

Oct. 13, 1925.

1,556,825

C. W. WYMAN

ELECTRICAL CONTROLLER

Original Filed June 14, 1918

2 Sheets-Sheet 1

Fig. 1.

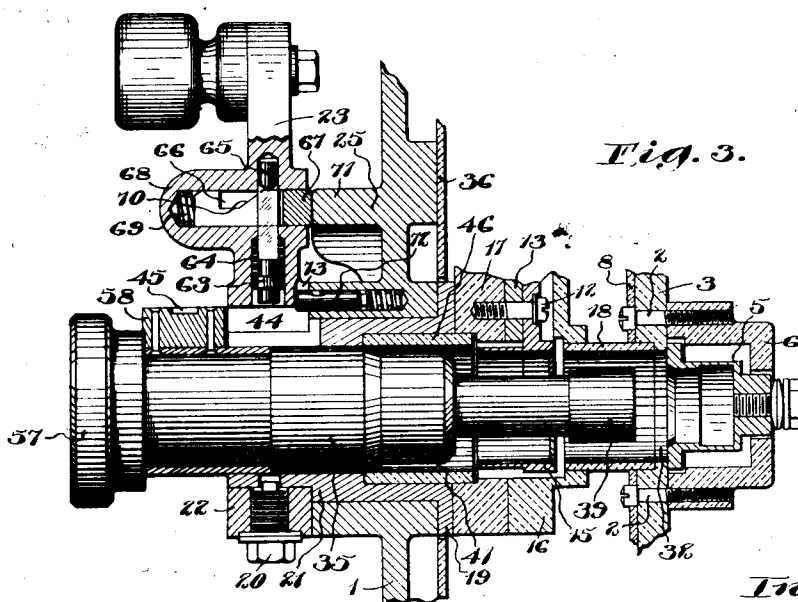
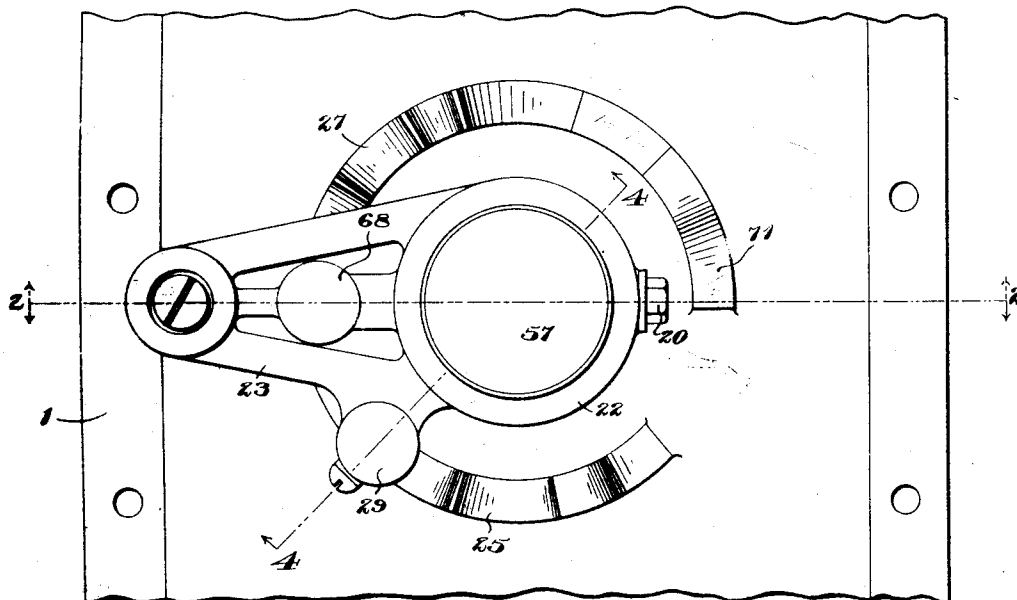


Fig. 3.

