

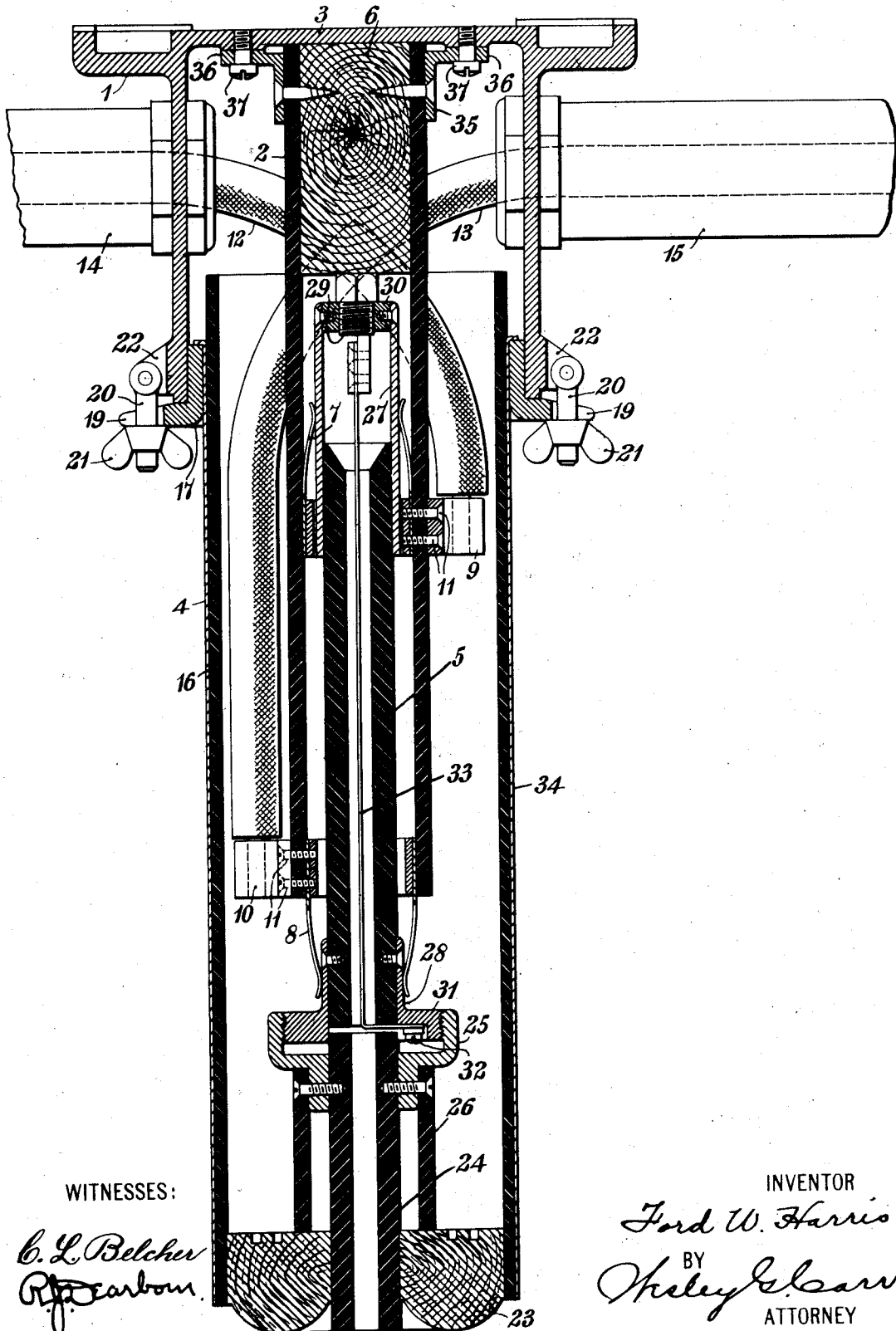
F. W. HARRIS.

INCLOSED FUSE.

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1,042,434.

Patented Oct. 29, 1912.



WITNESSES:

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INCLOSED FUSE.

1,042,434.

