

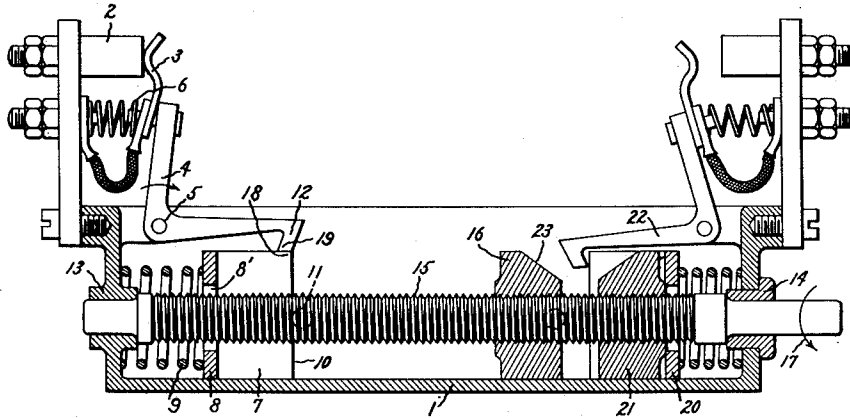
March 17, 1942.

T. SAITO

2,276,740

CONTROL DEVICE

Filed Dec. 18, 1940



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UNITED STATES PATENT OFFICE

2,276,740

CONTROL DEVICE

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Application December 18, 1940, Serial No. 370,709
In Japan December 23, 1939

5 Claims. (Cl. 200—47)

My invention relates to control devices, more particularly to mechanical limit switches, adapted to carry out an electrical switching operation after a predetermined travel of a driven member, and has for its object a limit switch which is simple in construction and small in size and which can control an electric circuit with precision when a motor or other machine has operated in a predetermined direction for a predetermined number of revolutions.

For a more complete understanding of my invention, reference should be had to the accompanying drawing, the single figure of which is a view in longitudinal section of a limit switch embodying my invention.

Referring to the drawing, on the base or frame 1 is mounted a stationary contact 2, suitably electrically insulated from other parts, with which cooperates a pivotally mounted contact 3 carried by an L-shaped contact arm or switch member 4 pivotally mounted on a pin 5 carried by the frame. The crank 4 is biased in a clockwise direction, as seen in the drawing and as indicated by the arrow, by means of a helical spring 6 whereby the switch contact 3 is biased to its open circuit position as shown on the right-hand side of the drawing. It will be understood that the switches at the opposite ends of the frame 1 are substantially identical although the description will be directed largely to the left-hand switch only, to which the reference numerals are applied. The left-hand switch is shown in the closed position while the right-hand switch is shown in the open position.

The crank 4 is normally held in its closed circuit position, as indicated on the left-hand side of the drawing, by means of a locking block or latch member 7 which is U-shaped but positioned on its side with the base 8 of the U adjacent the end of the frame. The locking block rests slidably on the bottom of the frame and normally is moved to the right by a helical spring 9 between it and the end of the frame to the position shown in the drawing against a pin 11 secured to the frame. In this position the two parallel spaced arms of the locking block forming spaced vertical walls or first portion, only one of which, 10, is shown, are positioned under the hooked end 12 of the crank 4 and hold the crank 4 in the closed circuit position shown. This hook 12 is long enough in a direction perpendicular to the drawing to extend across and rest on the two arms 10 of the latch member.

Also mounted on the frame in suitable bear-

ings 13 and 14 provided for it is a threaded shaft or screw rod 15 which extends in parallel relation with the bottom of the frame, between the two arms 10 of the U-shaped member 7, through an aperture 8' in the base 8 of the U-shaped member and through the spring 9. This screw rod 15 is arranged to be rotated by a motor or other machine (not shown in the drawing) and thereby to move the latch member 7 toward the left hand against the spring 9 and thereby release the hook 12 and the crank 4. This movement of the latch member 7 is effected after a predetermined number of turns of the screw rod 15 by means of an operating block or traveling member 16 having a threaded bore engaging the threaded screw rod 15.

When the shaft 15 is rotated in the direction indicated by the arrow 17, the operating block 16 is gradually moved forward toward the latch member 7, i. e., to the left as seen in the drawing. The operating block moves under and past the hook 12 and between the arms 10 of the latch member into engagement with the flat base or second portion of the latch member 7. It then pushes the latch member toward the left against the spring 9. After a predetermined number of revolutions of the screw rod, the latch member 7 disengages the hooked part 12, whereupon the crank 4 is released and snapped quickly by the spring 6 to its open circuit position. Preferably the latch member 7 is provided with sharp edges or corners 18 on the upper right-hand ends of its two arms 10 while the hooked part 12 is provided with a corresponding sharp edge or corner 19 to provide for a positive release of the crank.

The position of the parts described above will be understood from the switch on the right-hand side of the drawing wherein the U-shaped latch member 20 has been moved by the operating block 21 to a position to release the crank 22.

By reason of the fact that the opening of the circuit by the separation of the contacts 2 and 3 is caused by the instantaneous disengagement of the end 12 of the crank from the sharp corners 18 of the latch block 7 and its quick turning due to the action of the spring 6, the circuit will be opened with speed and precision when the screw rod 15 has been turned a predetermined number of revolutions, and the opening of the circuit will be substantially independent of whether the speed of revolution of the machine and screw rod 15 is fast or slow.