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2 Sheets-Sheet 2

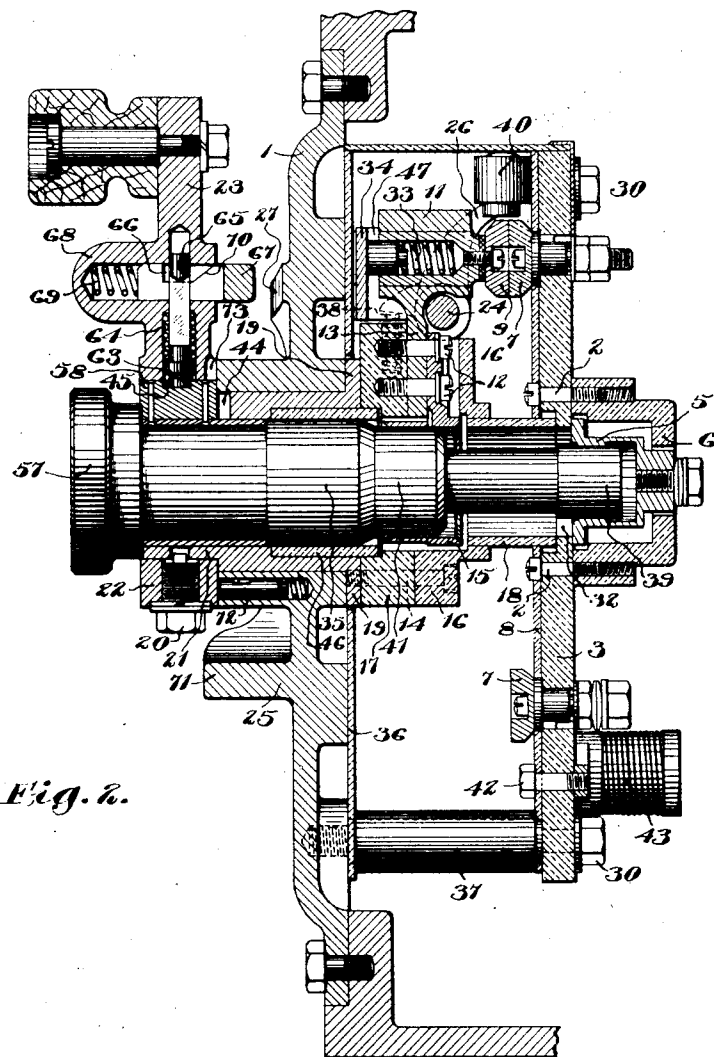


Fig. 2.

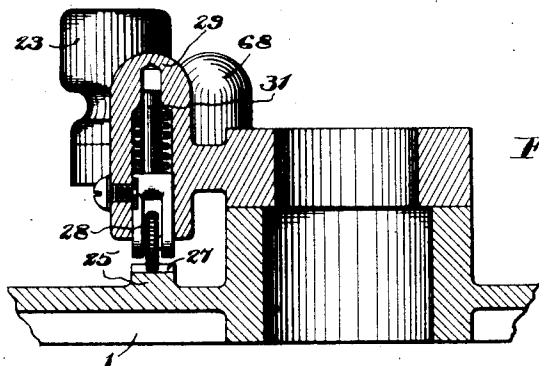


Fig. 4.

Inventor:
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by *Israel R. Scher.*
att'y.

UNITED STATES PATENT OFFICE.

CHARLES W. WYMAN, OF CLAREMONT, NEW HAMPSHIRE, ASSIGNOR TO SULLIVAN MACHINERY COMPANY, A CORPORATION OF MASSACHUSETTS.

ELECTRICAL CONTROLLER.

Application filed June 14, 1918, Serial No. 240,035. Renewed May 19, 1924.

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 Electrical Controllers, of which the following is a full, clear, and exact specification.

This invention relates to electrical controllers for mining and other machines, and has for an object the provision of an improved controller of this character having means for reducing the sparking or arcing within the apparatus during the operation thereof and for minimizing the effect of such sparking or arcing.

Another object of the invention is the provision of an improved controller of the character referred to having a removable connector, herein a fuse plug, and provided with means for locking said controller against operation when said connector is removed, with means for normally locking said connector against removal, and with means for positively unlocking said connector when said controller is moved into a position to break the circuit.

The foregoing and other objects of the 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 said drawings,—

Fig. 1 is a front elevation of a controller box constructed in accordance with the invention.

Fig. 2 is a transverse section taken on the line 2—2, Fig. 1, looking in the direction of the full line arrows thereon, and showing the fuse plug locked against removal and the controller handle unlocked.

Fig. 3 is a similar view, also taken on the line 2—2, Fig. 1, but looking in the direction of the dotted arrows, said view showing the controller handle in a position diametrically opposite that shown in Figs. 1

and 2, the fuse plug unlocked and partly removed, and the controller handle locked against operation.

Fig. 4 is a section on the line 4—4, Fig. 1, showing the means for positioning the controller handle.

