Dec. 16, 1924. 1,519,263

E. K. READ ET AL

INTERLOCK FOR SWITCHES

Filed Nov. 26, 1920

Fig.1.

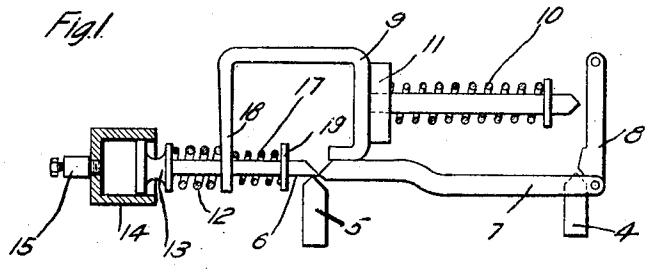


Fig.2.

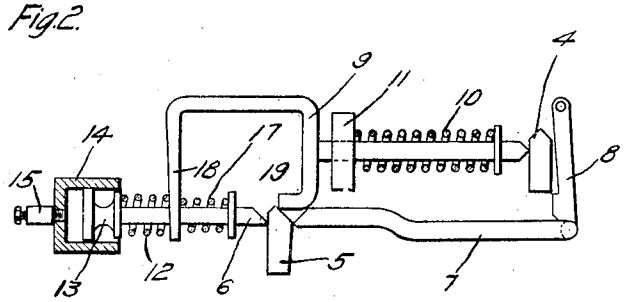
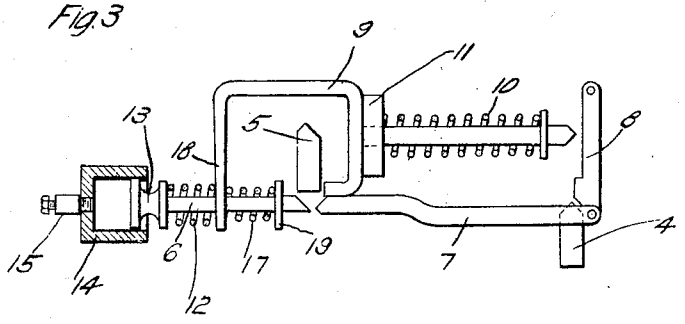


Fig.3



WITNESSES:
K. L. Blowes.
A Martin

INVENTORS
Ernest K. Read and
Clarence A. Johnson.
BY
Wesley G. Carr
ATTORNEY

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UNITED STATES PATENT OFFICE.

ERNEST K. READ, OF WILKINSBURG, AND CLARENCE A. JOHNSON, OF LARIMER, PENNSYLVANIA, ASSIGNORS TO WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

INTERLOCK FOR SWITCHES.

Application filed November 26, 1920. Serial No. 426,462.

To all whom it may concern:

Be it known that we, ERNEST K. READ, a a citizen of the United States, and a resident of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, and CLARENCE A. JOHNSON, a citizen of the United States, and a resident of Larimer, in the county of Westmoreland and State of Pennsylvania, have invented a new and useful Improvement in Interlocks for Switches, of which the following is a specification.

Our invention relates to mechanical interlocking devices adapted to ensure proper sequence in the operation of a plurality of levers, such as are used in connection with electric switch apparatus.

The object of the invention is to provide and apparatus whereby the proper sequence of operation between two switch levers is automatically assured, as in the case of high-voltage motors, which must be started under a relatively low voltage before the high voltage can be safely supplied thereto.

Various types of automatic interlocks have been devised, such as those wherein the running switch lever is automatically maintained against closing movement until after the starting switch lever has been opened, but in none of them is provision made for automatically insuring against the closing of the running switch lever until after the starting switch lever has been closed for the period of time necessary for the motor to acquire sufficient momentum.

We provide a construction wherein the running switch lever cannot be closed until after the starting switch lever has been withdrawn to retracted position, and wherein the running switch lever cannot be closed unless the starting switch lever has remained in advanced, or closed, position long enough to enable the motor to develop the speed necessary to permit of the running switch lever being safely closed. Furthermore, we provide means for preventing the closing of the starting switch lever while the running switch lever is in closed position.

The preferred form of construction for accomplishing the foregoing objects is shown in the accompanying drawing, wherein—

Figure 1 is a side elevational view, partially in section, of the apparatus in its normal position;

Fig. 2 is a view showing the position of the parts when the starting switch lever is in closed position, and

Fig. 3 shows the position of the parts when the running switch lever is in closed position.

The apparatus shown in the accompanying drawings is a modification of the locking apparatus shown in the copending application of E. K. Read, Serial No. 412,544, filed September 24, 1920, and assigned to the Westinghouse Electric & Mfg. Co., and is adapted for application to the arrangement of the switch levers shown therein.

In the accompanying drawings, 4 represents a starting switch lever and 5 a running switch lever. The running switch lever 5 is normally held in retracted position by a locking bar 6, but the starting switch lever is free to move to its upper, or closed, position, past the arm 7 which is connected to a latch member 8 in such manner that it does not interfere with the movement of the end of the lever 4 to the position shown in Fig. 2.

