O. H. JUNG.

CARTRIDGE FUSE.

APPLICATION FILED FEB. 12, 1918.

1,287,039. Patented Dec. 10, 1918.

Fig. 1.

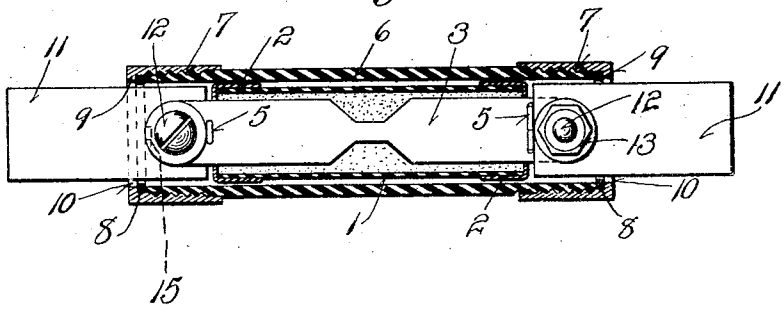


Fig. 2.

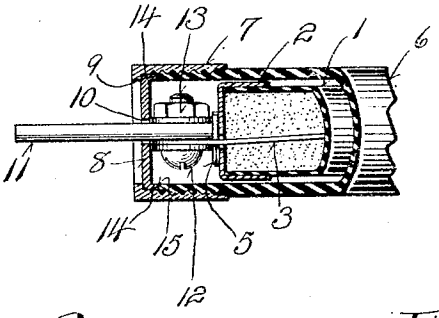


Fig. 3.

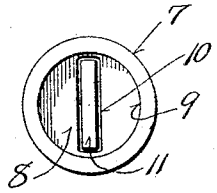


Fig. 4.

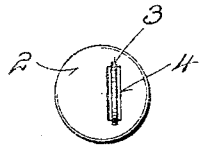
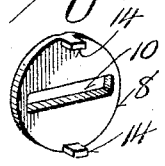


Fig. 5.



Witness

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CARTRIDGE-FUSE.

1,287,039. Specification of Letters Patent. Patented Dec. 10, 1918.

Application filed February 12, 1918. Serial No. 216,805.

To all whom it may concern:

Be it known that I, OSCAR H. JUNG, a citizen of the United States, and resident of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Cartridge-Fuses; and I do hereby declare that the following is a full, clear, and exact description thereof.

This invention relates to new and useful improvements in cartridge fuses, particularly those of the refillable or renewable type, and has for its most important object to provide a simply constructed arrangement whereby when the fusible link is blown, the retaining casing will be prevented from shattering or rupturing, the end caps will be held against drawing off, the explosion will be rendered practically noiseless, and other external evidence of operation will be absent.

I carry out this object of my invention by inclosing a capsule containing the fusible link within an outer tubular casing, the inner member or capsule being spaced from the walls of the outer. Furthermore both the inner capsule and outer casing have vent apertures to permit the slow escape of gases created when the fusible link blows.

I am aware of the use of a fusible link-containing capsule within an outer retaining casing, both the capsule and outer casing being provided with vent apertures, but in all such devices with which I am acquainted the vent apertures provide merely for the direct discharge of pressure gases into the atmosphere, and consequently, to the extent that the device is vented, lessen the degree of fire protection afforded by the casing, and increase the noise incidental to blowing the fuse. Inasmuch as the outer casing is a permanent part of my device, and the inner casing in my device is intended to be discarded, I may make the outer casing of relatively heavy material, while the inner casing would preferably be of light material. It is a more particular object of my invention to provide an arrangement wherein a sufficiently slow and restricted escape of gases is provided for, to prevent danger of fire and the occurrence of noise, yet wherein bursting of the capsule under fuse blowing pressure is prevented, and to this end I contemplate the provision of vent apertures in the capsule adapted to permit a ready discharge of gases therefrom into the outer casing to thus set up a pressure in the outer casing which will neutralize or balance the pressure in the capsule, the outer casing being sufficiently strong to take up the stress incidental to a slow and prolonged discharge of pressure gases into the atmosphere in a safe and noiseless manner.

It is an additional object of my invention to provide a simply constructed means for effectively holding the blades of a knife blade type of cartridge fuse in operative position.

With these general objects in view the invention resides in the novel features of construction, combination and arrangement of parts which will be hereinafter more particularly described and claimed and shown in the drawing, wherein:

Figure 1 represents a vertical longitudinal sectional view through a refillable cartridge of the knife blade type constructed in accordance with my invention.

Fig. 2 is a similar view of a portion of the fuse, the section being taken at right-angles to the section on which Fig. 1 is cut.

Fig. 3 is an end view of a complete fuse.

Fig. 4 is a similar view of the inner link carrying capsule or renewable member, and

Fig. 5 is a detail perspective view of a portion of the cap.

As the specific description progresses it will be noted that the principal object of the invention may be carried out with practically any type of fuse and is not limited merely to the refillable knife blade type illustrated in the drawing. Also the forms of the inner and outer casings, that is to say the inner capsule and the outer casing, may be of any preferred or convenient structure.

Referring more particularly to the drawing wherein similar reference characters denote like parts throughout the several views, the numeral 1 designates an inner casing or capsule formed of impregnated paper or the like and having metallic closure caps 2 disposed over its ends, said capsule being a container for a fusible link 3 which is of a length somewhat longer than said capsule and projects through slots 4 in the caps 2. The link is held against longitudinal shifting within the capsule and the closure caps 2 are held in position thereon by means of cotter pins 5 extended through openings in the opposite ends of said link, said cotter pins being disposed to engage the outer ends

of said caps 2 as clearly shown in Figs. 1 and 2.