Referring to the drawings, 1 denotes a part of a controller box or casing containing a plate 3 secured to and spaced from the front wall of said casing by means of bolts 30 and spacing sleeves 37, respectively. Suitably attached, as by bolts 2, to one face of the plate 3, is an insulating casing 6 containing a hollow line terminal 5 disposed opposite an opening 32 in the plate. On the opposite face of the plate 3 is a series of contacts 7 conveniently arranged in an arc of a circle and between which and said plate is preferably interposed an insulating lining 8. A brush 9 is adapted to wipe over the contacts 7, said brush being slidably mounted in a head 11 and being pressed toward said contacts by a spring 33 interposed between said brush and a follower 34 which engages an insulating lining 36 secured to the front wall of the casing 1. The head 11 is connected by an arm 13 with a tubular terminal 15 in axial alinement with the line terminal 5. The arm 13 and terminal 15 are secured, as by bolts 12, to a plate 17, the latter in turn being secured, as by bolts 14, to a collar 19 of a hollow shaft 21 arranged coaxial with the terminals 5 and 15 and journaled in an opening in the casing 1. Secured to the plate 17 by the bolts 14 is an insulating shield 16 which encloses the terminal 15 and the bolts 12 to prevent arcing between said parts and the contacts 7. The shield 16 carries an insulating sleeve or bushing 18 coaxially disposed with respect to the shaft 21 and bridging the space between the terminal 15 and the plate 3. Exterior to the casing 1 the shaft 21 is provided with a handle 23 secured to said shaft by a set screw 20 which passes through the hub 22 of said handle and engages said shaft. When said handle is rocked it oper-

ates, through the shaft 21, to move the brush 9 over the contacts 7. To position the handle with respect to the contacts 7, a segment 25 is secured to or formed integral with the casing 1, said segment being provided with a series of recesses or indentations 27 to receive a roller 28 carried by a spring pressed pin 31 slidably mounted in a boss 29 formed on the handle 23.

10 Pivoted at 24 to the arm 13 is an arm 26 carrying at its end a roller 40. Between the arm 26 and the plate 17 is interposed a spring 38 tending normally to press the roller 40 toward the plate 3. The follower 15 34 is also preferably provided with a laterally extending lip 47 overlapping the arm 26 and its spring 38 in such a manner as to protect those members from arcing between the same and the contacts 7 when the controller is operated as hereinafter described. As the shaft 21 is rotated the roller 40 engages successively a series of studs 42 carried by the plate 3, said studs corresponding in number and arrangement to the contacts 25 7, and each being connected with the adjacent contact through a blow-out coil 43. The arrangement is such that, as the handle 23 is turned toward the "off" position, the roller 40 is brought into engagement with a stud 42 before the brush 9 passes out of engagement with the corresponding contact 7. The circuit between the terminal 15 and contact 7 is therefore closed through the arm 26, roller 40, stud 42, and blow-out coil 43 before it is broken between said contact and the brush 9, so that no arc is drawn between said brush and contact when they are separated. When the roller 40 and stud 42 are subsequently separated, the arc drawn between them is immediately extinguished by the blow-out coil 43. By this means, it will be seen, any arcing incidental to the passage of the brush 9 from one contact 7 to another will take place between the roller 40 and studs 42, rather than between the brush 9 and contacts 7, thereby preventing injury to the latter. It will also be seen that this arcing is reduced to a minimum by the action of the blow-out coils 43. It will furthermore be seen that each of the blow-out coils is energized only during the separation of the corresponding connector elements, when current flow through said coil is needed to extinguish an arc, so that all difficulties arising from heating or waste of current due to unnecessary current flow through the coils are avoided. The blow-out phase of the invention is being made the subject matter of a separate application, Serial No. 568,337, filed June 14, 1922.

To connect the line terminal 5 with the brush terminal 15, there is provided a connector, herein in the form of a fuse plug 35 adapted to be introduced into the hollow 65 shaft 21 and to seat in an insulating bushing

46 therein, said fuse plug containing a suitable fuse (not shown) and having a terminal 39 adapted to engage the line terminal 5, a terminal 41 adapted to engage the brush terminal 15, and a handle 57 at its outer end whereby said fuse plug may be conveniently removed. The particular construction of the fuse plug per se forms no portion of the present invention and, being of a type well known in the art, this fuse plug requires no further description in detail herein.

