

Oct. 13, 1925.

1,556,830

C. W. WYMAN
CONTROLLER INTERLOCK
Filed June 30, 1921

Fig. 1.

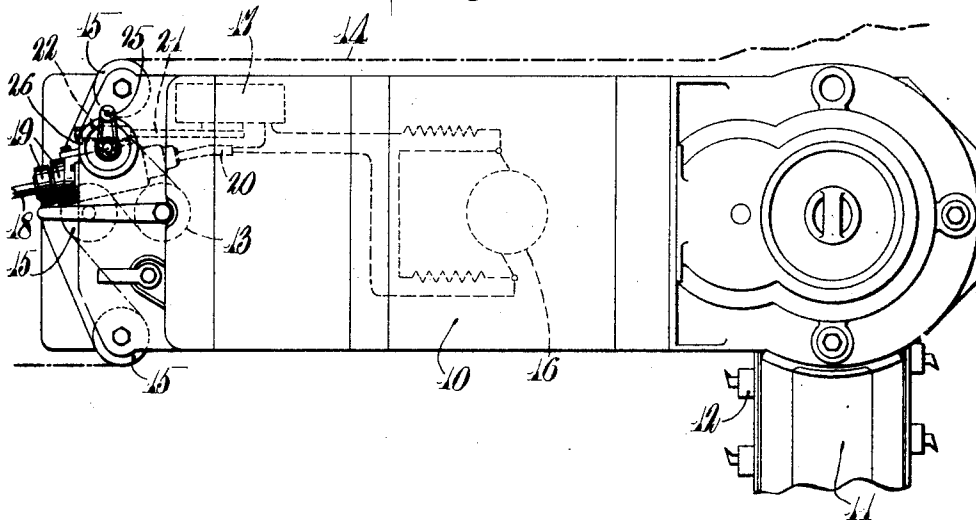


Fig. 2.

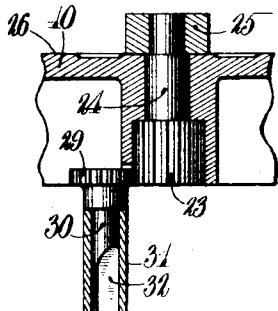
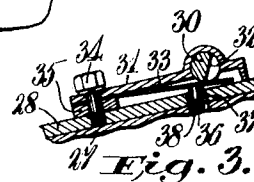
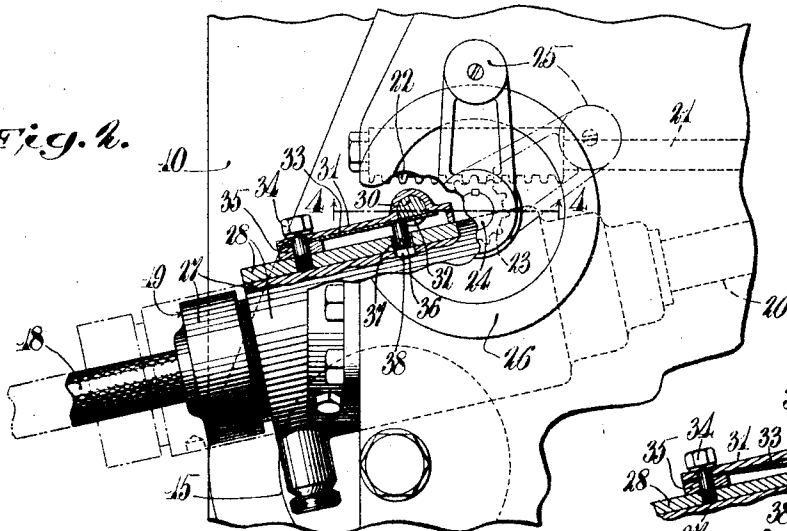


Fig. 4.

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UNITED STATES PATENT OFFICE.

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CONTROLLER INTERLOCK.

Application filed June 30, 1921. Serial No. 481,695.

To all whom it may concern:

Be it known that I, CHARLES W. WYMAN, a citizen of the United States, residing at Claremont, in the county of Sullivan and State of New Hampshire, have invented certain new and useful Improvements in Controller Interlocks, of which the following is a full, clear, and exact specification.

My invention relates to locking devices for the circuit closers and connectors of electrically operated machines for the purpose of preventing accidents due to improper operation thereof.

It has for its object to provide improved, simple and effective means for locking a plug, such as the connector plug through which the machine is supplied with current, against removal or insertion except when the controller of the machine is in "off" position, in order to prevent arcing or other undesirable results which might result from removal or insertion of the connector plug at other times.

The more particular objects of invention, together with means whereby the same may be carried into effect, will best be understood from the following description of one form or embodiment thereof illustrated in the accompanying drawings, in which:

Fig. 1 is a plan view of an electrically driven mining machine equipped with the invention.

