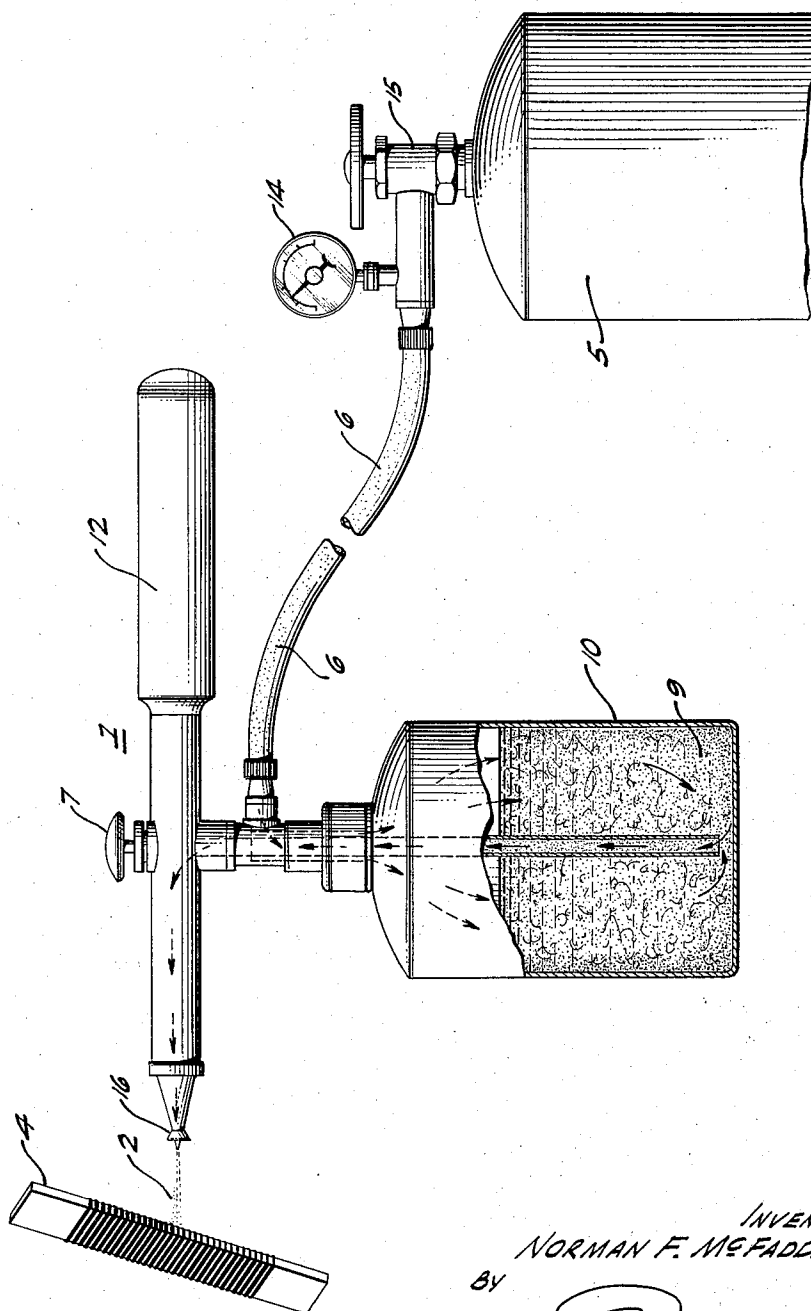


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COATING REMOVING METHOD

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COATING REMOVING METHOD

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This invention relates to the removal of surface coatings and particularly to a method and apparatus for forming a contact area on a winding of insulated fine wire.

The process of the invention, briefly, comprises directing a fine jet of powdered pumice suspended in water against the surface coating to be removed. The capabilities of the cutting jet are increased by reducing the surface tension of the water, and by using a gas under pressure as the means of propulsion. A certain amount of the gas is carried along with the cutting stream, and acts to cool the windings during the abrading away of the surface coating.

In manufacturing resistance elements for use in potentiometers and the like, it has been common practice to wind an insulated wire or other resistance element about a form, and subsequently to remove chemically or mechanically a sufficient amount of the insulation to provide a contact path for engagement by a sliding connection member. With large resistance elements this is a comparatively simple matter. As the size of the resistance element is reduced, the difficulty of removing the coating over a precisely defined area without disturbing the winding or injuring the wire is increased.

Additional problems are found with high precision equipment. One such is the tendency of the common efficient abrasive materials of the class of Carborundum to remain in the interstices of the windings and form an electrical path between the adjacent turns. Another is the likelihood of an expansion of the wire caused by heat generated during physical removal of the coating, resulting in a loosening of the windings and displacement of the turns on the core.

The present invention affords a simple process for removing a coating from the surface of a winding along a desired path without disturbing the turns or leaving an undesired residue as may occur in chemical processes. It is not limited to the initial production stages, but can be utilized even after the winding has been assembled in equipment.

