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METHOD OF REMOVING COATINGS FROM CONDUCTORS

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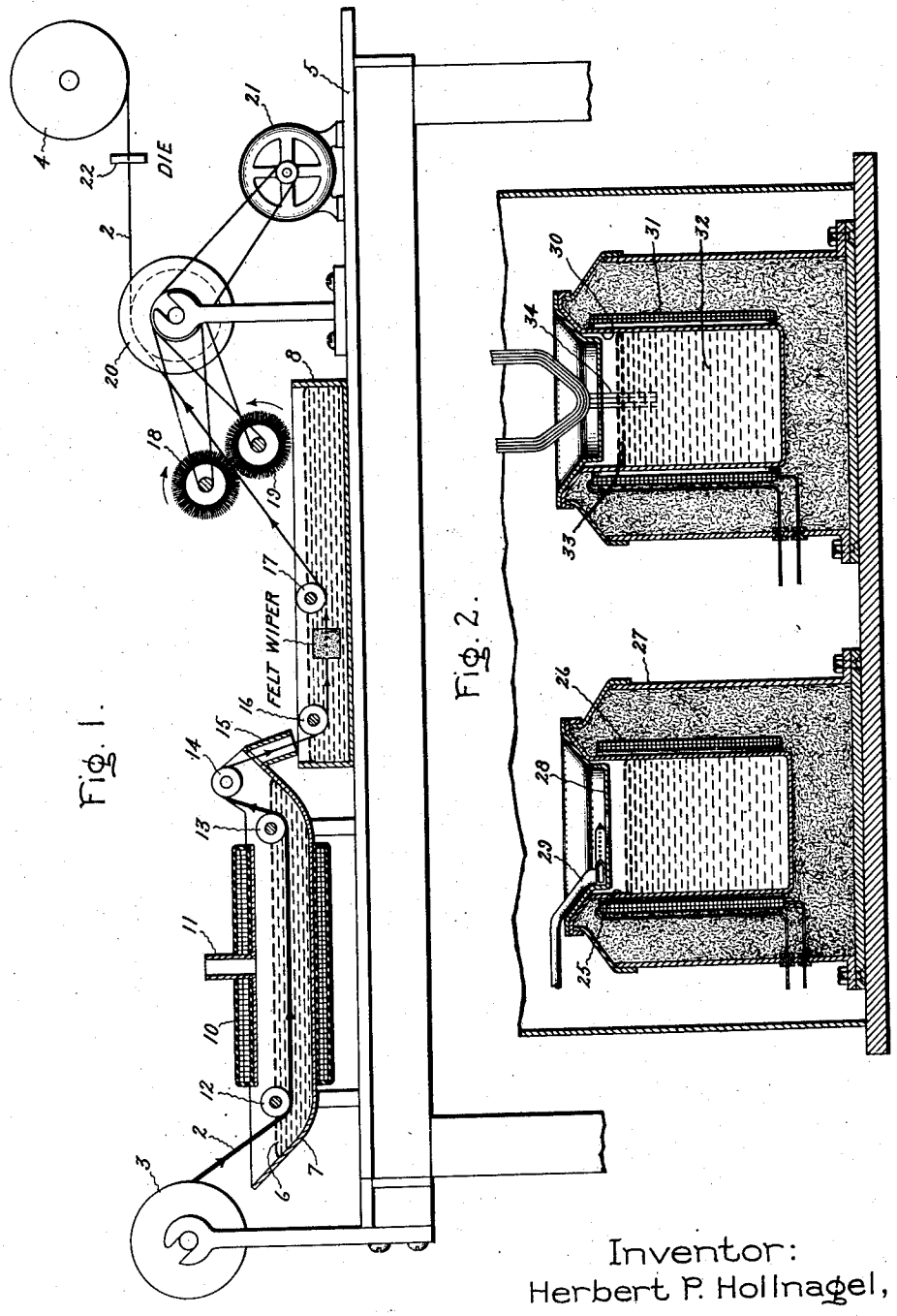


Fig. 1.

Fig. 2.

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UNITED STATES PATENT OFFICE.

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METHOD OF REMOVING COATINGS FROM CONDUCTORS.

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The present invention relates to the removal from electrical conductors of sheaths or coatings of insulating materials of various kinds, as for example cotton, silk, paper, asphalt, varnishes, asbestos, or the like, which may be present either alone or in combination. It may be necessary to remove these coatings either locally to make electric connections or over a long length of wire when, for example, the insulation has been damaged, or insulated wire has been rejected for one reason or another.

Heretofore, these various insulating coatings have been removed mechanically, for example, by scraping, but this method is time consuming, even for the removal of short lengths of insulation.

In accordance with my invention; the insulation is removed more conveniently and expeditiously by a chemically active agent, preferably a fused alkali. The wire is not only freed from insulation by this method but also is annealed and has its surface cleaned, thereby facilitating subsequent operations. In accordance with another feature of my invention, the uncoated conductor is subjected after this treatment, while chemically clean, to a surface alloyage with another metal to facilitate making electric connections. Other features of my invention will be set forth hereinafter and pointed out in the accompanying claims.

The accompanying drawing shows in Fig. 1 a somewhat diagrammatic vertical section of an apparatus for removing insulation from wire in continuous lengths and Fig. 2 shows in vertical section two heated receptacles respectively containing a medium for removing insulation from the ends of insulated wire and a fused metal for surface alloying the wire, preparatory to making connections.

My invention is applicable for the rapid removal of various kinds of insulation, the more common example being cellulose compositions, such as paper or cotton and gummy organic compositions, such as various kinds of gums, asphalts, varnishes, lacquers, and synthetic resins. Insulation consisting of complex silicates, such as asbestos can be removed in the same way. Non-vitreous enamels, that is coatings of oxidized or polymerized oil, are removed with ease.

