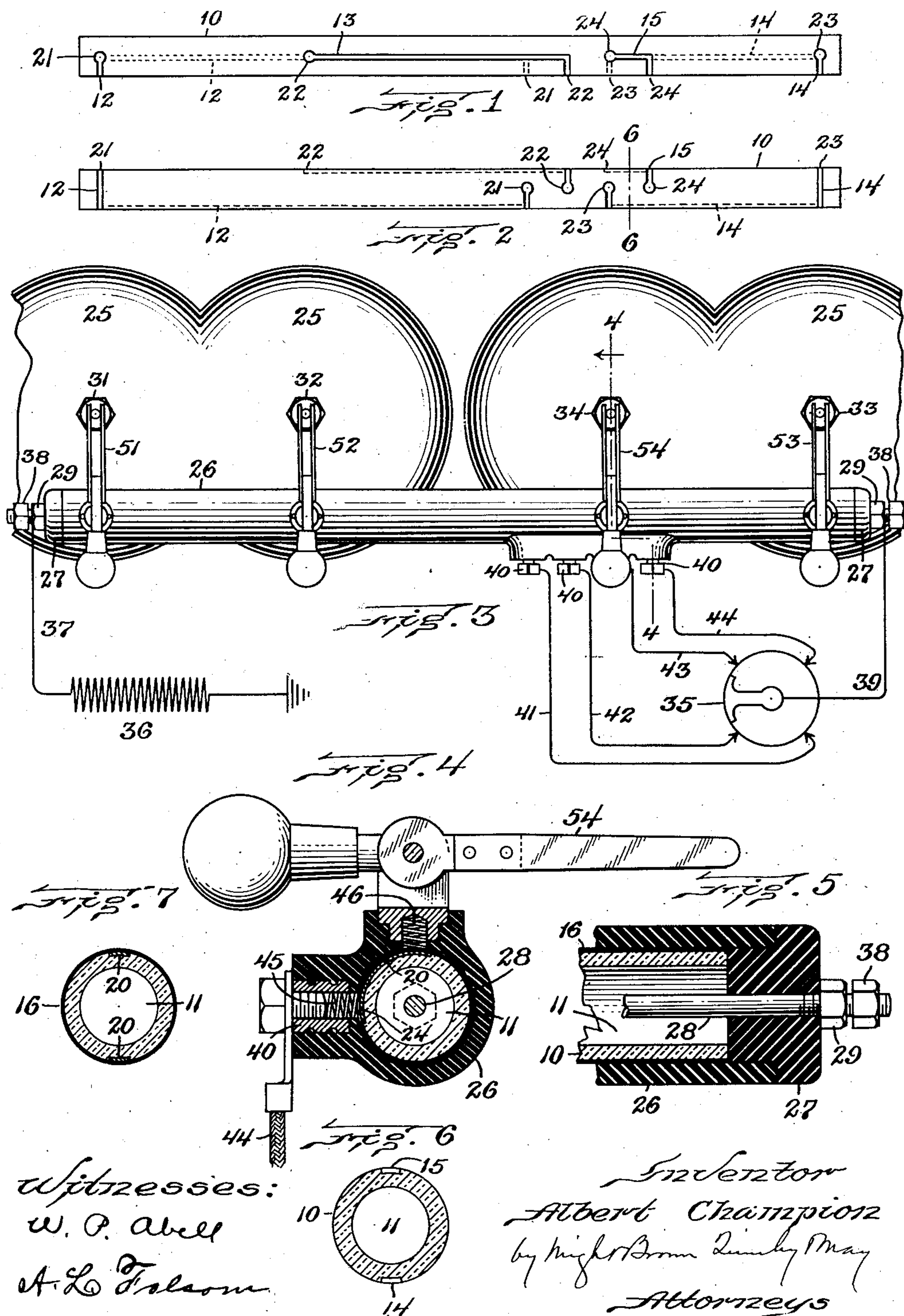


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INSULATOR AND CONDUCTOR FOR ELECTRIC CURRENTS.  
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# UNITED STATES PATENT OFFICE.

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INSULATOR AND CONDUCTOR FOR ELECTRIC CURRENTS.

959,052.

Specification of Letters Patent.

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*To all whom it may concern:*

Be it known that I, ALBERT CHAMPION, of Flint, in the county of Genesee and State of Michigan, have invented certain new and useful Improvements in Insulators and Conductors for Electric Currents, of which the following is a specification.

This invention has relation to insulators for conductors of electric currents and to a combination therewith of one or more conductors in addition to a main conductor.

In other words, the invention consists of a conduit or tube composed of non-conductive material, in the wall of which one or more conductors are embedded and which is adapted to serve as a container for another conductor extending within the interior chamber.

The chief object of the invention is to provide a holder for a plurality of conductors, so composed and arranged as to afford as nearly as possible an absolute protection to the conductors, both electrically and physically. As is generally known, currents of great voltage jump from one conductor to another if the conductors are sufficiently close to each other, unless protected by a material having a great degree of insulating property. This invention, therefore, is directed first to the provision of a compact, inexpensive, and effective holder containing one or more conductors, the whole being especially adapted for use with high tension currents, and, secondly, to means for inclosing and protecting a separate conductor or conductors, such as, for instance, feed wires.

The invention is hereinafter more clearly set forth in the following specification and pointed out in the claims.

