June 4, 1935. L. P. BOLL ET AL 2,003,768

FUSE SWITCH

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FIG. 1.

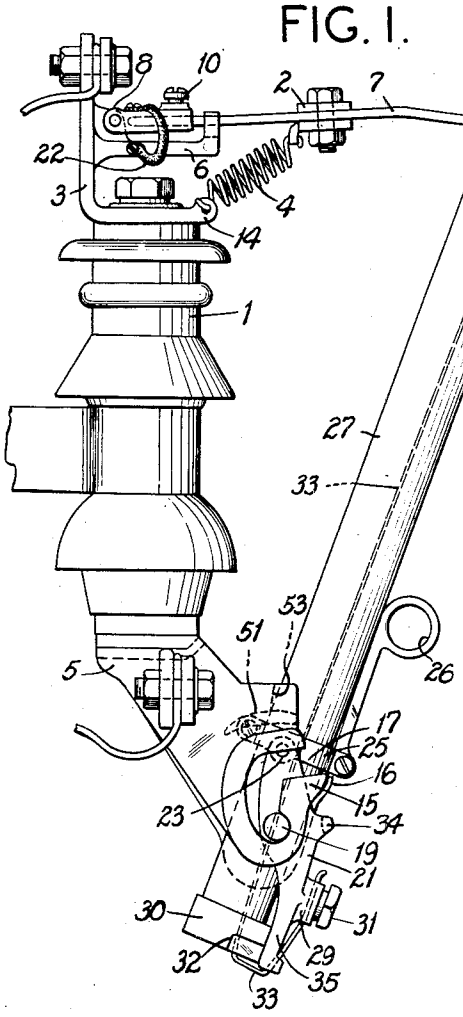


FIG. 5.

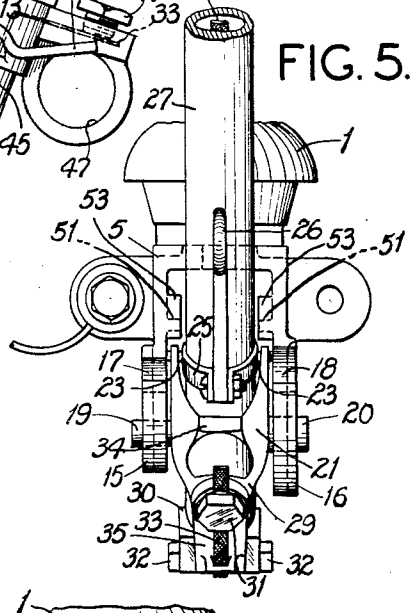


FIG. 3.

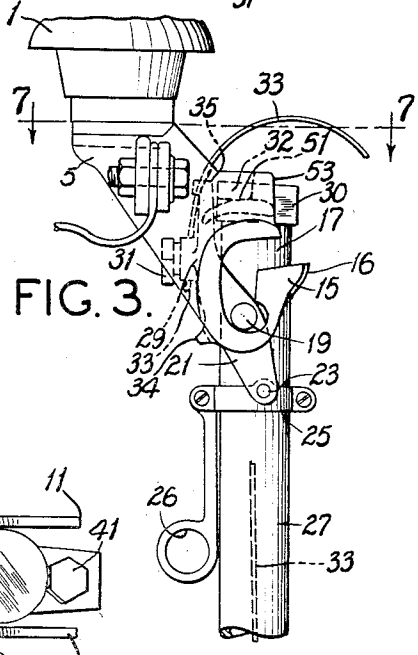
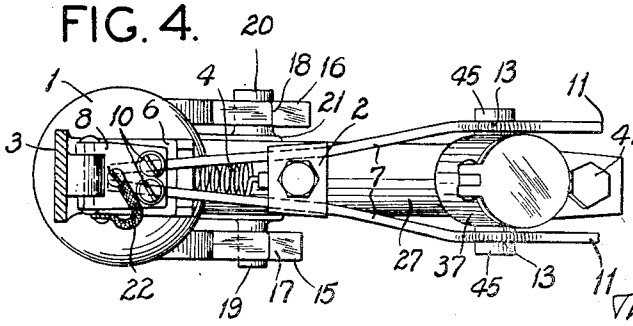


FIG. 4.