As is customary in devices of this character the fusible link is surrounded by a finely divided arc-choking material. In carrying out my invention I have discovered that a much more efficient result may be obtained when the arc-choking powder is properly proportioned to the size of the fusible link. The best proportion is to have approximately sixty parts of the powder by volume to one part of the material forming the fusible link.

The capsule 1 above described is adapted to form the renewable element of a refillable cartridge fuse, this element being disposed within an outer casing formed of a tube 6 of fibrous or other insulation material. The casing is completed by disposing removable caps on the ends of the tube 6.

When the device is to be used on switch boards requiring knife blade type fuses, the caps for closing the ends of the tube 6 are in the form of ferrules 7 internally screw threaded for engagement with external screw threads on the ends of said tube, and disks 8, said disks being substantially the same diameter as the outer diameter of the tube 6 and engaged with the ends thereof. These disks are held in operative position by an inwardly extending annular flange 9 formed on each of the ferrules 7.

Each disk 8 is provided with a slot 10 to permit a rectangular contact blade 11 to extend therethrough as clearly shown in Fig. 1. The inner ends of the blades are connected to the opposite ends of the fusible link 3 by bolts and nuts 12 and 13 respectively. The blades 11 are held in alinement with each other and against rotation with respect to the tube 6 by the provision of lugs 14 which extend inwardly from the disks 8 and engage in kerfs 15 cut in the ends of said tube 6. Two of the lugs are provided on each of the disks and are disposed diametrically opposite as shown in Fig. 5.

The operation of the invention may be now more particularly explained. It is obvious that if the capsule containing the fusible link was disposed, without any exterior protective covering, in a circuit which thereafter was overloaded or short-circuited, the link 3 would melt, and in so doing an explosion would occur which would be of sufficient intensity to shatter the capsule and widely scatter its contents.

The report of the explosion would be very loud and because of the shattering and scattering of the parts of the capsule and the link danger of fire would be very prevalent. The same result occurs in a modified sense even when the fusible link is housed in a fibrous casing or a casing of other insulating material than impregnated paper. Even under those conditions when the fibrous casing does not rupture, flame is liable to spurt from the ends thereof and ignite articles which are adjacent the same.

In order to overcome these difficulties and procure an inexpensive outer casing of fibrous material which can be used with an indefinite number of renewable capsules 1, I have discovered that an air cushion should be employed between the inner and outer casings. In the present invention this cushion is obtained by spacing the inner capsule from all of the walls of the outer casing. Furthermore the capsule and the casing are provided with outlet vents which, in practice will be the slots 4 and 10, said slots being of somewhat greater size than the parts which project therethrough. If necessary other vent openings may be employed. The result of this arrangement is that when the link 3 blows a portion of the gas created will be forced through the slots 4 and into the interior of the surrounding casing, thus greatly increasing the gas pressure within said outer casing, this increase will tend to neutralize the great increase in pressure within the capsule 1. The provision of the enlarged slots 10 permits gases to escape from the outer casing very slowly so that all noise of the explosion is practically obviated. Thus it is necessary to properly proportion the size of the slots 4 and 10 or other vents because if the same are too small either one or both of the casings will rupture, while if they are too large the noise of the explosion will not be deadened.

I claim:—

1. A fuse of the character described including an outer casing, an inner casing in the outer casing and spaced from the walls thereof, and a fusible link in the inner casing, said inner casing being provided with vent apertures adapted to permit a free discharge of pressure gases into the outer casing and said outer casing being provided with vent apertures having lesser area than the apertures of the inner casing whereby pressure gases discharged from the inner casing into the outer casing will be accumulated in the outer casing to neutralize pressure in the inner casing, and will be slowly discharged from the outer casing.

2. A fuse of the character described comprising an outer casing, an inner casing disposed in the outer casing, said casings being provided with vent openings, and spaced from the walls thereof, a fusible link in the inner casing, and conducting members secured to said fusible link and engaging the outer casing for support thereby and serving to hold the inner casing spaced from the walls of the outer casing.

3. A fuse of the character described comprising an outer casing, an inner casing disposed within the outer casing, said casings being provided with vent openings, a

fusible link extending through the inner casing and projected from the ends thereof, conducting members extending through the ends of the outer casing, and connecting means for the adjacent ends of the link and conducting members, said conducting members supporting the inner casing in spaced relation to the walls of the outer casing and said connecting means engaging the ends of the outer casing to hold the inner casing against longitudinal movement with respect to the outer casing.

4. A fuse of the character described comprising an outer casing provided with slots in its ends, an inner casing disposed in the outer casing and provided with slots in its ends, a fusible link extending through the inner casing with its ends projecting through the slots thereof, conducting members passed through the slots of the ends of the outer casing and connected with the ends of the link, the cross-sectional areas of the connecting members and link being less than the cross-sectional areas of their respective slots whereby to permit discharge of gases through the slots.

5. A fuse of the character described comprising an outer casing provided with slots in its ends, an inner casing disposed in the outer casing and provided with slots in its ends, a fusible link extending through the inner casing with its ends projecting through the slots thereof, conducting members passed through the slots of the ends of the outer casing and connected with the ends of the link, the cross-sectional areas of the connecting members and link being less than the cross-sectional areas of their respective slots whereby to permit discharge of gases through the slots, and the combined gas discharge areas of the inner casing slots being greater than the combined gas discharge areas of the outer casing slots.

In testimony that I claim the foregoing I have hereunto set my hand at Milwaukee, in the county of Milwaukee and State of Wisconsin.

OSCAR H. JUNG.