Referring to the drawings, forming a part of this specification,—Figure 1 is an elevation of one form of an insulating holder adapted for a plurality of conductors. Fig. 2 is an elevation thereof at an angle of 90° from the aforesaid elevation. Fig. 3 is a plan view and diagram of electric wiring of an internal combustion motor to which the invention is adapted. Fig. 4 is a section on the line 4—4 of Fig. 3. Fig. 5 is a longitudinal section of one end of the insulator. Fig. 6 is a section on line 6—6 of Fig. 1. Fig. 7 is a similar section with the

addition of conductors and an external covering.

The same reference characters indicate the same parts wherever they occur.

The drawings illustrate the invention as applied to an internal combustion motor, but it is by no means limited to this use or arrangement. In this connection, however, Figs. 1 and 2 illustrate a tubular holder or conduit 10 adapted to be employed in the electrical system of a four-cylinder motor of the aforesaid type. The holder may be of any desired proportions and cross sectional shape. As shown, the holder is cylindrical, having an internal chamber 11 open at the ends. The holder is composed of any highly insulated material such as glass, porcelain, rubber, or wood fiber.

The chamber 11 is intended as a conduit for a separate removable conductor hereinafter described, and the wall or shell of the holder is of sufficient thickness to contain several individual conductors. These conductors may be installed in various ways, that shown being in the form of strips inlaid in the exterior surface of the shell. For this purpose, grooves 12, 13, 14 and 15 are formed in the shell and afterward filled with the conducting material. The grooves may be formed either in the molding of the shell or by a cutting process. If the shell be made of glass, the grooves may be formed by the chemical action of fluorin on such parts as are intended to be eaten away thereby.

For setting the conductors in the grooves, various methods may be employed. In this instance, in which a glass shell is shown, a successful method of installing the conductors is to cover the shell with wax except along the lines of the grooves, and to then submit it to a precipitation of gas containing nitrate of silver. In this way a thin layer of silver is deposited in the grooves in which it adheres to the glass. By then removing the wax covering and immersing the silver inlaid shell in an electro-plating bath, the silver may be covered to any desired thickness with metal, preferably copper. In this way, conductors 20 may be laid in the grooves and may be inclosed by a coating or covering 16 of insulating material such as



varnish. See Fig. 7. In this form of the invention, the conductors are preferably left bare at the terminals 21, 22, 23 and 24 for the purpose of making connections with other conductors.

Instead of forming the conductors of silver and copper, as described, after the molding of the shell, it is obvious that conductors molded in the wall of the shell would be an equivalent within the scope of this invention, and that the latter is capable of still other modifications wherein conductors are contained in the wall or shell of a conduit composed of insulating material.

By way of describing the particular use to which this form of the invention is adapted, reference is now made to Figs. 3, 4 and 5, in which the cylinders of a motor are indicated at 25. The shell 10 is here contained in a casing 26 mounted in any desired manner near the tops of the cylinders 25 as shown. The casing is composed of non-conducting material such as vulcanized rubber and has end caps 27 of similar material. The caps are here confined by a rod 28 somewhat longer than the casing and extending therethrough as well as through the caps themselves. The ends of the rod are screw-threaded and are provided with clamping nuts 29 for holding the caps and the rod in place. According to this arrangement, the rod 28 is utilized as a conductor in an electric circuit for producing sparks in the cylinders 25. The current in the circuit is therefore of high voltage and is distributed successively to spark plugs 31, 32, 33 and 34 through a rotary distributor 35 and other means. The current, generated in the secondary winding 36 of a transformer, passes through a wire 37 to one end of the rod 28 to which the wire may be bound by a nut 38. The other end of the rod is connected to a rotary arm of the distributor by means of a wire 39 similarly bound. The stationary contacts of the distributor are connected by wires 41, 42, 43 and 44 to binding posts 40 mounted in the casing 26. Connection is made between each binding post 40 and one set of terminals 21, 22, 23 and 24 by means of helical springs 45 shown in Fig. 4.

In addition to the binding posts, the casing is provided with split switches 51, 52, 53 and 54 which are adapted to engage respectively the plugs 31, 32, 33 and 34. The bases of the switches are connected to the other set of terminals 21, 22, 23 and 24 by helical springs 46. With one side of the winding

36 grounded on the cylinders 25, the circuit is made successively through the conductors 20 contained in the wall of the shell 10, but the conductors are here so far separated and so thoroughly insulated as to be capable of transmitting a current of high voltage without liability of leakage.

The rod 28, which is a feeder for the conductors 20, is afforded equal protection against leakage and liability of derangement by external interference. The value of this arrangement is especially apparent in connection with automobiles and power-boats driven by motors of this type.

Having thus explained the nature of my said invention, and described a way of constructing and using the same, although without attempting to set forth all of the forms in which it may be made or all of the modes of its use, what I claim is:

1. The combination with a tube of insulating material having conductors embedded in its wall, of a casing for said tube, said casing having an opening for the insertion and removal of said tube, means for covering said opening, and a conductor extending through said tube and through said covering means and connected to said covering means whereby said covering means is fastened against said casing.

2. The combination with a tube of insulating material having conductors embedded in its wall, of a casing for said tube, said casing being open at both ends, covers for the openings in the ends of said casing, a conductor extending through said tube and through said covers, and means for connecting said conductor and said covers whereby said covers are fastened against said casing.

3. The combination with a tube of insulating material having conductors embedded in its wall, of a casing for said tube, said casing being open at both ends, covers for the openings in the ends of said casing, said covers being adapted to confine said tube in one position, a conductor extending through said tube out of contact therewith, and through said covers, and means on said conductor for engaging and holding said covers against their seats.

In testimony whereof I have affixed my signature, in presence of two witnesses.

ALBERT CHAMPION.

Witnesses:

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