

Nov. 18, 1969

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3,478,552

METHOD OF MAKING WELDING ELECTRODE

Original Filed Feb. 1, 1963

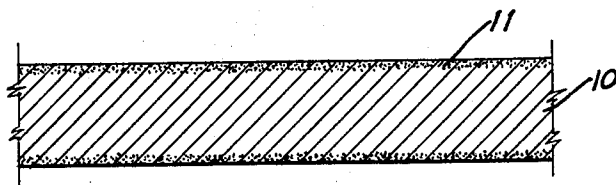


Fig. 1

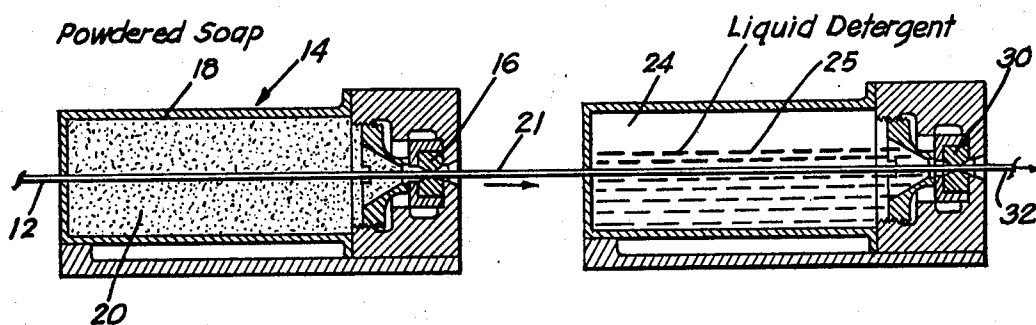


Fig. 2

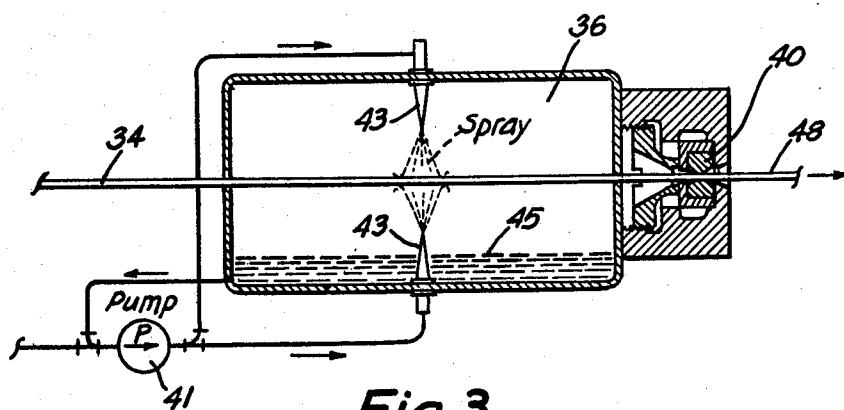


Fig. 3

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ATTORNEYS

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3,478,552
METHOD OF MAKING WELDING ELECTRODE
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Continuation of application Ser. No. 255,528, Feb. 1, 1963. This application Dec. 8, 1966, Ser. No. 600,276
Int. Cl. C23f 17/00; B21f 45/16; B21c 1/00
U.S. Cl. 72—42 2 Claims

ABSTRACT OF THE DISCLOSURE

A continuous feeding ferrous welding electrode is formed by initially coating a mild steel wire with a lime solution, applying a substantially dry soap lubricating compound to coat the surface of the wire, drawing the wire to reduce its diameter with a portion of the sodium soap being impregnated within the surface pores of the wire, applying a liquid lubricating solution to the wire, and further drawing the wire to reduce its diameter with a portion of the lubricating solution also being impregnated into the surface pores of the wire to provide a rust and corrosion resistant electrode having improved feeding and welding characteristics.

This application is a continuation of application Ser. No. 255,528, filed Feb. 1, 1963, which is now abandoned.

This invention relates to arc welding, and more particularly to wet drawn wire electrodes useful for automatic, semi-automatic, and manual welding practice.