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FIG. 2.

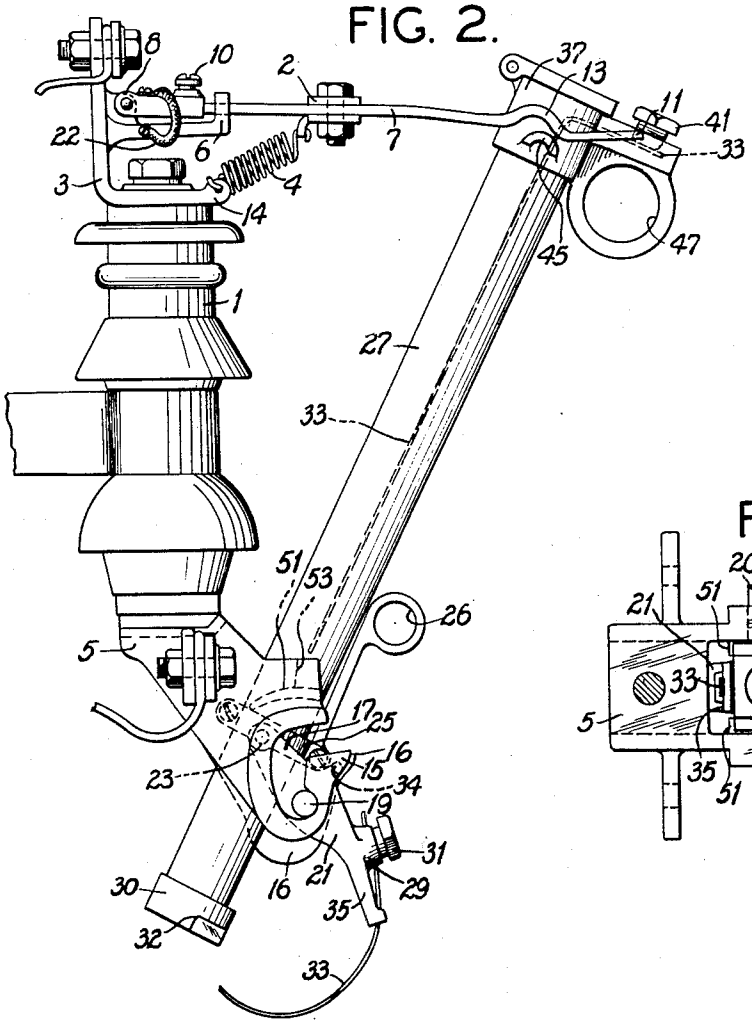
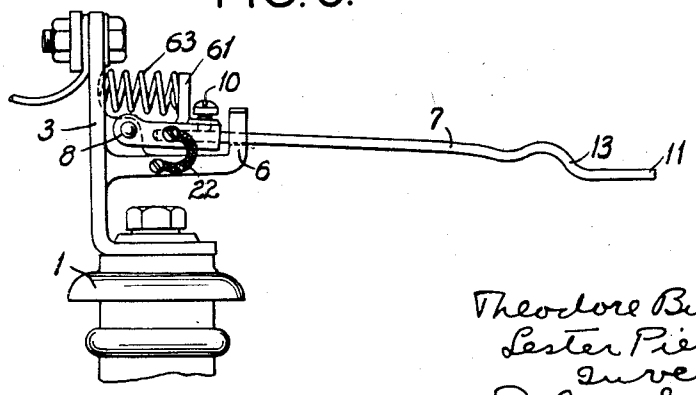


FIG. 7.

FIG. 6.



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FUSE SWITCH

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Application March 3, 1934, Serial No. 713,860

6 Claims. (Cl. 200—116)

This invention relates to a fuse switch, and with regard to certain more specific features, to a collapsible type of this switch.

