June 10, 1930. L. P. BOLL 1,762,607

CARTRIDGE

Filed April 14, 1927

Fig. 1.

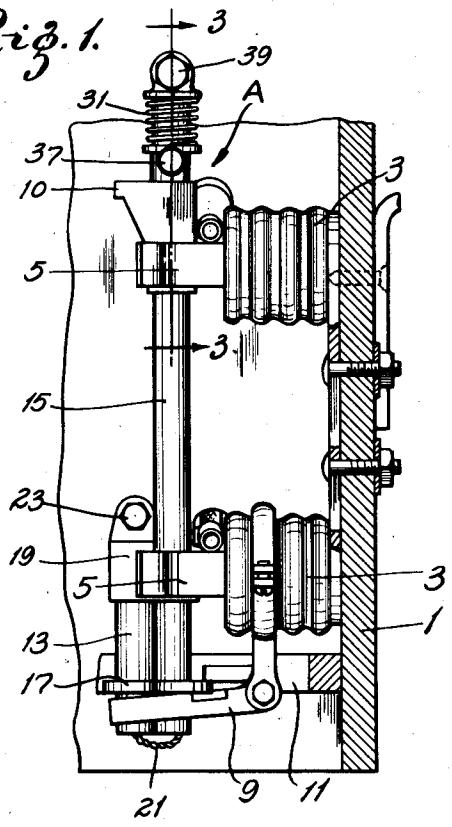


Fig. 2.

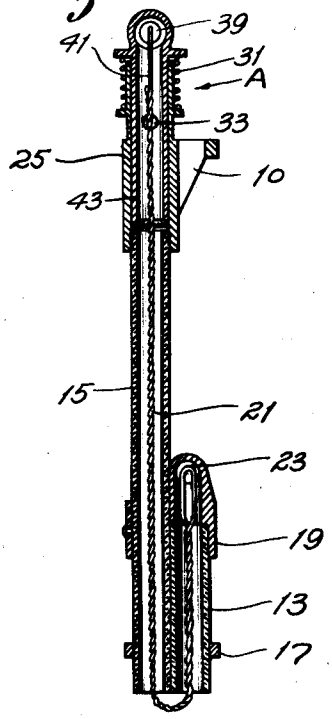


Fig. 3.

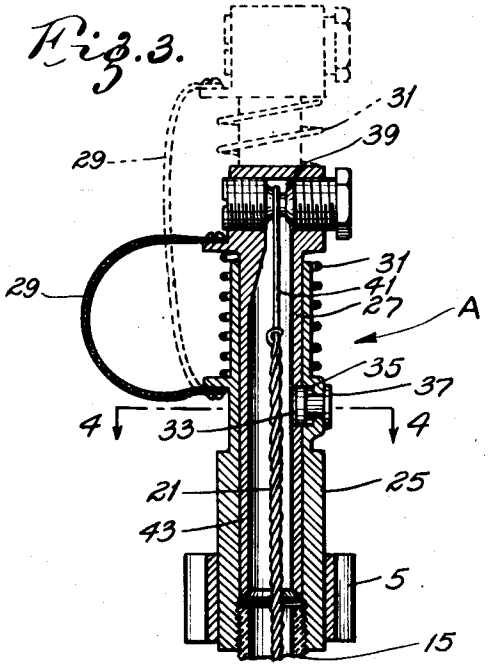
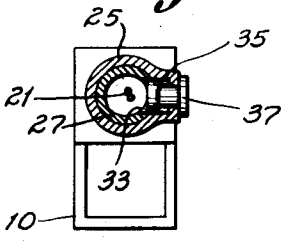


Fig. 4.



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UNITED STATES PATENT OFFICE

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CARTRIDGE

Application filed April 14, 1927. Serial No. 183,658.

This invention relates to fuses and with regard to certain more specific features, to fuse cartridges. The general type of switch box involved is shown in prior Patents, No. 1,288,951, and No. 1,398,335, issued to Claude L. Matthews and Walter A. Heinrich, December 24, 1918, and November 29, 1921, respectively.

The general type of fuse switch involved is shown in prior Patent No. 1,514,210, issued to Walter A. Heinrich, November 4, 1924.

