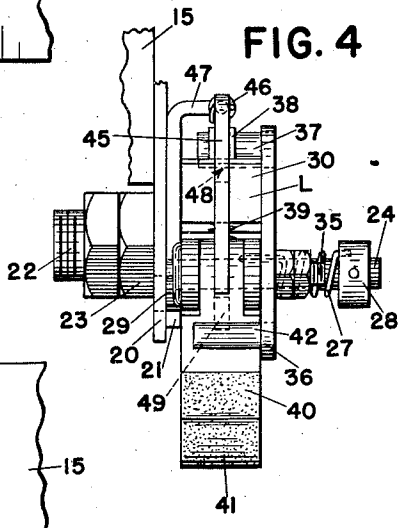
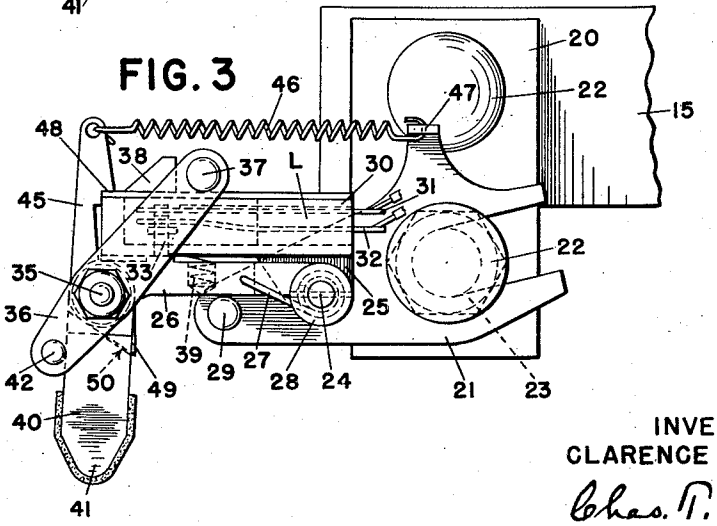


FIG. 3



INVENTOR
CLARENCE R. KRONOFF

Chas. T. Hawley

ATTORNEY

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ELECTRIC SWITCH CONTROLLING MECHANISM

Clarence R. Kronoff, Worcester, Mass., assignor to Crompton & Knowles Loom Works, Worcester, Mass., a corporation of Massachusetts

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8 Claims. (Cl. 139—341)

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This invention relates to improvements in mechanisms for operating electric switches and it is the general object of the invention to provide means by which an object such as a shuttle when moving in one direction will lock a switch in closed position but when moving in the opposite direction will unlock it.

In the operation of electric protecting mechanism for looms it is desirable to have switch means operated by the shuttle in such manner that when the shuttle moves in one direction into a shuttle box a control switch will be closed but when the shuttle moves out of the box in the opposite direction during a picking operation of the loom the switch will be opened. It is an important object of the present invention to provide switch controlling mechanism having a part moving in one direction from neutral position when the shuttle is boxed to close and lock a switch but movable in the opposite direction when the shuttle is picked out of the box to unlock and to open the switch.

It is another object of the invention to mount the actuating and locking parts for bodily movement transverse of the path of the shuttle without disturbing their control of the switch.

With these and other objects in view which will appear as the description proceeds, my invention resides in the combination and arrangement of parts hereinafter described and set forth.

In the accompanying drawings, wherein a convenient embodiment of my invention is set forth,

Fig. 1 shows part of a loom having the invention applied to each end thereof,

Fig. 2 is an enlarged front elevation of the switch control mechanism shown at the left of Fig. 1, the parts being in the position they assume when the switch is open.

Fig. 3 is a view similar to Fig. 2 but showing the switch locked in closed position, and

Fig. 4 is a side elevation looking in the direction of arrow 4, Fig. 2.

In order to illustrate one use of the invention it is shown in Fig. 1 as adapted to a loom. The loom frame 10 supports a lay 11 having right and left shuttle boxes 12 and 13, respectively. The lay is supported on swords 14 connected at their upper ends by a hand rail 15 which assists in supporting the usual reed 16. Shuttle S is picked back and forth across the lay from one shuttle box to the other and in its flight is guided by the reed and lay. In fly shuttle looms it is necessary to provide protecting means which will stop the loom in the event the shuttle fails to box in proper time, and the switch mechanism set

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forth herein has been used in connection with such means.