I will first explain the removal of insulation from continuous lengths of wire. Expeditious removal of insulation will permit the salvaging of wire upon which the insulation has been damaged. Fig. 1 shows such a wire 2 unwinding from a reel 3 passing through the treating apparatus and finally being wound upon a receiving reel 4, the entire apparatus being supported upon a table 5. The decoating bath is contained within an elongated tank 7 consisting of iron or the like. The decoating composition consists of fused lye, which has been carefully freed from water. Chemical purity is not essential.

I may use commercial lye which consists of about 94% of sodium hydrate, about 2% of sodium carbonate, about 2% of sodium chloride and about 2% sodium sulphate. Potash lye, and alkali sulphite can be used. A second tank 8 contains water or other washing medium. An auxiliary abrasion mechanism, which will be described presently, is used in some cases.

The alkali bath 6 is heated to a fusing temperature, or somewhat higher, by any convenient means, as for example, an electric heater 10. The temperature preferably should not exceed 700° C. A vent pipe 11 provides for the removal of fumes. The wire 2 is carried over suitable guides 12, 13, 14 through a discharge neck 15 into the washing tank, where it is received by guides 16, 17. A felt washer, or similar wiping device preferably is interposed between the guides as indicated. A flow of water should be maintained through the tank through inlet and outlet pipes (not shown). As sometimes small patches of tenaceous insulation may adhere loosely to the wire after the chemical treatment, rotating brushes 18, 19, are provided between which the wire is passed as an extra precaution, but these brushing devices are not always necessary. The necessary pull or tension to carry the wire through the described apparatus is applied by a reel 20, which is driven by a motor 21. Power also is derived from this motor to drive the brushes 18, 19.

As small diameter wires tend to become reduced in cross-section by the stretching effect of the tension under which they are put, they are preferably drawn through a die as indicated at 22, to bring the cross-section of the wire to a standard size. The wire becomes softened, by the stripping process, that is, by contact with the heated bath of

lye and the subsequent washing treatment. The drawing through a die somewhat rehardens or tempers the wire to a state approximating its original condition.

Various speeds and temperatures may be used according to the conditions. As an illustrative example, 81 mil copper wire insulated with an inner coat of a vegetable oil enamel and externally by a double coating of cotton, can be stripped by feeding through the fused bath at 8 feet per minute at a temperature of about 620° C. The immersion at this velocity is about 22.5 seconds.

My invention also is applicable to quick stripping of insulation from the ends of conductors in order to make electrical connections. The insulated conductors need be dipped for but a few seconds in fused alkali at a temperature of about 400 to 600° C. depending on the character of the insulation. Fig. 2 shows a bath arrangement suitable for this purpose. A container 25 consisting of iron, or other suitable material, is provided with an electrical heater 26. A heat insulating jacket 27 surrounds the container. A shield 28 preferably is provided above the bath to prevent spattering of the hydroxide. An air blast supplied by a pipe 29 and being directed across the surface of the bath, is highly desirable to prevent charring and burning of the combustible insulations. In order to prevent unravelling of fibre insulated wires, the cotton, silk, or other fibre first is impregnated over a region overlapping the section to be stripped with shellac and baked at 100° C. for about 30 minutes. The molten hydroxide removes the impregnated insulation leaving a clear margin of shellac-coated covering which will not unravel. In some cases it is desirable to first treat the cotton or the like with paraffine.

The immersion of the ends should occur gradually to reduce foaming and the hydroxide should act for a length of time varying from a few seconds to about ten seconds until the insulation is removed. The wires then are held in a spray of water to wash out a residue of hydroxide and finally are dried.

When it is desirable to "tin" the bared ends of the conductors, to facilitate soldering or for any other reason they are immediately dipped, without washing, into molten solder, preferably through a thin layer of molten hydroxide. Fig. 2 shows a pot 30, also electrically heated by a heater 31, and containing a quantity 32 of alloying metal, such as solder, and a superimposed layer 33 of sodium hydroxide, or other suitable flux. As indicated, the leads of the coil 34 are dipped into this bath to tin the conductors.

While I have described specific embodiments of my invention, I do not wish to be limited to the particular form shown and described as it will be apparent that many modifications therein may be made without departing from the scope of my invention as set forth in the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. The method of removing coatings of cellulose fibres from metal objects which consists in bringing fused caustic alkali into contact with said coating, and thereupon washing with water to remove excess alkali and reaction products.

2. The method of removing organic insulating coatings from conductors which consists in passing said conductors through fused alkali and thereupon washing with water.

3. The method of removing fibrous insulating coatings from the ends of electrical conductors by chemical decomposition, which consists in applying shellac to the coating over a region within which the boundary of decomposition will occur, heat hardening the shellac, treating uncoated material adjacent said boundary by a caustic alkali, and washing with water.

4. The method of removing cellulose insulation from an electric conductor which consists in immersing the portion of said conductor to be freed from such insulation in fused caustic alkali at a temperature in excess of about 400° C. and thereupon washing with water to remove excess of alkali and decomposition products.

5. The method of removing organic insulation from metal conductors which consists in bringing said conductors into contact with a fused reagent containing a commercial lye and thereafter removing reaction products with water.

6. The method of removing organic insulation from metal conductors which consists in bringing said conductors into contact with a fused reagent containing a substantial proportion of strong alkali and thereafter removing reaction products with water.

In witness whereof, I have hereunto set my hand this eighth day of April, 1924.

HERBERT P. HOLLNAGEL.