Specification of Letters Patent.

Patented Oct. 29, 1912.

Application filed October 5, 1907. Serial No. 396,043.

To all whom it may concern:

Be it known that I, FORD W. HARRIS, a citizen of the United States, and a resident of Wilksburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Inclosed Fuses, of which the following is a specification.

My invention relates to protective devices for electric circuits, and it has special reference to such devices as embody fusible strips of conducting material which may be easily replaced in the event of destruction thereof.

The object of my invention is to provide a device of the class above indicated that shall be simple and durable in construction and specially adapted for the protection of electric railway vehicle motor circuits of relatively high voltage.

Since alternating current railway motors have been developed and perfected, the voltage of the supply circuit has been raised to relatively high values in order that large amounts of power may be transmitted over relatively small conductors. The fuse of my present invention is admirably adapted for the protection of such equipments, since it is designed to occupy a minimum amount of space on the car bottom, and not only effectively interrupts the circuit under predetermined conditions but is arranged to obviate any possibility of setting fire to, or otherwise injuring, adjacent apparatus.

The single figure of the accompanying drawing is a sectional elevation of a protective device constructed in accordance with my invention.

Referring to the drawing, the device here illustrated comprises a stationary frame or socket 1, which may be secured to the bottom of a car body or carried in any suitable relation to an electric vehicle, an insulating tube 2 which is secured to the base 3 of the socket and projects outwardly therefrom, an inclosing casing 4, which is removably attached to the walls of the socket 1, and an inner tube 5 which is removably secured to the casing member.

The inner end of the tube 2 is sealed by an insulating plug 6 and is provided with internal resilient contact members 7 intermediate its ends and with similar members 8 that project from its outer extremity. The contact members 7 and 8 are provided with

terminals 9 and 10 which are on the outside of the tube and are connected to the contact members by screws 11, and conducting leads 12 and 13 are electrically connected to the terminals and extend through insulating bushings 14 and 15 that are located in the side walls of the socket 1.

The casing member 4 comprises an insulating tube 16 having a ring 17 located near its inner end which extends for a short distance into the socket 1, the ring 17 being closely fitted into the socket and being provided with projections 19 that are engaged by bolts 20 and wing nuts 21. The bolts 20 are pivotally connected to projections 22 from opposite sides of the socket 1. The outer extremity of the tube 16 is partially sealed by a block 23, through which a relatively small tube 24 extends. A screw-threaded socket 25 is secured to the inner extremity of the tube 24 and is spaced from the insulating block 23 by an insulating tube 26.

The inner tube 5 is provided with contact sleeves 27 and 28 that are located near its ends and are adapted to be engaged by the resilient contact members 7 and 9 when the tube 5 is inserted in the tube 2. The inner contact member is provided with a terminal bolt 29 that engages a nut 30 located in the end of the tube, and the outer contact sleeve 28 is provided with a flange 31 that is screw-threaded to engage the socket 25 and is provided with a set-screw 32 to which one extremity of the fusible strip 33 may be attached. The strip 33 is threaded through the inner tube 5 and is secured to the bolt 29 at its opposite end. The opening in the inner tube 5 is preferably of the same size as that of the short tube 24, and the tubes 2, 5, and 24 have coincident axes. The tube 16 is provided with an outer casing 34 of sheet iron.

In operation, a circuit is completed through conducting lead 12, contact members 7 and 27, fusible conductor 33, contact members 28 and 8, and conducting lead 13, and, if the current traversing the fusible conductor exceeds a predetermined amount, this conductor will be ruptured and the arc formed when the circuit is broken will form an explosion which will expel the hot gases through the open end of the tube 5 and through the tube 24. A special advantage is obtained in this way, since these hot gases

are immediately carried outside of the casing 4 and are, consequently, unable to cause the arc to continue through the contact members 27 and 28 or to reestablish an arc between them.

5 The inner end of the fuse-containing tube is provided with a gas-tight joint which prevents any portion of the hot gases, formed when the fuse is ruptured, from escaping into the other parts of the assembled device and consequently, the insulation of the leads and the contact members are not injured by an indefinite number of circuit interruptions.