Each end of the hand rail supports one of the switch mechanisms forming the subject matter of the present invention, these switches being designated generally at R and L at the right and left hand ends of the hand rail. Since these mechanisms are similar except that they are of opposite hand, only one of them will be described in detail, namely, the mechanism L shown at the left of Fig. 1. It is to be understood, however, that this description applies also to the mechanism R when the invention is part of an electric protecting means for a loom.

Referring to Figs. 2 and 4 which show the switch in open position, the hand rail 15 has mounted thereon a plate 20 in which a support 21 is secured by a bolt 22. The latter permits angular adjustment of the support 21 with respect to the plate 20 and the adjustment is held by a lock nut 23. Support 21 has fixed thereto a forwardly extending stud 24 on which are pivoted two cooperating members one of which is a switch carrier 25 and the other of which is a support arm 26. Stud 24 is surrounded by the coils of a torsion spring 27 one end of which engages the arm 26 and the other of which enters a collar 28 held in adjusted angular position on stud 24. The spring 27 normally holds the arm 26 down against a stop pin 29 on support 21, but permits upward pivotal movement of the arm around stud 24 if such movement is necessary in the operation of the mechanism.

The carrier 25 supports a switch casing 30 which may be of the conventional type having upper and lower spring contacts 31 and 32, respectively, supported within the casing. A small plunger 33 guided in the bottom of casing 30 is normally pressed downwardly by contact 32 and if desired into engagement with arm 26. When the switch is open the plunger is in low position relatively to casing 30 and the two contacts are out of engagement with each other so that the switch is open.

A stud 35 secured to the left end of support arm 26 as viewed in Fig. 2 affords pivotal support for three different members one of which is an operating lever 36. The upper end of this lever is provided with a laterally extending pin 37 lying over the top of casing 30 and limited in movement to the left by a stop 38 extending upwardly from and secured to the casing 30. A compression spring 39 located between the arm 26 and the casing 30 tends normally to raise the latter against the under side of pin 37. Engagement

of the latter with the top of casing 30 and stop 38 determines the normal inclined position of lever 36 shown in Fig. 2.

The second of the members pivoted on stud 35 is an actuator arm 40 having a downwardly extending nose 41 for engagement with a passing object such for instance as the shuttle S. The lower end of lever 36 has a second stud 42 which extends laterally therefrom along the left side of arm 40 and assists in holding the latter normally in the neutral vertical position shown in Fig. 2.

The third member pivoted on stud 35 constitutes a lock arm 45 the upper end of which is attached to one end of a tension spring 46 the other end of which is connected at 47 to support 21. Lock arm 45 has a detent 48 adapted to slip over the adjacent upper end of casing 30, as will be described. The lower end of arm 45 is provided with a finger 49 lying close to a lifting surface 50 on the actuator arm 40.

Assuming that the normal position of the mechanism is that shown in Fig. 2 in which the switch is open, the casing 30 will be in relatively high position with plunger 33 in low position relatively thereto. The actuator arm 40 will hang down in neutral position, and pin 37 will engage the top of casing 30 and stop 38, while the pin 42 will engage the left side of arm 40. Spring 27 will hold the support arm 26 and the members supported thereby in low position, and spring 46 will hold lock arm 45 against the left end of casing 30 with detent 48 in non-locking position.

When the shuttle travels to the left as indicated by the arrow in Fig. 1 and engages the nose of actuator arm 40, it will move the latter to the left from neutral position, thereby exerting a force on pin 42 which causes clockwise turning of lever 36 around stud 35. This turning is accompanied by downward movement of pin 37 which lowers the casing 30 against the action of spring 39. Since arm 26 is limited in downward movement by stop pin 29 the plunger 33 due to its engagement with support arm 26 will cause upward movement of the lower contact spring 32 relatively to the casing 30 the effect of which is to establish electric engagement between the contacts 31 and 32 to close the switch.

As casing 30 descends its upper left end moves down to register with detent 48, at which time spring 46 moves the lock arm 45 to the right to place the detent over casing 30 and lock the latter in down position with the switch closed. The shuttle therefore leaves the switch closed as it enters the left box 13.

During this operation there may be some upward movement of arm 26 as the shuttle passes under nose 41. If this happens spring 27 will return the arm 26 to its low position against stop 29 after the shuttle has passed the nose.

When the shuttle is next called into action it moves out of box 13 to the right toward box 12, a condition under which it is desirable to open switch L. This result is accomplished by engagement of the right advancing end of the shuttle with nose 41, the effect of which is to rock arm 40 to the right as viewed in Fig. 3, thereby causing lifting surface 50 to engage finger 49. Lock arm 45 is thereupon rocked in a counter-clockwise direction as viewed in Fig. 3 to move the detent 48 away from casing 30. Spring 39 then raises the casing to lift contact 31 out of electric engagement with contact 32, thus opening the switch. An upward force is also exerted on pin 37 which tends to rock lever 36 in a counter-

clockwise direction as viewed in Fig. 3 to restore it to the normal position shown in Fig. 2. Spring 46 also returns lock arm 45 to the normal position of Fig. 2 as the shuttle leaves nose 41.

