F. B. COOK.

INDIVIDUAL PROTECTOR.

APPLICATION FILED JUNE 10, 1908.

**919,696.** Patented Apr. 27, 1909.

2 SHEETS—SHEET 1.

Fig. 6.

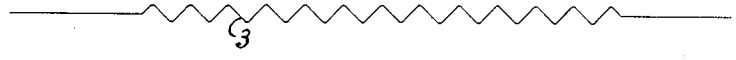



Fig. 3.

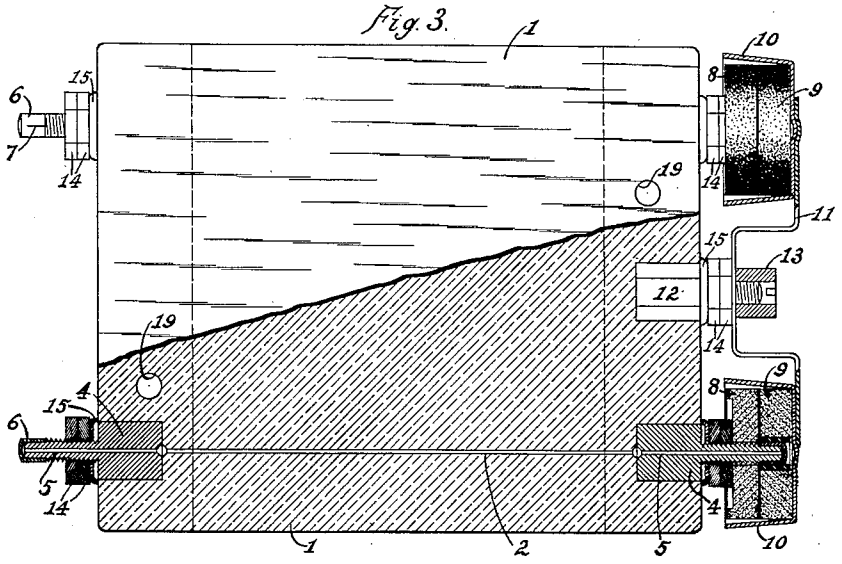



Fig. 1.

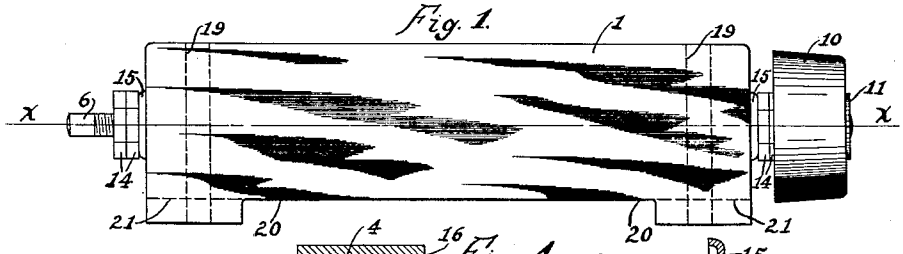



Fig. 4.

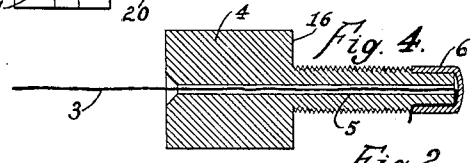



Fig. 5.

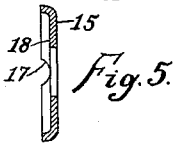
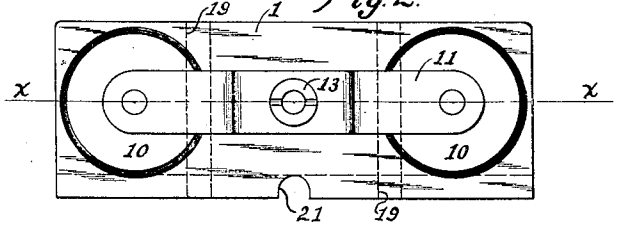



Fig. 2.




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2 SHEETS—SHEET 2.

*Fig. 7.*

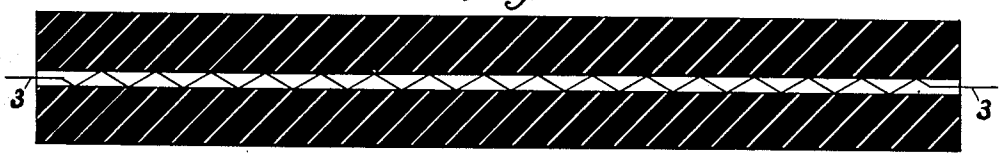
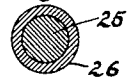



*Fig. 8.*




WITNESSES:

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Frank B. Cook.