Fig. 2 is an enlarged plan view, partly broken away and partly in section, of a portion of the rear end of the machine shown in Fig. 1, illustrating the locking device in released position to permit the removal of the connector plug.

Fig. 3 is a detail section of the locking device showing the same in locking position.

Fig. 4 is a detail section taken substantially on line 4—4 of Fig. 2.

In Fig. 1 the invention is illustrated as applied to a mining machine of the long-wall type, said machine comprising a casing 10 having at one end a swinging or angularly adjustable cutter bar 11 provided with the usual cutter chain 12 and at its opposite end with a rotatable feed member or sprocket 13 cooperating with a flexible feed member or chain 14, which, in accordance with the usual practice, is anchored at one

end and passes about suitably disposed guide sprockets 15, whereby rotation of the feed sprocket 13 and the simultaneous actuation of the cutter chain 12 causes the machine to move longitudinally along a mine face and the cutter bar 11 to cut a kerf in said face. The cutter chain 12 and feed sprocket 13 are operated, through suitable mechanical connections well known in the art, from an electric motor 16 governed by a controller 17 of any suitable and well known type, said motor being supplied with current by a cable or other conductor 18 which is detachably connected, through a suitable coupling 19, with conductors 20 leading to the controller 17. The controller 17 is operated by a longitudinally movable bar 21 having at its end a rack 22 cooperating with a pinion 23 on a short upright shaft 24 journaled in the casing 10 and provided above said casing with a controller handle 25 movable over the usual segment 26.

In the construction shown, the detachable coupling 19 comprises a connector plug 27 of any suitable or well known form and to which the cable 18 is connected, said plug being insertable into or removable from a socket 28 secured to the casing 10 and electrically connected with the conductor 20. In the use of plug and socket connectors of this type, it is desirable that the plug be removed only when the controller is in the "off" position, or in the position to break the circuit to the motor, since otherwise the removal of the plug is likely to result in arcing which may not only injure the machine but which, in the case of a mining machine, may ignite the mine gases and cause a disastrous explosion. It will also be evident that it is also highly undesirable for the plug to be inserted when the controller is in "on" position. In order to prevent such improper removal or insertion of the plug 27, and in accordance with the present invention, the following simple mechanism is employed:

The pinion or gear 23 on the controller handle shaft meshes with a second pinion or gear 29 (Fig. 4) on a second upright shaft 30 journaled in a housing 31 secured to the socket 28 by a cap screw 34. The shaft 30 is provided with a cam portion formed by cutting away or flattening said

shaft for a portion of its length, as shown at 32, said cam portion cooperating with the free end of a leaf spring 33 disposed within the housing 31 and secured, at its end opposite the shaft 30, by the cap screw 34, between the top of said housing and a spacing block 35. Adjacent the shaft 30 the spring 33 carries a locking pin 36 which is received in an opening 37 in the wall of the socket 28 and is movable therein into and out of engagement with a locking recess 38 in the plug 27.

In operation, when the controller handle 25 is in the "off" position shown in full lines in Fig. 2, the shaft 30 is turned, through the gears 23 and 29, into the angular position shown in Fig. 2, with its flattened portion 32 opposite the spring 33, thereby permitting said spring to lift the locking pin 36 out of the socket 38 so as to unlock the plug 27 and permit removal thereof. When, however, the controller handle 25 is turned into any other position, for example, that shown in broken lines in Fig. 2, the shaft 30 is likewise turned, causing the cam portion thereof to depress the spring 33, as shown in Fig. 3, and holding the pin 36 in locking engagement with the recess 38 in the plug 27 so as to prevent removal of said plug from the socket 28 or its insertion if it is out.

From the foregoing it will be seen that the invention provides a very simple and inexpensive, but extremely effective device for preventing the removal of the connector plug and consequent arcing when the controller is in a position to close the circuit. It will be noted in this connection that the pinion 23, forming an essential part of mechanism for operating the controller, is, in accordance with the invention, made to perform the added function of operating or controlling the locking device, thereby contributing to the simplification of the mechanism and the reduction of the number of necessary parts thereof.

While I have herein shown in detail and specifically described one form which my invention may assume in practice, it will be understood that the particular construction and arrangement described and shown have been chosen for illustrative purposes merely, and that the invention may be otherwise embodied and practiced without departing from its spirit or the scope of the claims hereunto appended.

What I claim as new and desire to secure by Letters Patent is:—

1. The combination with motor current controlling means and a plug and socket in series therewith, of means for controlling the insertion and removal of said plug and the operation of said controlling means including a recess in said plug, a pin adapted to engage in said recess, supporting means for said pin, and a member rotatable to cause

said pin to enter said recess and operatively connected with said controlling means, said pin moving curvilinearly in a plane to which the axis of rotation of said rotatable member is perpendicular.