In conventional wire drawing equipment the same comprises a die box containing the drawing die and which has positioned adjacent thereto a compartment or chamber for holding lubricant, and through which the wire passes before entering the drawing die. Various lubricants have been used or suggested, such as powdered lime, grease, soap, and the like. Flash coatings of metal such as copper have also been used. Such coatings when applied to wire electrodes provide a relatively thick film of the material on the wire which is easily scraped off as the coated electrode is fed through the welding nozzle and hoses. Even flash coatings of metal, e.g. copper deposited on the wire surface tend to flake off and accumulate on the working parts of the welding apparatus.

In accordance with the improved welding electrode of this invention, the electrode is wet drawn using a combination of powdered soap and liquid detergent which is forced into the surface pores of the wire. Wet drawing of the wire is essential, at least during the last wire drawing operation, to impregnate the surface of the wire with the detergent lubricant and avoid leaving a coating of the lubricant material on the wire and such as tends to scrape off during use of the wire electrode.

Dry drawing employing powdered soap and the like lubricant may be utilized during intermediate wire drawing operations, and which is followed by a final wet drawing operation to form the finished electrode. Wet drawing of the wire using powdered soap and liquid detergent in accordance with the invention leaves only an infinitesimally thin film of the lubricant impregnant on the surface of the wire. During wet drawing, the detergent lubricant is hydraulically forced or pressure worked into the pores at the surface of the wire and which is essential for achieving the improved results.

The invention is applicable for the treatment of limed or unlimed wire or rod electrodes. Such material is treated with a soap and liquid detergent prior to power-drawing the wire through one or more dies until the electrode is of the desired diameter. By wet drawing of the wire electrode the detergent lubricant is impregnated into the wire surface and no appreciable coating thickness of the lubricant is left on the surface of the wire, as aforementioned.

It is accordingly an object of the invention to provide an electrode for welding having improved properties, and which avoids the aforementioned difficulties encountered with conventionally coated electrodes.

It is a further object of the invention to provide a welding electrode having an adherent outer impregnated film of material which functions both as a lubricant and rust inhibitor and which does not increase the contact resistance of the welding electrode at the current collecting nozzle.

In accordance with the present invention, an improved electrode wire is produced by the treatment of the same to impregnate the electrode surface portion with an electrically conductive lubricant and corrosion inhibitor. Welding wire electrodes treated in accordance with the invention slip through the hoses and nozzles of the welding equipment easily and the electrode is protected against rusting or deterioration due to corrosion.

Further objects and advantages of the invention will hereinafter be apparent, and for the purposes of illustration, an embodiment of the invention is shown in the accompanying drawing in which—

FIGURE 1 illustrates in section and on an enlarged scale a wire electrode having the surface area portion impregnated with a lubricant and protective composition;

FIGURE 2 is a vertical sectional view taken through a pair of wire drawing die boxes and illustrating how the invention may be practiced;

FIGURE 3 is a vertical sectional view of a modified wire drawing die box for applying the liquid detergent.

Referring to the drawings, in FIGURE 1 a finished electrode 10 is illustrated, having an integral surface or impregnated shell 11 comprising the detergent lubricant.

In the embodiment illustrated in FIGURE 2, a wire electrode 12 passes through a die box 14 and drawing die 16. The die box is provided with a chamber 18 which is filled with powdered sodium soap 20. Following drawing die 16, the resultant drawn wire 21 is passed through die box 24 containing liquid detergent 25 and finally through the drawing die 30, to provide a finished wire electrode 32.

As a modification of the liquid die box arrangement shown in FIGURE 2, there is illustrated in FIGURE 3 a spray-type die box. In this modification the wire 34 is passed through a closed spray chamber 36 and sprayed with liquid detergent, which may contain dye for marking the wire as it is drawn to the desired size by the drawing die 40. Utilizing a pump 41 and conduit arrangement with spray nozzles 43, the liquid detergent may be withdrawn from the bath 45 and sprayed on the wire just prior to its passage through the drawing die 40 to provide a finished electrode wire 48.

Preferred embodiments of the invention, but not limitative thereof, are exemplified in the examples as follows—

EXAMPLE 1

A mild steel wire electrode previously drawn down to 0.125 inch (diameter) and soaked in lime to introduce calcium in the form of oxide into the surface pores is drawn down to 0.084 inch with the application thereto of powdered sodium soap. The soap which is in the form of a dry powdered mixture (300 mesh particles) is applied to the wire electrode as it passes through the die box.