Among the several objects of the invention may be noted the provision of a contact which is proof against breakage due to improper handling during application of a fuse cartridge; the provision of apparatus of this class which shall involve less intricacy of adjustment during assembly; the provision of apparatus of the class described having improved collapsible contact features and stop arrangement therefor; and the provision of apparatus of the class described which is simple to manufacture and which is dependable in operation. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structures hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, in which are illustrated two of various possible embodiments of the invention,

Fig. 1 is a side elevation showing one form of the invention with a cartridge in connected position;

Fig. 2 is a view similar to Fig. 1 showing a cartridge partially released;

Fig. 3 is a fragmentary side elevation showing a final position;

Fig. 4 is a plan view of Fig. 1;

Fig. 5 is a detail front elevation of the lower terminal of Fig. 1;

Fig. 6 is a fragmentary detail showing an alternative form of the invention; and,

Fig. 7 is a cross-section taken on line 7—7 of Fig. 3.

Similar reference characters indicate corresponding parts throughout the several views of the drawings.

This invention is an improvement upon the construction shown and claimed in our patent application 655,462, for fuse switch, filed February 6, 1933.

Referring now more particularly to Fig. 1, there is shown at numeral 1 a supporting insulator carrying separate line terminals 3 and 5. It is to be understood that two or more insulators may be substituted for the insulator 1. Extending from and electrically connecting with the upper line terminal 3 is a contact stop 6 composed of material such as bronze or the like.

Pivoted rearwardly on the stop 6 is a member 8 having two sockets therein adapted to receive spring wires 7 composed of spring bronze or the like, and held in place by set screws 10. The outer ends 11 are bent upwardly and behind the upwardly bent portions 11 on each spring extension 7 is a notched portion 13. Thus the members 7 constitute forwardly extending cantilever spring contacts. However, merely the spring of the material in the extension 7 is not entirely depended upon for operation, as in the case of our said application. An added feature is effected by clamping a cross member 2 between the extensions 7 and hooking thereto a tension spring 4, the latter being also hooked to a fixed eye 14 in connection with the contact 3. Thus, not only the spring of the member 7 is used, but the tension of the spring 4 is used to determine the lowermost position of the extension 7 against the stop 6. A flexible wire connection 22 between the socket member 8 and stop 6 prevents substantial current from passing through the hinge joint.

The advantage of the above construction is that in assembling the device a very definite relationship is ascertained for the positions of the extensions 7, this being determined by the stop 6. Consequently, the adjustments during manufacture are reduced to a minimum. Furthermore, the hinging action of extension 7 prevents bending of the same under abuse. This will be clarified hereinafter.

The lower line terminal 5 has associated therewith a pair of forwardly extending, supporting bearings 15 and 16 having upwardly open notches 17 and 18 respectively therein for rotatingly and removably accommodating sidewardly extending gudgeons 19 and 20 respectively. As shown in Fig. 5 the gudgeon 19 and bottom of its bearing notch 17 are smaller than the gudgeon 18 and the bottom of its notch bearing 20, hence preventing improper application of the fuse cartridge to which the gudgeons are fastened.

The gudgeons 19 and 20 extend from sideward legs of a forked member 21, said member 21 pivoting at 23 to a collar 25. The collar 25 comprises a clamp about tube 27, the latter comprising a part of a fuse cartridge. The collar 25 also holds an eye 26 for a tool used in applying the gudgeons 19 and 20 to their sockets.

The pivoting member 21 has a lower saddle portion 29 which accommodates a screw contact 31 for fastening the lower end of a fusible link 33, the latter passing to said contact 31 from

the open lower end of said tube 27. A collar 30 at the lower end of the cartridge carries gudgeons 32. A leg 35 of the member 21 forms a limiting stop against the collar 30 of tube 27 (Fig. 1). A bridge portion 34 forms another limiting stop (Fig. 2).

When the tube 27 is fused, it is applied through a fixed upper metallic contact 37 where it is fastened by a screw 41. It then is caused to pass through the tube 27 and out of the lower end thereof where it is bent and fastened to the contact 31. When the fastening at 31 is made, the fuse is drawn up enough that it is responsible for the member 35 being held in the position shown in Fig. 1; that is, against the collar 30 of tube 27. The tension in the link under these conditions needs only be slight. Thus there is provided a fuse cartridge having laterally extending gudgeons 19 and 20, the rigidity of the gudgeons 19 and 20 with respect to the tube 27 depending upon the fuse link 33 functioning as a holding member.

