

Aug. 24, 1937.

H. SENGEBUSCH

2,091,108

SWITCH MECHANISM

Filed Oct. 14, 1935

FIG. 2

FIG. 1

FIG. 3

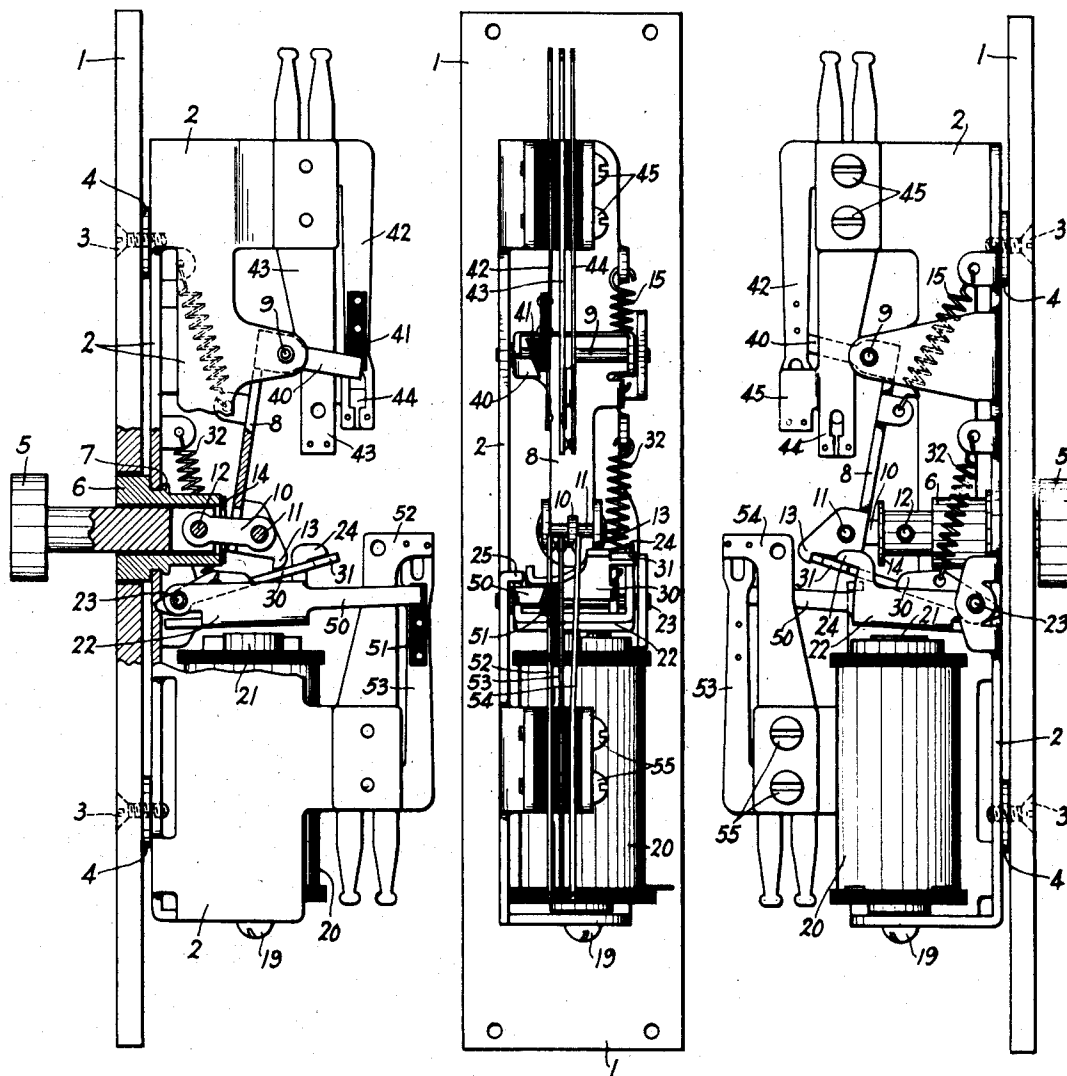
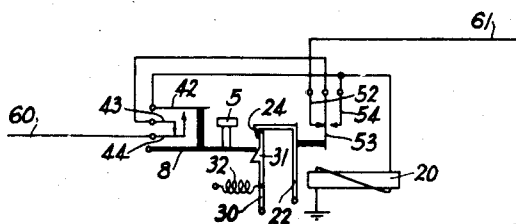


FIG. 4



INVENTOR.
HANS SENGEBUSCH

BY

Chas. F. Candy
ATTORNEY.