The method of the invention may be utilized in connection with the apparatus as illustrated in the accompanying drawing, in which:

Fig. 1 is an elevational view of a gun, partly broken away to show details of construction, for directing a cutting jet against a work piece, together with a compressed gas supply tank.

It will be understood that the method is not limited in its utilization to use with the precise apparatus shown, but is applicable to all equivalent embodiments.

In Figure 1, an air gun of conventional design, generally indicated as 1, is shown as directing an abrasive jet stream against a work piece 4. The propulsive force is supplied by gas under pressure from a tank 5, delivered to the gun through a flexible conduit 6. The application of the jet is controlled by the operator through a valve 7. This valve opens to allow the abrasive mixture, shown at 9, to be forced out of the closed container portion 10 through a fine adjustable nozzle 11 in the

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form of the cutting jet stream 2 of controllably small diameter.

A gun of the type used by artists in air brush work, which is readily obtainable in commerce, is very satisfactory for use with the method of the invention. Such a gun has a handle 12 which the operator holds during use, conveniently placed for controlling the jet by pressure of his finger on the valve 7. The container portion 10 is provided to receive a supply of the abrasive mixture 9.

This mixture consists of a suspension of air-blown or finely divided pumice in chemically pure water. Distilled water is of sufficient purity for this purpose. A small amount of a wetting agent such as that known by the registered trade name "Aerosol" is added to the water, and the whole shaken up well before each use. This addition makes it possible to carry the pumice in suspension more effectively by lowering the surface tension of the water.

In a typical embodiment, the container 10 holds about three ounces of water to which three drops of Aerosol are added, together with from one to two ounces of powdered air-blown pumice. The amount of pumice used depends on the type of coating material to be removed from the wire, and its thickness. Two ounces is about the maximum that can be used before the gun will choke and refuse to give a smooth continuous cutting stream.

The gas tank 5 may be of the standard fifty-pound commercial variety, filled with either CO₂ or N₂. A pressure gauge 14 is provided, and the tank valve 15 is set to deliver about 70 pounds per square inch pressure to the gun 1.

The operator directs the gun 1 onto the particular portion of the resistance wire from which the insulation is to be removed, and adjusts the controllable nozzle 16 to give the desired width of the cutting jet. He then presses the valve 7, and the mixture will be directed in a controlled-diameter jet stream against the work piece. The pressure from tank 5 operates against the surface of the abrasive mixture liquid 9 in the closed container 10, forcing it out the nozzle 16 and against a work piece 4. The work piece here shown for example is the potentiometer winding 4, from the edge of which the insulation is to be removed to permit a sliding contact arm to engage electrically therewith to afford a variable resistance circuit element.

As the mixture strikes the insulated surface, which may be enamel, lacquer, or plastic, for example, and the jet is moved slowly along the surface to be cleaned, the insulating coating is cut away by the pumice. The spraying continues until the bare metal surface of the wire is exposed to the view of the operator. The operation is best performed under a low power binocular microscope in a large enamel metal tray to catch residual solution. Inasmuch as the wires used are from .0004 to .001 inch in diameter, an unskilled worker using a hand method could very easily break the wires on the wound unit in trying to remove the enamel coating.

The wet pumice process makes it possible for an operator with little previous skill in this type of work to produce a finished unit in minimum time with acceptable quality. The removal can either be confined to a special area on the resistor unit by a masking technique or by careful direction of the jet. In some cases, an entire assembly can be thoroughly stripped of its insulation and later the entire unit washed clean with distilled water under pressure with an air gun. After being dried by blowing CO₂ or N₂ on the unit with an air gun, such an assembly is ready for use or installation.

With a work piece such as that illustrated at 4, there is sufficient gas entrained with the jet stream to provide the desired cooling effect. As the abrasive-carrying

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stream impinges on the work piece, the entrained gas evolves therefrom and in the process cools the work piece, thereby preventing expansion of the windings and possible subsequent dislocation on the supporting core member.

It will thus be seen that the method of this invention makes it readily possible for even unskilled workers to perform stripping operations on small size equipment to be used in precision circuitry. It will also be apparent that this method of removing enamel, lacquer, or plastic insulation is also suited to the preparation of work pieces for soldering or other permanent attachment purposes requiring a substantially chemically clean surface.

What is claimed as new is:

1. In a method of removing a surface coating from wire material, the steps of: supporting said wire material; directing a stream of an abrasive carrying emulsion

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against said wire material, said emulsion including water, a wetting agent and said abrasive; and pressurizing said emulsion with gaseous nitrogen to produce said stream.

2. A method of removing a surface coating from wire material in accordance with claim 1 wherein said abrasive comprises powdered air-blown pumice.

3. A method for removing a surface coating from wire material in accordance with claim 2 wherein said water is chemically pure.

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