2. The combination with a controller, a controller handle, and a plug in circuit with said controller, of a locking device for said plug controlled by said handle and a leaf spring carrying said locking device and determining the path of movement thereof, said leaf spring normally holding said locking device in unlocked position.

3. The combination with a controller, a controller handle, a socket in circuit with said controller, and a plug received in said socket, of a housing carried by said socket, a leaf spring in said housing, and a locking device operated and entirely supported by said spring and controlled by said handle.

4. The combination with a controller, a controller handle, a socket in circuit with said controller, and a plug received in said socket, of a housing carried by said socket, and means in said housing and controlled by said handle for locking said plug including holding and locking elements, the latter being entirely supported by the former.

5. The combination with a controller, a controller handle, a socket in circuit with said controller, and a plug received in said socket, of a locking device for said plug controlled by said handle and comprising a leaf spring and a locking pin carried and guided by said spring, said socket having an opening to receive said pin.

6. The combination with a controller, a controller handle, a socket in circuit with said controller, and a plug received in said socket, of a locking device for said plug controlled by said handle and comprising a housing carried by said socket, a leaf spring in said housing, and a locking pin carried and entirely supported by said spring, said socket having an opening to receive said pin.

7. The combination with a controller, a controller handle, a socket in circuit with said controller, and a plug received in said socket, of a locking device for said plug controlled by said handle, said locking device comprising a leaf spring and a locking pin carried and guided by said spring, and said socket and plug being provided with openings to receive said pin.

8. The combination with a controller, a controller handle, and a plug in circuit with said controller, of means for locking said plug, and a shaft operated by said handle but rotatable on an axis offset from the axis of rotation of said handle for controlling said locking means.

9. The combination with a controller, a controller handle, and a plug in circuit with said controller, of means for locking said plug, and a shaft operated by said handle

but rotatable on an axis offset from the axis of rotation of said handle and provided with a cam for controlling said locking means.

said locking means, and a rack cooperating with said pinion for operating said controller.

10. The combination with a controller, a controller handle, and a plug in circuit with said controller, of a locking device for said plug, a leaf spring for operating said locking device, and a shaft operated by said handle and having a flattened portion adapted to engage said spring.

17. The combination with a controller, a controller handle, and a plug in circuit with said controller, of means for locking said plug, a shaft for controlling said locking means, a gear carried by said shaft, a shaft by which said handle is carried, a pinion on said last named shaft meshing with said gear, and a rack cooperating with said pinion for operating said controller.

11. The combination with a controller, a controller handle, and a plug in circuit with said controller, of means for locking said plug including a rotatable member, and gears connecting said handle and member.

18. In combination, in a controller, a plurality of circuit establishing elements, locking means for at least one of the same, and a single controlling handle having a pinion common to the actuation of said locking means and another element.

12. The combination with a controller, a controller handle, and a plug in circuit with said controller, of means for locking said plug, a shaft for controlling said locking means, and gears connecting said handle and shaft.

19. The combination with a controller, of a circuit establishing member, and means for locking the same comprising a strip-like member and a rotatable shaft having a flattened portion adapted to engage said strip.

13. The combination with a controller, a controller handle, and a plug in circuit with said controller, of means for locking said plug, and a member connected with said handle for operating both said controller and said locking means, said member lying intermediate the same.

20. The combination with a controller, of a circuit establishing member, and means for locking the same comprising a strip-like member, a projection carried thereby, means forming a recess to receive said projection, and actuating means for said strip-like member comprising a rotatable shaft having a flattened portion adapted to engage said strip.

14. The combination with a controller, a controller handle, and a plug in circuit with said controller, of means normally biased to inactive position for locking said plug, a gear connected with said handle for operating said controller, and a gear meshing with said first named gear for operating said locking means.

21. The combination with a controller, of a plurality of elements one of which is longitudinally movable and has a rack gear associated therewith and the other of which is rotatable and has a pinion gear associated therewith, and common actuating means therefor including a pinion meshing with each of said gears.

15. The combination with a controller, a controller handle, a socket in circuit with said controller, and a plug received in said socket, of a leaf spring carried by said socket, a locking pin carried by said spring, said socket and plug having openings to receive said pin, a shaft having a cam portion cooperating with said spring, a gear connected with said handle for operating said controller, and a gear on said shaft meshing with said first named gear.

22. The combination with a controller, of a plurality of elements one of which is longitudinally movable and has a rack gear associated therewith and the other of which is rotatable and has a pinion gear, common actuating means therefor including a pinion meshing with each of said gears, and locking means associated with and actuated by one of said elements.

16. The combination with a controller, a controller handle, and a plug in circuit with said controller, of means for locking said plug, a shaft by which said handle is carried, a pinion on said shaft for operating

In testimony whereof I affix my signature.

CHARLES W. WYMAN.