# UNITED STATES PATENT OFFICE.

FRANK B. COOK, OF CHICAGO, ILLINOIS.

## INDIVIDUAL PROTECTOR.

No. 919,696. Specification of Letters Patent. Patented April 27, 1909.

Application filed June 10, 1908. Serial No. 437,722.

*To all whom it may concern:*

Be it known that I, FRANK B. COOK, a citizen of the United States of America, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Individual Protector, of which the following is a specification, reference being had to the accompanying drawings, illustrating same.

My invention relates to electrical protective devices and more in particular to protective devices of the individual type, such as are commonly used at telephone substations.

The principal objects of my invention are to provide an improved mounting base or block for an individual protector; to provide improved means for inclosing the fuses in such a protector; to provide an improved fuse for various kinds of protective devices; to provide an improved lightning arrester for protectors of the character specified; to provide an improved arrangement of the fuses and lightning arresters in such a protector; and to provide accessibility and simplicity of construction in such a device.

Other objects will be apparent from the following specification.

In the accompanying drawings Figure 1 is a side elevation of the preferred form of individual protector of the present invention; Fig. 2 is a right-hand end view of Fig. 1; Fig. 3 is a plan view of Fig. 1, with portions shown in cross-section taken on plane *x x* of Figs. 1 and 2; Fig. 4 is a longitudinal cross-sectional view of one of the binding posts or metallic connection terminals carried by the base portion of the protector, showing the method of attaching the fuse wire to the terminal; Fig. 5 is a cross-sectional view of the clamping washer used on the connection terminal shown in Fig. 4; Fig. 6 is a side elevation of the preferred form of fuse wire used in this present invention, showing the wire crimped for purposes hereinafter described; Fig. 7 is an enlarged longitudinal cross-sectional view of a fuse casing showing the crimped fuse in place therein; and Fig. 8 is an enlarged transverse cross-sectional view of the improved fuse wire of this invention.

Like characters refer to like parts in the several figures.

In the ordinary types of inclosed fuses it is customary to provide a tube for each fuse wire, and to employ a pair of such tubes for an individual protector for a metallic line. In one of applicant's patents a pair of such tubular fuses are inserted through openings in a porcelain block, the whole being used as an individual protector. In this present invention the ordinary tubes for inclosing the fuse wires are done away with and instead of these tubes a heavy block of insulating material, preferably porcelain, is employed for inclosing the fuses, the block being provided with small bores therethrough through which the respective fuse wires are extended and suitably secured to metallic terminal portions mounted on the ends of the block of insulation.

In the accompanying drawings the numeral 1 represents the block of insulating material, and the numeral 2 represents one of the small bores through the block 1 for accommodating the fuse wire 3 which is shown in Fig. 6.

The fuse wire preferably employed in this invention is constructed of two metals, an interior core 25 of iron or steel and an exterior sheath or covering 26 of copper surrounding the iron core, the two metals being rolled or drawn down together to the proper size. Such a fuse wire affords various improvements over other fuse wires generally employed. It may be made to blow on a very small current, say one-quarter of an ampere, and at the same time can be readily handled and utilized for fusing purposes. With the ordinary lead or soft fuse wire it is very difficult to handle or utilize fuses of such small capacity. In the double-metal fuse wire of this invention the iron or steel core gives great strength to the wire, and the copper sheath thoroughly protects the iron or steel core from corrosion and at the same time provides a path of high conductivity. When this fuse wire is blown it gives off a much smaller quantity of gas than does the ordinary lead or soft fuse wire, and is therefore very desirable in inclosed fuses in which it is desired to reduce the volume of gas as much as possible to prevent the fuse casings from blowing up when the fuses are blown.

The fuse wire 3 of this present invention is preferably crimped as shown in Fig. 6, so that when it is threaded through a small cylindrical bore as shown in Fig. 7, the most of

the wire is held away from the sides of the bore. This construction causes the fuse to blow very uniformly because the same amount of the surface thereof always touches the sides of the bore. With the ordinary straight fuse wire some of the wires do not touch the sides of the bore at all, if the wire is stretched tightly, while others, which are loose, touch the sides of the bore for nearly the entire length of the fuse. This gives a very ununiformity of operation in the fuses, due to the ununiform conduction of heat from the fuse wires through the casings.