UNITED STATES PATENT OFFICE

2,091,108

SWITCH MECHANISM

Hans Sengebusch, Villa Park, Ill., assignor to Associated Electric Laboratories, Inc., Chicago, Ill., a corporation of Delaware

Application October 14, 1935, Serial No. 44,833

6 Claims. (Cl. 177—311)

This invention relates in general to switch mechanisms but more particularly to switch mechanisms such as keys or push buttons which actuate circuit controlling contacts and are locked operated under control of an electromagnet. Switch mechanisms of this type have utility in signalling systems such as remote control of power systems, railway signalling, taxi-cab call systems, and many other types where a manual switching operation is desired and an acknowledgement or answer-back is required.

An object of the invention is to design a switching mechanism that is sturdy and compact in construction, reliable and simple in operation and economical to manufacture.

A further object is to design a switching key in which both the operation of the key and the electromagnet actuate separate sets of circuit controlling contacts and in which the contact sets are easily accessible for adjustment.

In former switching mechanisms of the foregoing type it was difficult to prevent the momentary actuation of the contact sets on the armature of the electromagnet whenever the key or button was operated. This occurred when the catch of the push key slid over the end of the armature of the electromagnet in order to lock the key operated and resulted in false or unintentional switching operations. It is accordingly an object of the invention to provide a structure in which the foregoing defect is entirely obviated. In accordance with this object a particular feature concerns a latching member arranged in a position intermediate the armature of the electromagnet and the catch member on the key.

The drawing discloses a preferred embodiment of the invention;

Fig. 1 being a rear plan view of the switch mechanism;

Fig. 2 a left side view partly in section;

Fig. 3 a right side view with the key operated; while

Fig. 4 is a diagrammatic circuit arrangement.

The whole switch mechanism is supported on a metal base plate 1 to which it is secured by screws 3 threaded into the irregular shaped frame or base 2 and slightly separated therefrom by spacing washers 4 where the screws 3 enter the frame 2. The insulating button or key 5 protrudes from the front of the base plate 1 while the shank of the button is journaled in the bearing 6 which in turn is secured to frame 2 by having its inner end spun over as indicated at 7.

A catch lever 8 is hinged from a pair of turned-up ears formed in it to the frame 2 by means

of the pin 9. The link member 10 is connected at one end to turned-up ears formed in the catch lever 8 by bearing pin 11, while the other end of link 10 is connected by means of bearing pin 12 to a slot cut in the shank of button 5. One of the turned-up ears of the catch member 8 is formed with a catch 13. The arrangement is such that pressing the button 5 inward rotates the catch lever 8 about pin 9 through the medium of link 10 so that the catch 13 is pushed over the edge 31 of the latch 20 as will be further pointed out. A fiber washer 14 around link 10 cushions the restoring shock of catch lever 8 against the end of bearing 6. The restoration of catch lever 8 is brought about by the coiled tension spring 15 attached to projections on the lever 8 and frame 2.

An electromagnet 20 which may be of the alternating current operating type provided with shading coil 21 is attached at one end of its core to frame 2 by the supporting screw 19. The armature 22 of the magnet 20 is hinged to frame 2 by means of the bearing pin 23. A back stop 24 is formed in one side of armature 22 for the latch member 30 to rest against and another back stop 25 formed on one side of frame 2 limits the normal resting position of the armature 22.

Latching lever 30 is hinged at its two ear projections to the pin 23 and nests inside the armature 22. The latch is provided with the projection 31 which in the resting position lies against back stop 24 while the catch 24 when moved engages the end of the projection 31. A coiled tensioned spring 32 one end of which is attached to the frame 2 and the other end of the latch 30 normally holds the latch against back stop 24 and thereby further pulls the armature against back stop 25.

The catch lever 8 is provided with an extended arm 40 having a beveled turned over end in slidable engagement with an insulated cam 41 which in turn is riveted to flexible contact spring 42. Movement of the button 5 is transmitted to catch 8 and arm 40 so that it slides transversely across cam 41 resulting in the movement and closing of spring 42 against contact spring 44 and this in turn causes the movement of contact spring 44 from against contact spring 43 opening these contacts. This is commonly known as a "make-before-break" spring contact arrangement. The set of contact springs 42, 43, and 44 are insulated from each other and frame 2 by insulating spacers and are clamped to the frame by the screws 45.

The armature 22 is provided with an extended

arm 50 the end of which is turned over and beveled so as to provide a slidable engagement with the insulating cam 51 attached to contact spring 53. Contact spring 51 is normally in engagement with spring 52 and upon being moved by arm 50 when the magnet 20 is energized breaks the contact with spring 52 and makes contact with spring 54. The contact springs 52, 53, and 54 are suitably insulated from each other and the frame 2 by insulating plates and the whole clamped to frame 2 by screws 55.