If now the machine and the screw rod 15 are rotated in the reverse direction, the screw rod

operating in a direction the reverse of that indicated by the arrow 17, the operating block 16 is moved gradually back to be restored to its original position, as shown in the drawing. As it moves toward the right hand, the bevelled or tapered surface 23 on a reset portion or projection of the operating block engages the hooked part 12 and thereby lifts the hooked part and turns the crank 4 in a counterclockwise direction. This reengages the contact 3 with the contact 2 against the force applied by the spring 6, thereby closing the circuit controlled by these contacts. Also, as the operating block 16 moves toward the right, the latch member 7 is likewise moved toward the right by the spring 9, it being held by the spring against the operating block. As a result, the latch member 7 moves under the hooked end 12 before the operating block moves away from the hooked end and consequently the latch member 7 is returned to the position shown in the drawing.

Preferably, in order to make possible the adjustment of the predetermined number of revolutions of the screw rod 15 required to open the switches, two operating blocks 16 and 21 are provided, one for each switch, so that each can be mounted in a desired position on the screw rod. Furthermore, although the drawing shows a limit switch provided with two contacts for opening the circuit it will, of course, be possible to arrange the switches to close the circuit at the predetermined limit of rotation of the screw rod 15.

While I have shown a particular embodiment of my invention, it will be understood, of course, that I do not wish to be limited thereto, since many modifications may be made and I, therefore, contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. The combination in a controller of a rotatably mounted threaded shaft, a traveling member in threaded engagement with said shaft arranged for movement lengthwise of said shaft upon rotation of said shaft, a switch member pivoted adjacent one end of said shaft, a latch arm on said switch member, a hooked part on the end of said latch arm, a spring for biasing said switch member to one position in which said hooked part lies in the path of movement of said traveling member, a latch member surrounding said shaft mounted for movement lengthwise of said shaft, a spring biasing said latch member toward said traveling member to a position in which said latch member engages said hooked part and holds said switch member in a second position against its bias, said latch member being arranged to be engaged by said traveling member when said shaft is rotated in one direction and moved by said traveling member to a position to release said hooked part whereupon said switch member moves to said first position in accordance with its bias, said traveling member moving past said hooked part before moving said latch member to a position to release said hooked part, and a projection on said traveling member provided with an inclined surface engaging said hooked part when said shaft is turned in the opposite direction thereby to lift said hooked part and move said switch member to said second position, said latch member being moved by its spring to a latching position under said hooked part before said hooked part is released by said traveling member.

2. The combination in a controller of an operating member mounted for forward and reverse movement, a latch member mounted in the path of movement of said operating member for movement toward said operating member, means biasing said latch member toward said operating member to a predetermined latching position, a switch member biased to one position mounted for movement transversely of the path of movement of said latch member but held by said latch member in a second position, said latch member being engaged by said operating member upon forward release movement of said operating member and thereby moved against its bias to release said switch member, and a reset portion on said operating member which moves past said switch member during said release movement and upon reverse movement of said operating member moves said switch member to said second position and holds said switch member in said second position until said latch member moves to said predetermined latching position.

3. The combination in a controller of a rotatably mounted threaded shaft, a latch member mounted in spaced relation with said shaft for movement lengthwise of said shaft, a spring for biasing said latch member to a predetermined latching position, a switch member biased to one position mounted for movement toward said shaft but held by said latch member in a second position, a traveling operating member on said shaft in threaded engagement therewith for release movement upon rotation of said shaft in one direction into engagement with said latch member thereby to move said latch member against said spring to release said switch member, and a reset portion on said operating member which moves past said switch member during said release movement and upon reverse movement of said operating member moves said switch member to said second position and holds said switch member in said second position until said latch member is moved by said spring to said predetermined latching position.

4. The combination in a controller of a rotatably mounted threaded shaft, a latch member mounted adjacent a first end of said shaft for movement lengthwise of said shaft having a first portion in spaced relation with said shaft and a second portion extending laterally of said shaft, a spring for biasing said latch member away from said first end to a predetermined position intermediate said shaft, a switch member extending laterally with respect to said shaft biased for movement toward said shaft and engaging said latch member at the end of said first portion adjacent the other end of said shaft whereby said switch member is held in a predetermined position, a traveling member on said shaft in threaded engagement therewith for movement upon rotation of said shaft between said shaft and said switch member into engagement with said second portion of said latch member thereby to move said latch member against said spring and release said switch member, and a projection on said traveling member arranged to engage said switch member upon reverse rotation of said shaft thereby to move said switch member into a position to be held by said latch member.

5. The combination in a controller of a rotatably mounted threaded shaft, a U-shaped latch member mounted adjacent a first end of said shaft for movement lengthwise of said shaft with

its base extending crosswise of said shaft adjacent said end and its sides extending toward the opposite end of said shaft on opposite sides of said shaft, a spring for biasing said latch member away from said first end to a predetermined position intermediate said shaft, a switch member extending across said sides biased for movement toward said shaft and engaging said sides at their ends whereby said switch member is held in a predetermined position, a traveling member on said shaft in threaded engagement therewith for movement upon rotation of said shaft between said shaft and said switch member into engagement with said base of said latch member thereby to move said latch member against said spring and release said switch member, said traveling member being arranged to engage said switch member upon reverse rotation of said shaft thereby to move said switch member into a position to be held by said latch member.

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