Oct. 3, 1944. J. J. MASCUCH 2,359,436

METALLIC SHIELD FOR ELECTRICAL CONDUCTORS

Filed April 27, 1929

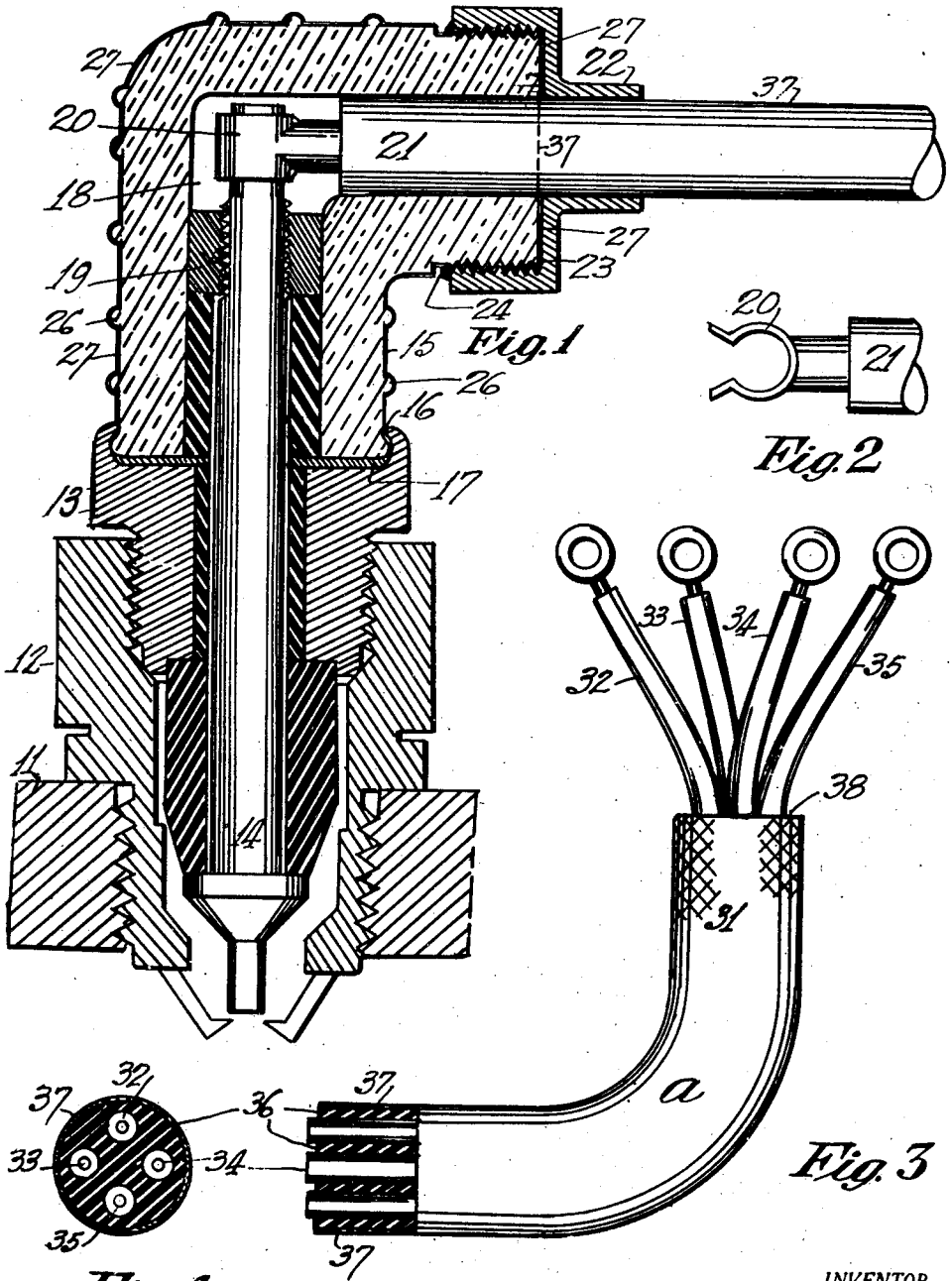


Fig. 1

Fig. 2

Fig. 3

Fig. 4

INVENTOR.
Joseph J. Mascuch
BY
M. N. Loughridge
ATTORNEY.

Patented Oct. 3, 1944 2,359,436

UNITED STATES PATENT OFFICE

2,359,436

METALLIC SHIELD FOR ELECTRICAL CONDUCTORS

Joseph J. Mascuch, Newark, N. J., assignor to Breeze Corporations, Inc., Newark, N. J.

Application April 27, 1929, Serial No. 358,711

2 Claims. (Cl. 123—169)

This invention relates to metallic shielding for electrical conductors and has for an object to protect insulated conductors by a metallic covering which is grounded thereby preventing radiation from the conductors and corresponding disturbances in radio active apparatus. A particular use of this invention is the shielding of the conductors leading to the spark plugs of the engines in airplanes so that the use of radio signaling on the airplanes may be possible.