An important feature of the invention relates to the provision of means for preventing the withdrawal of the connector or fuse plug 35 from the casing, for any purpose, except when the controller handle is in a position to break the circuit and thereby prevent the flow of current through the apparatus. To this end, said fuse plug is provided with a lug or projection 58 which is received in a suitably disposed recess 44 in the shaft 21 and the hub 22 of the handle 23, said lug or projection having a socket 45 to receive a latch or pin 63 guided in a suitable opening in the handle 23 and normally held in the position to engage the socket in the lug 58 by means of a spring 64, thereby locking the fuse plug to the shaft 21 in a position to connect the terminals 5 and 15, as shown in Fig. 2. At its outer end, the pin or latch 63 is provided with a T-shaped head 65 having a beveled under surface which, when said pin is in the position to lock the fuse plug, is received in recesses 66 in the arms of a bifurcated slide 67 guided for longitudinal movement in a boss 68 formed on the handle 23, said slide being normally held in its inoperative position, with the recesses 66 opposite the head 65, by means of a spring 69. The arms of the slide 67 are formed with cam surfaces 70 adapted, when said slide is moved from the position shown in Fig. 2 into that shown in Fig. 3, to engage the head 65 and withdraw the pin 63 from locking engagement with the fuse plug against the tension of the spring 64. For so moving said slide 67 there is provided at the end of the segment 25 a cam projection 71 adapted, when the handle 23 is moved into the position to break the circuit, to engage the end of the slide 67, thereby moving the same into the position shown in Fig. 3 against the tension of the spring 69 and positively unlocking the fuse plug 35, permitting its withdrawal.

Slidably mounted in a suitably disposed recess in the casing 1 adjacent the shaft 21, is a spring pressed locking pin or latch 72 which, when the fuse plug 35 is inserted, is engaged and pushed back by the lug or projection 58 on said fuse plug, and which, when the handle 23 is moved into any of its circuit closing positions, is held retracted by engagement with the hub 22, as shown in 130

Fig. 2. When, however, said handle is moved into the position to break the circuit, and the fuse plug is withdrawn, as shown in Fig. 3, said pin 72 is released, and when so released is forced by its spring into engagement with a suitably positioned recess 73 in the hub 22, thereby locking the handle 23 against operation.

From the foregoing, it will be seen that the connector or fuse plug 35 is normally locked in its normal position against removal; that, when the handle 23 is moved into the position to break the circuit, said fuse plug is unlocked and may be removed; that when said fuse plug is so removed the handle 23 is automatically locked in its circuit breaking position against operation until the fuse plug is fully replaced, whereupon said handle may be turned into one of its circuit closing positions; and that when said handle is so turned the fuse plug will be again locked against removal. These provisions render impossible the ignition of any combustible gases in the atmosphere in which the apparatus is used by sparking or arcing due to the removal or insertion of the fuse plug when the current is on.

While I have in this application specifically described one embodiment which my invention may assume in practice, it will be understood that this form of the same is shown for purposes of illustration and that the invention may be modified and embodied in other forms of the same without departing from its spirit or the scope of the appended claims.

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

1. The combination of a casing, electrical controlling means cooperating therewith, a connector for introduction into said casing and removable therefrom, and a spring pressed pin engageable by said connector for locking said controlling means against operation when said connector is removed from said casing, said pin being movable in a direction parallel to the movement of said connector.

2. The combination with a casing, electrical controlling means cooperating therewith, a connector for introduction into said casing and removable therefrom, and a spring pressed pin controlled by said connector and engageable with said controlling means for locking the latter against operation when said connector is removed from said casing, said pin being movable in a direction parallel to the movement of said connector.

3. The combination of a casing, electrical controlling means cooperating therewith including a shaft journaled in said casing and a handle on said shaft, a connector for introduction into said casing and removable therefrom, and a spring pressed latch mov-

able in a direction parallel to the motion of said connector and engaged and held inoperative by said connector when the latter is inserted into said casing, said latch being adapted to engage and lock said handle when said connector is removed from said casing.

4. The combination of a casing, contact means therein, a brush cooperating with said contact means, a hollow shaft journaled in the wall of said casing by which said brush is carried, an operating handle on said shaft exterior to said casing, a connector for introduction into said shaft and removable therefrom, said connector having a projection, and a spring pressed pin in said casing engaged and rendered inoperative by said projection when said connector is placed in position in said shaft, said pin being adapted to engage and lock said handle when said connector is removed.

5. The combination of a casing, electrical controlling means cooperating therewith, a connector for introduction into said casing, an automatically acting latch for preventing the removal of said connector from said casing, means for withdrawing said latch when said controlling means is moved into a position for preventing the flow of current, and means for locking said controlling means against operation when said connector is removed, said last mentioned means being movable in a direction parallel to the motion of said connector when the latter is inserted or withdrawn.