As shown in Fig. 7, the interior wall of the bearings 15 and 16 are provided with cams 51 and ultimate stops 53. Upon rotation of the cartridge to the position indicated in Fig. 3, the gudgeons 32 are adapted to ride upon the cams 51 and into engagement with the stops 53, thus bringing the cartridge to a vertical position with minimum shock. In riding upon the cam 51, the gudgeons 32 expend some of the momentum of the cartridge in friction and some of it in lifting the cartridge so that the gudgeons 19 and 20 are lifted slightly from their resting positions in their sockets 17 and 28, as shown at said Fig.3.

Operation of the device is as follows:

The fused cartridge is placed in a substantially horizontal position (if the switch be mounted as shown) and the gudgeons 19 and 20 are applied to the proper bearing recesses 17 and 18. After the gudgeons are placed in the recesses, the cartridge is rotated counterclockwise. This causes the head of screw 41 to pass between the extensions 7 and the upper gudgeons 45 thereon to spring into the notched portions 13 of said extensions 7. A ring 47 is provided on the upper contact 39 to which an insulated tool may be applied to protect the operator during this closing operation.

The gudgeons 19 and 20, when the cartridge is as shown in Fig. 1 are slightly forward of the line drawn through the centers of pressure of gudgeons 45 and the pivots 23. Thus the extensions 7, under influence of spring 4, in pressing the cartridge so that the gudgeons 19 and 20 are forced into the bottoms of the recesses 17 and 18, also cause a slight tension on the fuse link 33. This is because, without the tension of a fuse link, the downward pressure is enough to swing the parts into the arrangement shown in Fig. 2 but this tendency is resisted by the placement of the unbroken fuse link 33 between the contacts 31 and 37.

However, when the fuse blows, its holding effect upon the linkage disappears. The linkage constituting the pivoted tube 27 and member 21 collapses and the spring 4 moves down the extensions 7 (Fig. 2). Rotation occurs at the gudgeons 19 and 20, the tube also swinging on the centers 23. The separation of the member 21 from the tube 27 results in its aiding in the withdrawal of the fuse 33 from the tube. The explosive action of the gases engendered upon fusing causes complete ejection at the lower end of the fuse. Finally, the collapsing action having caused clearing under the extensions 7, the tube 27 falls forwardly carrying the member 21 with it. Rotation is stopped by the gudgeons 32 riding on the cams 51 and against the stops 53. At the same time the gudgeons 19 and 20 are driven up their bearing recesses 17 and 18, these recesses being so formed as to again close the member 21 against the cartridge (Fig. 3). From this position it is quite simple to remove the cartridge for fuse replacement.

From the above, it may be seen that if the lineman's tool in the ring 47 happens to slip out and strike one or more of the extensions 7, no damage is done because the spring 4 permits ample upward swing of the member 7 without bending of the same.

After blowing of the fuse and collapse of the cartridge and subsequent swinging down of the same, the ultimate stop is made with very little shock, because of the frictional engagement finally encountered and the conversion of energy of momentum into potential energy by the slight lifting of the cartridge. At the same time the lifting of the gudgeons 19 and 20 from their respective bearings 17 and 18 causes a folding up of the member 21 against the cartridge 27. This results in the ability to readily remove the cartridge without encountering any entanglements, due to members such as 21 being in open position (compare Figs. 3 and 2).

In Figure 6 is shown an alternative form of the invention wherein like numerals designate like parts. In this form, instead of using a tension spring 4, such as used in Fig. 1, there is used a compression spring 63 between an extension 61 from the hinge member 8, said spring 63 reacting against the contact 3. The operation is analogous to that described in connection with the form of Fig. 1, except that spring 63 compresses when the fuse switch is closed and extends when it blows, instead of vice versa as in the case of spring 4. It is to be understood that either of the coil springs may have a leaf spring substituted therefor, if desired.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in carrying out the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

We claim:

1. In appparatus of the class described, line terminals, a cartridge having terminal engaging elements, bearings associated with one of said line terminal, oppositely located gudgeons associated with one of said terminal engaging elements, one of the bearings and associated gudgeons being smaller than the other, whereby it becomes impossible to apply the larger gudgeon to said smallar bearing thereby to avoid improper application of the cartridge.