When the lever 4 is advanced to closed position, as indicated in Fig. 2, its beveled edge co-operates with a beveled edge on the end of a bracket or locking member 9 to force the bracket to the left and compress a spring 10 against a bracket-supporting member 11 and to compress a spring 12 against a piston 13, which operates in a cylinder 14 having a valve 15, the piston and cylinder together forming a dashpot.

The closing movement of the starting switch lever causes the motor (not shown) to start under low voltage, and the compression of the spring 12, between the bracket 9 and piston 13, forces the piston to the left and moves the locking bar 6 out of the path of the running switch lever 5, thus permitting it to be moved to the position shown in Fig. 2. The bracket 9, being held in its left-hand position by the starting switch lever 4, prevents movement of the running switch lever 5 to closed position.

It will be seen that the action of the spring 12, against the dashpot, retards the release

movement of the locking bar 6, and this retarding action may be regulated by means of the valve 15, the purpose being to prevent the release of the running switch lever 5 for an appreciable period of time after the starting switch handle has been advanced, thus preventing the advancement of the running switch lever 5 until after sufficient time has elapsed to permit the motor to acquire the necessary momentum.

Movement of the running switch lever 5 to the position shown in Fig. 2 moves the bar 7 to the right, thus tripping the latch 8 and permitting the starting switch lever 4 to be retracted to neutral position.

When the starting switch lever 4 has been retracted, the spring 10 returns the bracket 9 to the position shown in Figs. 1 and 3. This movement of the bracket 9 releases the running switch lever 5 and permits it to be advanced to the position shown in Fig. 3, thus completing the placing of the motor under full operating current.

During the return movement of the bracket 9, under action of the spring 10, a spring 17 is compressed between an extension 18 of the bracket and a collar 19 that is fastened to the locking bar 6. By this movement, the spring 17 then acts to return the locking bar 6 to the position indicated in Fig. 1. As the upper edges of the lever 7 and the locking bar 6 are beveled, the running switch lever 5 may be moved to retracted position when desired, the locking bar and the lever yielding sufficiently to permit the running switch lever 5 to pass, but resume their normal positions when the running switch lever has reached its retracted position, as shown in Fig. 1.

The running switch lever 5, in the position indicated in Fig. 3, prevents movement of the bracket 9 to the left and thereby insures against closure of the starting switch lever while the running switch lever is in closed position.

Various modifications might be made in the structure without departing from the spirit of the invention, as defined in the accompanying claims.

We claim as our invention:—

1. In combination, in an interlocking device, a starting switch lever and a running switch lever, means whereby the running switch lever is held against closing until after the starting switch lever has been advanced and retracted, and means for retarding the advancement of the running switch handle for an appreciable period of time after the starting switch handle has been advanced.

2. The combination with two switch members, of a pair of independently-operable latch members for engaging the said members for preventing the operation of one switch member within a predetermined period following the operation of the other one of said switch members.

3. In combination, in an interlock device, a starting switch lever and a running switch lever, means for normally locking the running switch lever in retracted position, means actuated by the advancement of the starting switch lever, for partially releasing the running switch lever, and a second locking means for the running switch lever that is brought into operative position by the advancement of the starting switch handle, but which is automatically released upon the retraction of the starting switch handle to complete the release of the running switch lever.

4. In combination, in an interlock device, a starting switch lever and a running switch lever, means for normally locking the running switch lever against advance movement, means whereby advancement of the starting switch lever moves the said locking means, to permit advancement of the running switch lever, and means for automatically retarding the movement of the locking means to unlocked position.

5. In combination, in interlocking apparatus, a starting switch lever and a running switch lever, a locking member for normally holding the running switch lever in open position, a bracket operated by advancement of the starting switch lever, to impart a yielding opening movement to the locking member, means for retarding said opening movement, and an extension on the bracket for locking the running switch lever against full closing movement until after the starting switch handle has been retracted and the bracket returned to its normal position.

6. In combination, in an interlock device, a starting switch lever and a running switch lever, means whereby the said levers are prevented from simultaneously occupying their closed positions, and means whereby the running switch lever is maintained in open position for a definite period of time after the starting switch lever has been closed.

7. The combination with two switch members, of a pair of independently-operable latch members for preventing the simultaneous operation thereof, and means controlling one of the latch members for preventing the operation of one switch member within a predetermined period following the operation of the other one of said switch members.

8. The combination with two levers, of a pair of independently-operable latch members for determining the sequence of operation thereof and means controlling one of the latch members for preventing the operation of one of said levers within a pre-

determined period following the operation of the other lever.

9. The combination with two switch members, of means for operating them in a predetermined sequence including a pair of independently-operable latch members, and a time limit device for controlling the movement of one of said latch members for a predetermined interval following an operation of one of the switch members.

In testimony whereof, we have hereunto subscribed our names this 12th day of November, 1920.

ERNEST K. READ.
CLARENCE A. JOHNSON.