Among the several objects of the present invention may be noted the provision of a fuse cartridge, including means for mounting a fuse therein, so that said fuse will not be under mechanical stress during normal operation but which, upon a blowing action of the fuse, is immediately put under a stretching stress, whereby the resulting gap in the fuse (due to blowing) is immediately elongated, with the result that the fusing arc is more quickly broken and the line unloaded; the provision of a device of the class described adapted to prevent escape of gases into the box in which it is mounted; and the provision of a fuse of the class described which is rugged but economical of construction and positive in operation. Other objects will be in part obvious and in part pointed hereinafter.

The invention accordingly comprises the features of construction, combination of elements and arrangements of parts, which are exemplified in the description hereinafter in connection with the accompanying drawings, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, in which is illustrated one of various possible embodiments of the invention,

Fig. 1 is a partial vertical section of the box into which the fuse fits, showing certain parts in full;

Fig. 2 is a longitudinal section of the cartridge showing the fuse mounted therein in unstressed position;

Fig. 3 is an enlarged section of the head of the cartridge taken at 90 degrees to the Fig. 2 section, that is, on line 3—3 of Fig. 1; and

Fig. 4 is a cross section taken on line 4—4 of Fig. 3.

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

Referring now more particularly to Fig. 1, there is illustrated at numeral 1 a line box having bolted therein spaced insulator members 3, the latter supporting spaced line engaging elements or clips 5, respectively connected to the line wires. The fuse cartridge, to be described, is adapted to be resiliently held within the spring clips 5 and socketed in a hinging member 9, the latter extending from a lower opening 11 in the box 1.

The cartridge proper comprises two, preferably fibre insulating tubes 13, 15, held together by a lower band 17, and a central metallic band and terminal piece 19. At its upper end, the longer of the two tubes (tube 15) is provided with another metallic terminal assembly A, which includes the stressing construction to be described.

The terminal piece or engaging element 19 and the terminal assembly or second terminal engaging element A are adapted to be put into an electrical connection by means of a fuse wire 21. The lower end of the wire, which is positioned in the shorter tube 13, is connected to said terminal piece or engaging element 19 by means of an anvil and set screw combination 23, whereby it is put into electrical connection when the terminal 19 is positioned in the lower spring clips 5. The fuse wire 21 passes downwardly out of the short insulating tube 13 and up into the long insulating tube 15.

The head of the tube 15 is fastened to a terminal piece 25 adapted to be engaged by said upper spring clip 5. This terminal piece 25 is bored out to slidably receive a movable fuse support 27 which is positively put into electrical connection with the terminal piece 25 by means of a length of flexible wire 29. The members 25 and 27 are also in electrical connection at their sliding joint but the wire 29 makes the connection between the two more positive.

A compression spring or strained element 31 is positioned to react between the slidable

member 27 and the terminal piece 25, tending normally to separate these pieces. However, as shown in solid lines in Fig. 3, the spring 31 is put into compression by pressing the support 27 into the terminal 25 to such an extent that a hole 33 in said member 27 aligns with a recess 35 in said terminal piece 25. A push-button key 37 is at this stage positioned so as to hold the member 27 in downward position against the pressure of the spring 31 (see Fig. 3). The key 37 is then held in position by the shearing tendency of the member 27. The inner end of the key 37 has a substantial area exposed to the hollow space within the fuse.

The upper end of the member 27 is also provided with a set screw and anvil combination 39, similar to the said combination 23, whereby the other end of the fuse wire 21 may be fastened into the cartridge, said cartridge being then in its shortened position shown in Fig. 3.

The operation of the cartridge, assuming that the terminal engaging elements 19 and 25 are in position within the terminal clips 5 of the line, is as follows:

The spring 31 tends to press the fuse holding or supporting member 27 upwardly but the key 37, being in an obstructing position prevents this action. The key 37 is itself maintained in position by the pressure of the member 27. The fuse 21 is long enough that under the above described conditions it may be positioned in the anvil combinations 39 without an elongating mechanical stress and consequent strain being engendered.

In the above manner the clips 5 are put into electrical connection and the line circuit is closed. The line circuit may be opened without the fuse blowing by pulling the fuse to the left (Fig. 1) on its hinging piece 9 and removing it from said last-named piece. A bridge 10 is provided for applying a tool to the cartridge for purposes of removal.