As the shuttle engages nose 41 while moving to the right there may be some upward movement of support arm 26, but such movement will ordinarily be less than the upward movement when the shuttle is moving to the left due to the freedom of spring 46 to expand. When spring 46 moves the lock arm 45 back into engagement with the casing 30 after deflection of arm 40 by the shuttle, finger 49 and surface 50 return the actuator arm 40 to its neutral or normal position.

It will thus be seen that when the shuttle moves nose 41 in one direction while moving to the left the normally open switch is closed and locked, the parts moving from the position shown in Fig. 2 to that shown in Fig. 3. During movement of the shuttle in the other direction nose 41 rocks in the opposite direction to unlock the mechanism, and the parts move from the position shown in Fig. 3 back to the normal open position shown in Fig. 2.

From the foregoing it will be seen that I have provided a simple electric switch controlling mechanism operated by a passing object such as the shuttle of a loom and wherein an actuator arm rocks first in one direction to close and lock a switch and then rocks in the opposite direction to unlock the switch. The adjustment of support 21 around stud or bolt 22 permits a relative raising and lowering of the nose 41 with respect to the path traversed by the shuttle. When the parts are in the position shown in Fig. 2 actuator arm 40 is held in proper position for engagement with the passing object by pin or stud 42 and finger 49. The small clearance between surface 50 and finger 49 permits lock arm 45 to move to locking position without disturbing the actuator arm, and the latter is able to hang down to be engaged by the shuttle when the switch is locked. It will also be seen that if nose 41 should by any circumstance be slightly lower than its optimum position the support or carrier arm 26 can rise against the action of spring 27, but this upward movement will not interfere with movement of switch casing 30 by either pin 37 or spring 39, since both the arm and the casing have a common center.

Having thus described my invention it will be seen that changes and modifications may be made therein by those skilled in the art without departing from the spirit and scope of the invention and I do not wish to be limited to the details herein disclosed, but what I claim is:

1. In electric switch operating mechanism having a support, switch means pivoted on said support and having two normally spaced contacts, a support arm pivoted on said support concentrically with the switch means, resilient means normally tending to move said support arm and switch means apart, an actuator pivoted on the support arm, a lever pivoted on said support arm effective to limit movement of the switch means away from the support arm and effective when rocked in a given direction to move said switch means toward said support arm, a stop on the support limiting movement of the support arm in a direction away from the switch means, said actuator when moved pivotally with respect to the support arm rocking said lever in said given direction, means thereupon effective to cause engagement of said contacts, and a lock mounted on the support arm effective to hold the switch

means in a position in which said contacts engage each other.

2. In electric switch operating mechanism having a support, a switch casing pivoted on the support and having two contacts which are spaced when the casing is in high position but which engage each other when the casing is in low position, a support arm pivotally mounted on the support, means on the latter limiting downward movement of the support arm, resilient means between the support arm and casing normally holding the latter in high position, a lever pivoted on the support arm having a part to limit upward movement of the casing and effective when the lever is rocked to move the casing to the low position thereof, an actuator pivoted on the support arm operative when moved relatively to the support arm to rock said lever, said actuator and lever normally positioned to enable said resilient means to hold the casing in high position, and a lock on said support arm effective when the casing is in low position to move to locking position to hold the casing in low position.

3. In electric switch operating mechanism having a support, a switch member pivoted on said support and having two normally spaced electric contacts, a support arm member also pivoted on said support, a stop on said support limiting downward movement of the support member, resilient means tending to separate said members, an operating lever pivoted on said support member having one end thereof normally engaging the switch member to limit movement thereof away from the support member but effective when rocked a given amount in one direction to cause said switch member to move toward said support member to a switch closed position, an actuator pivoted on the support member effective when moved in one direction relatively to the support member to rock said lever said given amount and cause the lever to move the switch member to said closed position, means engaging the support member thereupon effective to cause engagement of said contacts, and a lock on said support member thereupon effective to hold said switch member in closed position with said contacts engaging each other.