2. In a fuse switch, line terminals, a cartridge having terminal engaging elements, one of said terminal engaging elements comprising a member hinged to the cartridge, gudgeons on said last-named member, bearings on one of said line terminals adapted to rotatably receive said gudgeons, a fuse link associated with said hinged member and the cartridge adapted in unblown condition to hold said cartridge and said hinged

member in a predetermined position but to release them for collapse when the link blows, said cartridge being rotatable at said gudgeons after collapse, camming means on the bearing, gudgeons on the cartridge adapted to frictionally engage said camming means, and stops adapted to positively limit the degree of rotation of the cartridge after said frictional engagement.

3. In a fuse switch, line terminals, a cartridge having terminal engaging elements, one of said terminal engaging elements comprising a member hinged to the cartridge, gudgeons on said last-named member, bearings on one of said line terminals adapted to receive said gudgeons, a fuse link associated with said hinged member and the cartridge adapted in unblown condition to hold said cartridge and said hinged member in a predetermined position but to release them for collapse when the link blows, said cartridge being rotatable at said gudgeons and on said member after collapse, camming means on the bearing, gudgeons on the cartridge adapted to frictionally engage said camming means, and stops adapted to positively limit the degree of rotation of the cartridge after said frictional engagement, said camming means being adapted to effect lifting of the cartridge so as to lift said gudgeons from their seats in the bearings.

4. In a fuse switch, line terminals, a cartridge having terminal engaging elements, one of said terminal engaging elements comprising a member hinged to the cartridge, gudgeons on said last-named member, bearings on one of said line terminals adapted to rotatably receive said gudgeons, a fuse link associated with said hinged member and the cartridge adapted in unblown condition to hold said cartridge and said hinged member in a predetermined position but to release them for collapse when the link blows, said cartridge being rotatable at said gudgeons after collapse, camming means on the bearing, gudgeons on the cartridge adapted to frictionally engage said camming means, and stops adapted to positively limit the degree of rotation of the cartridge after said frictional engagement, said camming means being adapted to effect lifting of the cartridge so as to lift said gudgeons from their seats in the bearings, said bearings being so formed that said hinged element is, in the ultimate disconnected position of the cartridge forced to its initial position with respect to the cartridge, whereby said gudgeons and the cartridge may be readily removed from their operative positions.

5. In a fuse switch, line terminals, a cartridge having terminal engaging elements, one of said terminal engaging elements comprising a member hinged to the cartridge, different sized gudgeons on said last-named member, different sized bearings on one of said line terminals adapted to respectively receive said gudgeons, a fuse link associated with said hinged member and the cartridge adapted in unblown condition to hold said cartridge and said hinged member in a predetermined position but to release them for collapse when the link blows, said cartridge being rotatable at said gudgeons after collapse, camming means on the bearing, gudgeons on the cartridge adapted to frictionally engage said camming means, and stops adapted to positively limit the degree of rotation of the cartridge after said frictional engagement, said camming means being adapted to effect lifting of the cartridge so as to lift said gudgeons from their seats in the bearings, the different sizes of said gudgeons and their respective bearings preventing misapplication of the cartridge and its hinged member.

6. In a fuse switch, line terminals, a cartridge having terminal engaging elements, one of said terminal engaging elements comprising a member hinged to the cartridge, gudgeons on said last-named member, bearings on one of said line terminals adapted to receive said gudgeons, a fuse link associated with said hinged member and the cartridge adapted in unblown condition to hold said cartridge and said hinged member in a predetermined position but to release them for collapse when the link blows, said cartridge being rotatable at said gudgeons after collapse, camming means on the bearing, gudgeons on the cartridge adapted to frictionally engage said camming means, and stops adapted to positively limit the degree of rotation of the cartridge after said frictional engagement, said camming means being adapted to effect lifting of the cartridge so as to lift said gudgeons from their seats in the bearings, said bearings being so formed that said hinged element is, in the ultimate disconnected position of the cartridge forced to its initial position with respect to the cartridge, whereby said gudgeons and the cartridge may be readily removed from their operative positions, and said gudgeons on the hinged member and their respective bearings being oppositely located and of different sizes whereby proper cartridge application is determined.

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