The composition of the dry powdered soap mixture is as follows—

	Parts by wt.
Sodium stearate	84.0
Borax	10.0
Sodium nitrite	5.5
Moisture	0.5

The sodium stearate functions as an adherent lubricant, and borax and sodium nitrite serve as a buffer and rust

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inhibitor. While the constituents of the soap composition may be varied over a range of 10 to 20% depending upon the metal used in the wire electrode, that set out in Example 1 is preferred for ferrous metal wire electrodes.

The liquid detergent and impregant is composed of the following components which are mixed with water to provide a liquid composition.

EXAMPLE 2

	Parts by wt.	
Potassium oleate -----	44	10
Potassium linoleate -----	44	
Corn oil fatty acid (linoleic acid) -----	5	
Sulfonated naphthalene (naphthalene sulfonic acid) -	5	
Sodium biphosphate -----	1	
Polyalkylaline glycol (sodium salt of diethylene glycol) -----	1	15

Five pounds of the above mixture is dissolved in 20 gallons of water to provide a liquid detergent impregnating composition. After wet drawing of the wire it is dried in air.

The proportionate amounts of the constituents of the liquid detergent may be varied over a range of 10-30% depending upon the composition and physical condition of the wire electrode used.

EXAMPLE 3

As a modification, and where it is desired to color the electrode, an azo dye is incorporated in the liquid detergent composition of Example 2 in sufficient amount to color the electrode. To produce a red colored electrode Croceine scarlet 3B is added to the liquid detergent composition to give it a brilliant red color. To provide a yellow colored electrode, Metanil Yellow is added to the detergent composition.

EXAMPLE 4

Example 1 is repeated using a blend comprising 1:1 parts by weight of the sodium stearate composition of Example 1 and the detergent composition of Example 2 dissolved in water. Five pounds of the solids mixture is dissolved in 20 gallons of water. This mixture is applied to limed drawn wire to provide an electrode having the liquid detergent mixture impregnated in the surface.

Liming of drawn wire is conventional practice for providing the surface with calcium electrons in the form of its oxide or hydroxide. The presence of calcium improves the arcing characteristics of the wire electrode. Other alkaline earths may be used in place of calcium but for economic reasons they are not generally employed. The bare wire may, where desired, be drawn through an aqueous suspension of calcium hydroxide (lime water) and the lime coated wire air dried. Thereafter the lime coated wire is treated with sodium soap and liquid detergent in accordance with the present invention, to provide an electrode having the improved electric arc welding characteristics.

What is claimed is:

1. A method for making a continuous feeding wire electrode for use in arc welding having materials impregnated into the pores thereof to provide improved welding characteristics and to permit the electrode to pass easily through welding nozzles and hoses, comprising the steps of

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initially coating a bare mild steel wire with a solution, such as lime, to aid in the subsequent adhesion of said impregnating material in the surface pores thereof;

applying a substantially dry sodium soap lubricating compound to coat the surface of said wire; drawing said wire to reduce it in diameter with said substantially dry sodium soap lubricating compound aiding in the drawing operation and being impregnated into the surface pores of said wire as a result of the drawing operation to provide a rust and corrosion inhibitor;

applying a liquid lubricating solution to said wire after it is drawn to remove that external dry soap lubricating compound remaining on the surface of said wire but not the impregnated materials and to coat the surface of said wire with said liquid lubricating solution;

further drawing said wire to reduce it in diameter with said liquid lubricating solution aiding in the drawing operation, with a portion of said solution being impregnated into the surface pores of said wire as a result of the drawing operation, and with the remainder of said solution being removed from the surface thereof by the drawing operation thereby providing a welding electrode having materials impregnated into its surface pores to improve the feeding and welding characteristics and to provide resistance to rust and corrosion.

2. The method defined in claim 1 wherein said dry sodium soap lubricating compound consists of

	Parts by wt.
Sodium stearate -----	84.0
Borax -----	10.0
Sodium nitrate -----	5.5
Moisture -----	0.5

and wherein said liquid lubricating solution consists of

Potassium oleate -----	44
Potassium linoleate -----	44
Corn oil fatty acid -----	5
Sulfanated naphthalene -----	5
Sodium biphosphate -----	1
Polyalkaline glycol -----	1

said liquid lubricating solution being dissolved in water in the proportionate amount of five pounds of solids to twenty gallons of water.

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U.S. Cl. X.R.

72-46; 117-202