6. The combination with a casing, electrical controlling means cooperating therewith, a connector for introduction into said casing, an automatically acting latch for preventing the removal of said connector from said casing, means for withdrawing said latch when said controlling means is moved into a position for preventing a flow of current, and means for locking said controlling means against operation when said connector is removed, the path of movement of said connector when being inserted or removed and the paths of movement of said latch withdrawing means and of said controlling means locking means being parallel.

7. The combination of a casing, electrical controlling means cooperating therewith, a connector for introduction into said casing, means for locking said connector against removal from said casing, and means movable in a direction parallel to the motion of the connector during the insertion or removal of the latter for positively withdrawing said locking means when said controlling means is moved into the position for preventing the flow of current.

8. The combination of a casing, electrical controlling means cooperating therewith, a connector for introduction into said casing, normally operative means for locking said connector against removal from said casing,

and cooperating means on said controlling means and casing respectively for withdrawing said locking means when said controlling means is moved into a position to break the circuit.

9. The combination of a casing, contact means therein, a brush cooperating with said contact means, means including a handle exterior to said casing for moving said brush relative to said contact means, a connector for introduction into said casing, means for locking said connector against removal from said casing, and cooperating means on said handle and casing for positively withdrawing said locking means when said handle is moved into a position to break the circuit.

10. The combination of a casing, electrical controlling means cooperating therewith including a handle, a hollow shaft therefor, a connector for introduction into said shaft, means for locking said connector against removal from said shaft, and means for positively unlocking said connector when said handle is moved into a position for preventing the flow of current.

11. The combination of a casing, electrical controlling means cooperating therewith including a handle, a connector for introduction into said casing, a spring pressed latch tending normally to lock said connector against removal from said casing, and means carried by said handle for positively withdrawing said latch when said handle is moved into a position to break the circuit.

12. The combination of a casing, electrical controlling means cooperating therewith including a handle, a connector for introduction into said casing, means for normally locking said connector against removal from said casing, means carried by said handle for positively unlocking said connector, and cooperating means on said casing for engaging and operating said unlocking means when said handle is moved into the position to break the circuit.

13. The combination of a casing, electrical controlling means cooperating therewith including a handle, a hollow shaft therefor, a connector for introduction into said shaft, a pin for locking said connector against removal, a spring for normally holding said pin in locking position, and means controlled by the position of said handle for withdrawing said pin against the tension of said spring.

14. The combination of a casing, electrical controlling means cooperating therewith including a handle, a hollow shaft therefor, a connector for introduction into said shaft, a normally operative latch for locking said connector to said shaft, a normally inoperative unlocking device carried by said handle, and means on the wall of said casing for engaging said unlocking device when said handle is moved into one position and

operating the same to positively release said latch.

15. The combination of a casing, electrical controlling means cooperating therewith, a connector for introduction into said casing, a latch tending normally to lock said connector against removal, a normally inoperative unlocking device for withdrawing said latch, and means for operating said unlocking device to withdraw said latch when said controlling means is moved into the position to break the circuit.

16. The combination of a casing, electrical controlling means cooperating therewith including a handle, a connector for introduction into said casing, a latch for locking said connector against removal, a spring for normally holding said latch in locking position, a cam slide carried by said controlling means for withdrawing said latch against the tension of said spring, a spring for normally holding said slide inoperative, and a cam on the wall of said casing engaged by said slide, when said handle is moved into the position to break the circuit, for moving said slide to release said latch.

17. The combination of a casing, electrical controlling means cooperating therewith including a handle, a hollow shaft therefor, a connector for introduction into said shaft, a pin for locking said connector to said shaft, a spring for normally holding said pin in locking position, a cam slide carried by said handle for engaging and withdrawing said pin against the tension of said spring, a spring for normally holding said slide inoperative, and a cam on the wall of said casing engaged by said slide, when said handle is moved into the position to break the circuit, for moving said slide to release said latch.

18. The combination of a casing, electrical controlling means including a handle, a connector for introduction into said casing, means carried by said handle and cooperating with said casing for positioning said handle, means for locking said connector against removal, and means including said handle positioning means and controlled by the position of said handle for withdrawing said locking means.