The mechanism having been described in detail it will be seen that pressing the button 5 moves catch lever 8 and arm 40 to actuate the contact springs 42, 43, and 44 against the tension of coiled spring 32, and thereby holds the button 5 and contact springs in their operated position after the pressure on the button is released. It will be particularly noted that as the foregoing operation and latching took place latch member 30 was moved slightly inward due to the catch 13 sliding over projection 31. The armature 22 is therefore not disturbed and consequently the contact springs 52, 53, and 54 are not momentarily operated as would be the case if catch 13 engaged the armature directly instead of latch 30. In order to restore the button the magnet 20 is energized resulting in the attraction of armature 22 and the movement of arm 50 to actuate contact springs 52, 53, and 54. As a further result the back stop 24 on the armature pushes the latch 30 along with the armature until the catch 13 is free whereupon the button 5 and catch member 8 are restored to normal by coiled spring 15. Deenergization of magnet 20 enables coiled spring 32 to pull the latch 30, and through the medium of back-stop 24, the armature 22 to normal position against its backstop 25.

The construction and arrangement of the two sets of contact springs is such that they are easily accessible for adjustment, repair, or replacement, by being mounted directly above the operating mechanism. This is made possible by the transverse sliding movement provided between arm 40 and cam 41, and arm 50 with cam 51 to actuate the springs.

Referring particularly to Fig. 4 this illustrates a circuit arrangement in which the switch mechanism is connected in a series circuit with a number of other similar mechanisms over the lines 60 and 61, for the purpose of transmitting a signal and receiving an acknowledgement of its reception. The line circuit 60 passes through springs 43 and 44, 53 and 52 to conductor 61. Operation of button 5 locks it under control of latch 30 and opens spring 43 to interrupt the line circuit to conductor 61 while closing contact springs 42 and 44. The circuit now passes over springs 44 and 42 through the winding of magnet 20 to ground. The magnet 20 is arranged so as not to operate in this circuit, but the signal operating mechanism connected to line 60 does operate in series with the magnet. In acknowledging the signal a higher value of current is transmitted over line 60 to the magnet 20, resulting this time in its energization and the operation of armature 22 to release the catch 8 and permit button 5 to restore. This serves as a visual indication of the acknowledgment. Contact springs 53 and 54 are likewise closed by the armature 22 to close a locking circuit for magnet 20 as long as the high potential is connected to conductor 60. At contact springs 52 a point in the line circuit to conductor 61 is opened, the previous point now being

closed at spring 43. The removal of the high potential permits the magnet 20 to restore and at spring 52 again connects the line circuit through to conductor 61. The mechanism is again at normal. Other circuit arrangements lend themselves equally as well to the mechanism disclosed and false or unintentional actuation of springs 52, 53, and 54 is precluded when the button 5 is pressed.

What is claimed is:

1. In a switch mechanism, a catch member, a key for operating said catch member, a set of contact springs actuated by the operation of said catch member, a latching member automatically holding said catch member in its operated position to maintain said contact springs actuated, a release member, means for operating said release member, a set of contact springs actuated by the operation of said release member, said release member also removing said latching member from holding said catch member, and means for restoring said catch member and said release member to move their respective contact springs sets to normal position.

2. In a switch mechanism, a rotatable catch member, a push button having a shank portion, a pivoted link member connecting the end of said catch member with the shank of said button, means responsive to the operation of said push button for rotating said catch member and locking it in its rotated position, a release magnet having an armature, and means controlled by said armature when operated by said magnet for releasing said rotatable catch member and through the medium of said link member restore said push button to normal.

3. A locking push button arrangement comprising a push button having a catch member pivoted to the inner end thereof, a latch member engaging said catch member when the push button is operated to lock the push button in operated position, a magnet, an armature for said magnet engaging said latch member when the magnet is energized to unlatch the catch member and permit the push button to restore, and circuit controlling springs closed by the push button when locked operated.

4. In a locking push button arrangement, circuit controlling springs, a push button, a lever for operating part of said springs, a magnet, an armature for said magnet having means for operating others of said springs, a link having one end pivoted to the push button and the other end pivoted to the lever, said link causing operation of the lever to operate its springs when the push button is operated, a catch member associated with said push button, a latch member engaging said catch member for holding the push button and lever in operated position, said latch member engaged by the armature when the magnet is operated to release the push button and lever.

5. In a circuit controlling arrangement, a manually operated device, circuit closing springs operated thereby, a catch member on the device, a magnet, an armature therefor, a latch member pivoted on a common bearing with the armature, said latch member engaging said catch member to lock the device in operated position, said latch member movable by the device independent of the armature each time the device is operated and movable by the armature when the magnet is energized to release the catch member and permit restoration of the device.

6. In a circuit controlling arrangement, a man-

ually operated circuit closer, a catch member on the circuit closer, a magnet having an armature, a latch member pivoted on a common bearing with the armature, a back stop on said armature, 5 a spring normally holding said latch member against said back stop to thereby hold the armature in deenergized position, said latch member movable independent of the armature by said

catch member when the circuit closer is operated, said catch member engaged by the latch member to hold the circuit closer in operated position, said magnet when energized moving said armature and latch member as a unit to disengage 5 the latch member from the catch member to release the circuit closer.

HANS SENGEBUSCH.