However, if the cartridge is in position across the terminals 5 and an electric overload comes on, the fuse will blow at its most restricted area 41. The blowing action is somewhat explosive and results in an internal pressure being built up within the tube 15 and elements connected therewith. This causes the key 37 to be pushed outwardly thereby releasing all obstructions to the upward movement of the member 27, the latter being under action of the spring 31 and the expulsive and recoil action of the gases ejected from the opening at the lower ends of the tubes 13, 15. Thus the resulting arc is quickly broken and the line unloaded, more quickly than when no relative movement of the fuse ends is had.

The skirt 43 of the supporting member 27 is long enough to provide a seal over the recess 35 as the fuse blows.

This fuse has an advantage over those that are maintained under constant tension, namely, that when a heavy load comes on, which merely softens the fuse but is not enough to require blowing, this present fuse does not tend to stretch and cause an unnecessary break. In fuses of the constant tension type, an incipient softening results in an unnecessary breaking by stretching, before the electrical load reaches the value desired for blowing the fuse.

After each blowing of the present fuse, it may be readily reset by pressing the member 27 downwardly against the tension of the spring 31 and resetting the key 37. The key 37 may be reset with the thumb from the outside of the member 25.

It will be understood that the member 27 comprises part of the upper terminal engaging element.

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

As many modifications of the embodiments above illustrated might be made without departing from the spirit or scope of the present invention, it is intended that the above description and accompanying drawings and claims shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. A fuse cartridge comprising spaced terminal engaging elements, a fuse held in electrical connection with said engaging elements, a compression spring tending to increase the distance between points of connection of said fuse with the terminal engaging elements, and means for resisting said tendency, the explosive pressure occasioned by the rupture of said fuse being adapted to prevent the resisting operation of said resisting means.

2. A fuse cartridge comprising spaced terminal engaging elements, a fuse held in electrical connection with said engaging elements, a compression spring tending to increase the distance between points of connection of said fuse with the terminal engaging elements, and means for resisting said tendency, the explosive pressure occasioned by the rupture of said fuse being adapted to prevent the resisting operation of said resisting means, said compression spring carrying at least some current which passes through the fuse.

3. In a fuse cartridge, terminal engaging elements, tubular means joining said elements and carrying a fuse link therein having electrical connections with said elements, strained means tending to increase the distance between the points of connection of the fuse with the engaging elements, said strained means being located externally of said tubular means, and means for resisting the tendency to increase said distance, the explosive

pressure occasioned by the rupture of said fuse being adapted to actuate said resisting means to release said distance-increasing means for operation.

4. In a fuse cartridge, terminal engaging elements, tubular means joining said elements and carrying a fuse link therein, said tubular portion having an opening therein, the fuse link having electrical connections with said elements, strained means tending to increase the distance between the points of connection of the fuse with the engaging elements, said strained means being located externally of said tubular means, and means for resisting the tendency to increase said distance, the explosive pressure occasioned by the rupture of said fuse being adapted to actuate said resisting means to release said distance-increasing means for operation, the distance-increasing means being effected at least in part by reaction due to expulsion of gases from said opening.

5. In a fuse cartridge, spaced terminal engaging elements, a fuse electrically connected near its respective ends of said elements and having a bent portion between the points of security, a tubular member enclosing said fuse from element to element and provided with an opening to receive the bent portion of the fuse, a movable member for securing one end of the fuse to one terminal engaging element and means causing movement of said movable member upon rupture of the fuse to separate the ends of the fuse link, due at least in part to reaction due to expulsion of gases from said opening.

6. In a fuse cartridge, spaced terminal engaging elements, a fuse electrically connected near its respective ends of said elements and having a bent portion between the points of security, a tubular member enclosing said fuse from element to element and provided with an opening to receive the bent portion of the fuse, a movable member for securing one end of the fuse to one terminal engaging element and means causing movement of said movable member upon rupture of the fuse to separate the ends of the fuse link, due at least in part to reaction due to expulsion of gases from said opening and means adapted to resist movement of rupture operable by a rise in pressure upon rupture of said fuse to permit movement.

7. In a fuse cartridge, spaced terminal engaging elements, a tubular portion leading from one of said engaging elements, a fuse link electrically joining the elements and passing through said tubular portion, the tubular portion having an opening at the end opposite one of the engaging elements, a movable member in said engaging element at said last-named end for supporting one end of the fuse adapted to be moved upon rupture of said fuse, due to rise in pressure caused by expulsive action from said opening, whereby the resulting arc is broken.

In testimony whereof, I have signed my name to this specification this 12th day of April, 1927.

LESTER P. BOLL.