19. The combination of a casing, electrical controlling means including a handle, a connector for introduction into said casing, a segment on said casing having indentations, a spring pressed device carried by said handle and adapted to enter said indentations to position said handle, means carried by said handle for locking said connector against removal, means carried by said handle for releasing said locking means, and a cam on said segment for operating said unlocking means.

20. The combination of a casing, electrical controlling means cooperating there-

with, a connector for introduction into said casing and removable therefrom, and means having an end automatically movable upon withdrawal of said connector into interlocking engagement with said controlling means to prevent movement of the latter, said connector upon introduction into said casing engaging said end and moving it out of interlocking engagement with the controlling means.

21. The combination of a casing, electrical controlling means cooperating therewith and including a rotatable member, a connector element for introduction into said casing in a position coaxial with the axis of rotation of said member and removable therefrom, said rotatable member having a recess formed therein, and a spring pressed pin movable by said connector element to inoperative position and operative on withdrawal of said element to engage in said recess and hold said rotatable member against rotation.

22. The combination of a casing, electrical controlling means cooperating therewith and including a rotatable member, a connector element for introduction into said casing and removable therefrom, said rotatable member having a recess formed therein, and a spring pressed pin movable by said connector element to inoperative position and operative on withdrawal of said element to engage in said recess and hold said rotatable member against rotation, said connector element being movable to engage the end of the pin projecting into said recess.

23. The combination of a casing, electrical controlling means cooperating therewith and including a rotatable member, a connector element for introduction into said casing and removable therefrom, said rotatable member having a recess formed therein, and a spring pressed pin reciprocable in a path parallel to the axis of rotation of said rotatable member and movable by said connector element to inoperative position and operative on withdrawal of said element to engage in said recess and hold said rotatable member against rotation.

24. The combination of a casing, electrical controlling means cooperating therewith and including a rotatable member, a connector element for introduction into said casing and removable therefrom, said rotatable member and said connector element each having a recess formed therein, and a pair of spring pressed pins moving in paths disposed at right angles to each other, one being operative to prevent movement of said member when said element is removed and the other to prevent removal of said element when said member is in on position.

25. The combination of a casing, electrical

controlling means including a handle, a connector for introduction into said casing, means for locking said connector against removal resiliently biased to locking position, and means rotatable as said handle rotates for positively retracting said locking means.

26. In an interlocking mechanism, a switch, a cooperating connector, and means movable in a direction making an angle with the plane of movement of said switch for automatically locking said switch upon withdrawal of said connector and adapted to maintain said locking function when said connector is completely removed.

27. In an interlocking mechanism, a switch, a cooperating connector, and switch locking mechanism including an element movable in a direction making an angle with the plane of movement of said switch controlled by a longitudinal movement of said connector and operative to lock said switch independently of said connector.

28. In an interlocking mechanism, a switch, a cooperating connector, and switch locking mechanism including an element adapted to be movable independently of actuation of said switch in a direction perpendicular to the plane of movement of said switch adapted to be released upon a longitudinal movement of said connector.

29. In an interlocking mechanism, a switch, a cooperating connector, and switch locking mechanism including an element movable in a direction perpendicular to the plane of movement of said switch locked by a longitudinal movement of said connector and while the latter is completely removed.

30. In an interlocking mechanism, a switch, a cooperating connector, and switch locking mechanism including an element adapted to be movable independently of actuation of said switch in a direction making an angle with the plane of movement of said switch locked or unlocked by a longitudinal movement of said connector.

31. In an interlocking mechanism, a switch, a cooperating connector, and switch locking mechanism including an element movable in a direction making an angle with the plane of movement of said switch and normally directly locking said switch by itself and adapted to be controlled for release by said connector.

32. In an interlocking mechanism, a switch, a cooperating connector, and means for automatically locking said switch upon withdrawal of said connector including an element interlocking with said switch and pushed by said connector to released position.

33. In an interlocking mechanism, a switch, a cooperating connector, and switch locking mechanism controlled by a longitudinal movement of said connector including an

element interlocking with said switch and pushed by said connector to released position.

34. In an interlocking mechanism, a switch, a cooperating connector, and switch locking mechanism released by a longitudinal movement on said connector including an element interlocking with said switch and pushed by said connector to released position.

35. In an interlocking mechanism, a switch, a cooperating connector, means for

automatically locking said switch upon withdrawal of said connector including an element interlocking with said switch and pushed by said connector to released position, and means movable with said switch for engaging said automatic locking means and holding the same in inoperative position during movement of said switch to full on position.

In testimony whereof I affix my signature.

CHARLES W. WYMAN.