4. In electric switch operating mechanism having a support, a switch casing including two normally spaced contacts, a support arm below the casing, means on the support providing a common pivot for said casing and support arm, means on the support limiting downward movement of the support arm, resilient means tending normally to move the casing upwardly away from the support arm, a lever pivotally mounted on the support arm having a part normally engaging the casing to limit upward movement thereof by said resilient means, said lever when rocked a given amount in one direction causing said casing to move toward said support arm to a given position, an actuator movably mounted on the support arm effective when moved in one direction relatively to said support arm to rock said lever said given amount, means positioned by the support arm effective to cause engagement of said contacts when the casing is in said given position, a lock arm normally ineffective to lock said casing prior to down movement thereof by said lever, and means causing said lock to move into locking relation relatively to said casing upon movement of the latter to said given position.

5. In electric switch operating mechanism having a support, electric switch means pivotally mounted on said support and having two normally spaced contacts, a support arm mounted pivotally on said support concentric with said switch means, means limiting downward movement of said support arm relatively to the support, resilient means tending to move said switch means upwardly from said support arm, a lever pivoted on said support arm having a part extending over said switch means and limiting upward movement thereof by said resilient means, said lever when moving a given amount in a given direction causing movement of said switch means toward the support arm to a contact closing position, means positioned by said support arm causing engagement of said contacts when said switch means is moved by said lever to said closing position, an actuator pivoted on the support arm concentrically with said lever in position for engagement therewith, said actuator when moved in one direction rocking said lever to cause said part thereof to move the switch means to said closing position, and a lock arm pivoted on said support arm concentrically with said lever effective to hold said switch means in said closing position with the contacts thereof in engagement with each other.

6. In electric switch operating mechanism having a support, electric switch means pivotally mounted on said support and including two contacts separated from each other when the switch means is in normal position, a support arm pivotally mounted on said support, an actuator arm pivoted on said support arm for movement in opposite directions from a neutral position thereof, an operating lever pivoted on the support arm, resilient means tending to move the switch means away from the support arm, means on said lever normally cooperating with the resilient means to hold said switch means in normal position and effective when the lever is rocked to move said switch means toward said support arm, said actuator arm when moving in one direction from the neutral position thereof causing rocking of said lever to cause said part thereof to move the switch means toward the support arm to a closed position, means thereupon effective to cause engagement of said contacts, a lock thereupon effective to hold said switch means in closed position, and cooperating means on said actuator arm and lock effective when said actuator arm moves in the opposite direction from the neutral position thereof to move said lock out of locking relation with respect to said switch means, whereupon said resilient means moves the switch means back to normal position.

7. In electric switch operating mechanism having a support, switch means pivoted on the support having two contacts separated from each other when the switch means is in normal position, a support arm pivoted on the support, resilient means tending to move the switch means away from the support arm, an operating lever pivoted on the support arm having one end thereof cooperating with the resilient means to hold the switch means in normal position when the lever is in normal position and effective when the lever moves in a given direction to a given extent to move the switch means toward said support arm to a closed position, means causing engagement of the contacts when the switch means is in closed position, a lock normally ineffective to lock the switch means when the latter is in normal position, an actuator arm pivoted on the support arm capable of movement in two oppo-

site directions from a neutral position thereof, said actuator arm when moving in one of said directions causing said lever to rock from the normal position thereof and move the switch means to said closed position, spring means thereupon causing the lock to lock the switch means in closed position, and means causing said actuator arm when moved in the opposite direction from the neutral position thereof to move the lock away from locking relation with the switch means, whereupon said resilient means returns the switch means to the normal position thereof.

8. In electric switch operating mechanism having a support, switch means pivoted on the support having two contacts spaced when the switch means is in normal position and engaging each other when the switch means is in closed position, a support arm pivotally mounted on the support, resilient means tending to move the switch means upwardly from said support arm, a stop on the support limiting downward movement of the support arm, an operating lever pivoted on said support arm operatively related to the switch means and when in normal position

cooperating with the resilient means to hold the switch means in normal position, said lever when having a given movement in a given direction causing said switch means to move to the closed position thereof, a lock pivoted on the support arm normally ineffective to lock the switch means when the latter is in normal position, a spring causing said lock to lock the switch means in closed position when the switch means moves to said closed position, an actuator pivoted on the support arm capable of movement in opposite directions from the neutral position thereof, said actuator when moving in one of said directions effecting said given movement of the operating lever in said given direction, and cooperating parts between said actuator and lock effective when said actuator is moved in the opposite direction from the neutral position thereof to move said lock away from said switch means against the action of said spring, said cooperating parts thereafter transmitting a force derived from said spring to said actuator tending to return the latter to the neutral position thereof.

CLARENCE R. KRONOFF.