The insulating base portion 1 is provided with recesses in its ends in which the binding posts 4 4 are preferably set and cemented, as shown. Each small bore 2 through the block 1 has a pair of connection terminals 4 4 at the opposite ends thereof, each connection terminal 4 having a longitudinal bore 5 therethrough in alinement with the bore 2. A fuse wire 3 is inserted through each of the bores 5 2 5 and is secured to the outer ends of the terminals 4 4 by small metallic caps 6 6, preferably as shown in Fig. 4, the fuse wire being bent over the exterior portion of the exterior ends of the terminals 4 4 and the caps 6 6 being then pressed over the ends of the terminals 4 4 as shown, to clamp the fuse wire 3 between the caps 6 6 and the ends of the terminals 4 4. Each of the caps 6 6 is preferably split as shown at 7 so as to properly grip the end of the terminal 4. This construction provides an arrangement whereby the block 1 may be readily re-fused, all that is necessary to re-fuse the block being to remove the caps 6 6, insert new fuse wire through the bores 5 2 5, and then replace the caps 6 6 on the exterior ends of the terminals 4 4 as shown in Fig. 4. In addition to this the caps 6 6 also prevent any flame from shooting out of the ends of the bores 5 5 when a fuse blows, because they cover up the ends of the bores 5 5 and divert the expelled gases back toward the base portion 1 of the protector. This construction practically forms U-shaped vents at the outer ends of the respective bores 5 5, which vents destroy any flame tending to be emitted therefrom and allow only a slight amount of smoke to be emitted from the caps 6 6 toward the base portion 1.

On one end of the block 1 is provided a pair of lightning arresters, each comprising a pair of carbon disks 8 9 and an interposed dielectric, and carried by a terminal post 4, preferably as shown, the line carbon 8 making electrical connection with the post 4 and the ground carbon 9 being insulated from the post 4 and cap 6 by a suitable insulating bushing, as shown. Each of the lightning arresters is provided with a metallic cup-shaped portion 10 inclosing same preferably as shown, the cup-shaped portions 10 10 being electrically connected with the ends of a spring member 11 which is suitably mounted on a binding post 12 carried by the center portion of one end of the block 1. The cup-shaped portions 10 10 hold the ground carbons 9 9 in place and also inclose and protect the lightning arresters from foreign particles or objects. When it is desired to remove the lightning arresters the nut 13 is loosened and the spring 11 is turned around 90 degrees, whereupon the cup-shaped portions 10 10 and the carbons 8 9, 8 9 may be readily removed from the posts 4 4.

Each of the binding posts 4 carries a pair of nuts 14 14 and a washer 15, by which a circuit conductor may be readily secured to the post 4, the circuit conductor being clamped between the washer 15 and the shoulder portion 16 of post 4, and the washer 15 being cut away as at 17 to permit the entrance of the conductor into the concave portion 18 of the washer 15. This construction of the washer 15 gives a finished appearance to the joint between the circuit conductor and the binding post 4. The binding posts 4 4 at the lightning-arrester end of the block 1 are preferably connected with the instrument or circuit to be protected, the binding posts 4 4 at the opposite end of the block 1 being connected with the respective line conductors of a metallic circuit, and the binding post 12 being connected with a grounded conductor. The binding post 12 is also provided with a pair of nuts and a washer for clamping the grounded conductor thereto.

The base portion 1 is provided with a pair of holes 19 19 for mounting the protector in place, and is cut away on the underneath side thereof as at 20, and grooved as at 21, so that any of the circuit conductors may be carried underneath the base portion 1 if desired.

It is believed that the operation and the purposes of the fuses and lightning arresters of this invention will be well understood without further detailed description.

I do not wish to limit this invention to all of the particular details of construction herein shown, as various modifications in same may be made without departing from the scope of the appended claims.

What I claim as my invention is:

1. A fusible conductor for electrical fuses, having an iron core and a copper sheath surrounding the iron core.

2. A fusible conductor for electrical fuses, comprising a core made of a metal of relatively low conductivity, and a sheath surrounding the core made of a metal of relatively high conductivity.

3. A fuse of the character described, comprising a casing having a cylindrical bore therethrough, and a crimped fuse wire ex-

tending through the said bore whereby a definite portion of the fuse wire touches the sides of the said bore.

4. A fuse of the character described, comprising a casing having a bore therethrough, and a crimped fuse wire extending through the bore whereby only a small portion of the fuse wire is allowed to touch the casing.

As inventor of the foregoing I hereunto subscribe my name in the presence of two subscribing witnesses.

FRANK B. COOK.

Witnesses:
FREDERICK R. PARKER,
JNO. F. TOMPKINS.