The spark plug conductors leading from the distributor are subject to high tension currents and require heavy insulation and should have a certain degree of flexibility. In the present invention a porcelain elbow is mounted on the top of the spark plug having the insulated conductor entering it at one end and engaging the post of the plug. In order that the elbow and the conductor may be metallically shielded on their entire outer surfaces, the elbow is coated with metallic foil, applied, if necessary, by an adhesive, and the conductor is similarly coated; these coatings connect with the metallic body of the spark plug and are thereby grounded to the engine.

The metallic foil may be applied in various ways to the outside of the insulation, however, I prefer to electro-plate the elbow and the conductor; also to electroplate the cable in which the conductor may be embedded, after the cable has been formed to shape. By a process herein described, I am able to electro-plate non-metallic substances and to form a light metallic coating on articles of various shapes, such as the conductors used on internal combustion engines.

This invention will be more particularly understood from the following specification and from the accompanying drawing selected to illustrate one form of my invention, in which, Fig. 1 is a sectional elevation on an enlarged scale of a spark plug with a shielded conductor according to this invention; Fig. 2 is a detail showing one method of connecting the conductor to the spark plug within the elbow; Fig. 3 is a form of cable that may be used between the distributor and spark plugs of an engine and Fig. 4 is a cross-section of the cable in Fig. 3.

In the drawing, 11 is the engine head, 12 is the spark plug body which is screwed into the engine head, 13 is the cap, 14 is the stem and 15 is the porcelain elbow to protect the outlet of the stem. The elbow is seated in the cap on the asbestos gasket 17 and is secured in place by the spun-over edge of the cap at 16. A nut 19 on the end of stem 14 holds the insulation in place.

Connection is made in the chamber 18 between the conductor 21 and stem 14 through the clip 20, Fig. 2 which clamps the stem as the conductor 21 is inserted in the elbow. A metallic cap 22 is screwed on the end of the elbow as indicated at 23 and may be sealed to the elbow 15 through the channel 24 by the application of a suitable sealing medium, or the edge of 23 may be spun into channel 24 to prevent cap 22 from unscrewing.

The elbow is preferably made from unglazed porcelain and provided with ridges at 26. It may be coated with shellac or other waterproof adhesive to which the metallic foil is applied, making a grounded connection with the cap 13. The rubber insulation of the conductor 21 may be similarly treated so that the metallic coating is grounded through 22 and the coating of the elbow to the cap 13.

The preferred way of applying the metallic foil to the elbow and to the rubber covering of the conductor is by electro-plating. This makes a uniform coating over the entire surface of a light metal such as nickel which is rust proof and has a high tensile strength, and adds very little to the weight of the conductors; at the same time sufficient flexibility is maintained in the conductors for the purposes intended.

In order to electro-plate a non-metallic substance it is necessary to "metalize" its surface so that it will conduct the electric current. The porcelain elbow is metallized by spraying the unglazed surface with shellac and then spraying with bronze powder, preferably in a volatile solution. This power quickly dries and leaves a conducing surface on the porcelain. In this state the porcelain is placed in the electro-plating vat to be plated as desired.

In the plating vat it is usually necessary to use increased voltage for the initial deposit until the metalized surface becomes a uniform conductor, after this stage is reached, it has been found that one volt is sufficient for a copper plating solution for these articles. After a foundation of copper plating is applied the device is then transferred to a nickel plating vat for a thin deposit of nickel.

The plated surface is indicated at 27, Fig. 1, and forms a continuous metallic shell over the irregular form of the elbow. If an unequal shrinkage should develop between this shell and the porcelain, the shell remains intact and is held in place by the ridges 26.

The conductors between the distributor and the spark plugs of a multiple cylinder engine are, in the present case, formed into a cable as indicated

in Fig. 3 which is moulded to the shape desired with the individual conductors fanning from the end of this cable.

This cable is electro-plated after it is formed, by metalizing the surface of the rubber insulation as described in connection with the porcelain and applying a copper and nickel deposit thereto.

The cable **31** is indicated as an elbow *a* of moulded rubber **36** in which the conductors **32**, **33**, **34** and **35** are embedded. Each of these conductors comprise a rubber insulated, stranded wire which terminates in the eyelets shown. The rubber insulation is sometimes braided and may be braided with wire in an ordinary braiding machine. This surface is coated with metallic powder and plated with copper and nickel as described. The plating is indicated at **37** which covers the entire surface including the outlet of the cable at **38** and the exposed surface of each of the conductors as indicated on conductor **21** at **37**.

It has been the practice to place the conductors in flexible metallic hose but this has not proven quite satisfactory for airplane work and does not form a continuous closed metallic covering for the conductor.

Having thus described my invention, I claim:

1. In combination, a spark plug comprising a metallic cap and a stem having an outlet, a conductor connecting to said stem at the outlet, a dielectric member seated against said cap and enclosing said outlet, a metal cap screwed on the end of said member and having an aperture for said conductor, and a metallic coating intimately encasing said member and said conductor, said coating and said caps being electrically connected.

2. In a spark plug of the type having a cylinder engaging shell carrying one electrode and a shielded conductor electrically connected to the other electrode, the combination with said conductor and shell of a shield having a cylindrical portion secured at its lower end by direct, locking contact with said shell and a second angularly-directed portion embracing the end of said conductor and electrically connected with the shield thereof and means for holding the two portions of said shield in engagement with each other whereby an electrical connection is maintained from the shield of said conductor through the two portions of said shield to said shell.

JOSERH J. MASCUCH.