10 The inner end of the tube 2 may be secured to the base of the socket 1 by any convenient means, a collar 35 having projections 36 through which bolts 37 extend, being provided for this purpose in the structure illustrated.

15 It will be observed that the arrangement of insulating tubes is such that the creepage distance over the surface of the tubes from one terminal to the other or from one terminal to the frame or socket 1 is relatively long.

20 It will be understood that various modifications in the shape and arrangement of parts may be effected within the scope of my invention, and I desire, therefore, that only such limitations shall be imposed as are indicated in the appended claims.

I claim as my invention:

35 1. A protective device comprising an insulating tube having internal resilient contact members and an open end, a tubular casing for said insulating tube, a fuse-containing tube located in and supported by said casing and projecting into said insulating tube and having an open outer end that projects beyond the open end of the contact-containing tube, contact sleeves on the outer surface of the fuse-containing tube to engage said resilient contact members, and a fusible conducting strip located within the inner tube and connecting the contact sleeves together.

40 2. A protective device comprising a tube, a supporting socket to which said tube is secured, resilient contact members located one at the outer extremity of the tube and one at an intermediate point within the tube, an inclosing casing attached to the supporting socket, a block which seals the outer end of the casing, and an insulating tube which projects inwardly from the center of the block, contact members on the outside of the inner tube that are adapted to engage the contact members on the inside of the first named tube, and a fusible conductor located within the inner tube and connecting the contact members thereof.

50 3. A protective device comprising a supporting frame, an insulating tube secured within, and projecting from said frame, a plug in the inner end of the tube, resilient

contact members secured one at the outer extremity of the tube and one at an intermediate point within the tube, conducting leads connected to the contact members, and a removable inner tube having contact members near its extremities which engage the resilient contact members, and a fusible conductor located within the inner tube and electrically connected to the contact members.

75 4. A protective device comprising a supporting frame, an insulating tube secured within, and projecting from said frame, a plug in the inner end of the tube, resilient contact members secured one at the outer extremity of the tube and one at an intermediate point within the tube, conducting leads connected to the contact members, a removable inner tube having contact members near its extremities to engage the resilient contact members, a fusible conductor located within the inner tube and electrically connected to the contact members, a screw-threaded flange upon the contact member at the outer end of the inner tube, a cylindrical casing which surrounds the tubes and is attached to the supporting frame, and a screw-threaded socket which engages the flange.

90 5. A protective device for electric circuits comprising two separable insulating tubes disposed the one within the other, a tubular casing for said tubes, and a fusible conductor disposed within the inner tube, said inner tube being rigidly supported by the casing and having an open outer end to carry away the gas formed when said conductor is ruptured by the passage of electric current therethrough.

105 6. A protective device for electric circuits comprising two separable insulating tubes disposed the one within the other and provided with cooperating contact terminals, a tubular casing for said tubes, and a fusible conductor within the inner tube, said inner tube being rigidly supported by said casing and having an open outer end to carry away the gas formed when said conductor is ruptured by the passage of electric current therethrough.

115 7. A protective device for electric circuits comprising an insulating tube having a gas tight joint at one end, a tubular casing for said tube having an auxiliary tube that projects into said insulating tube, and a fusible conducting strip located within the auxiliary tube and connected to terminals with which it is provided, said auxiliary tube having an open end that projects through the closed end of the casing to convey away the gas which is formed when the conductor is ruptured by the passage of electric current therethrough.

125 8. A protective device for electric circuits comprising an insulating tube having a gas

tight joint at one end and internal resilient
contact terminals, an insulating tube located
within said first-named tube and having ex-
ternal contact terminals to make separable
5 engagement with said internal contact ter-
minals, a tubular casing in which said inner
tube is rigidly supported, and a fusible con-
ductor located within the inner tube and
connected to its contact terminals, said inner

tube having an open end that projects 10
through the closed end of the casing.

In testimony whereof, I have hereunto
subscribed my name this 26th day of Sept.,
1907.

FORD W. HARRIS.

Witnesses:

C. A. TUCKER,
BIRNEY HINES.