March 21, 1933. J. R. FOLEY 1,902,438

INSULATED ARTICLE

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Fig. 1.

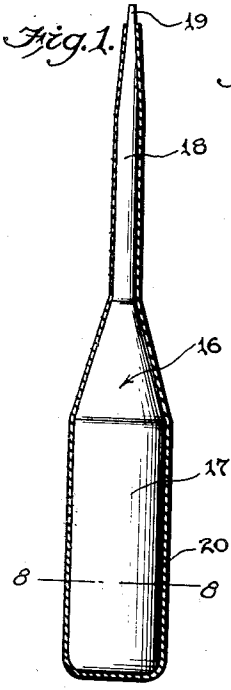

Fig. 2.

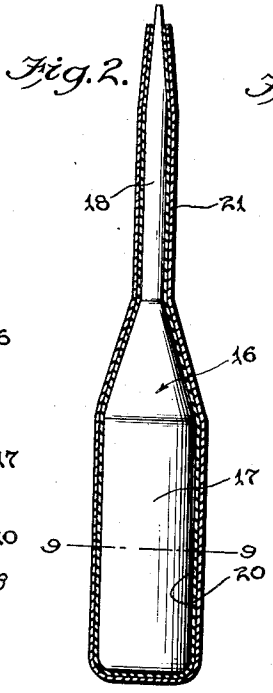

Fig. 3.

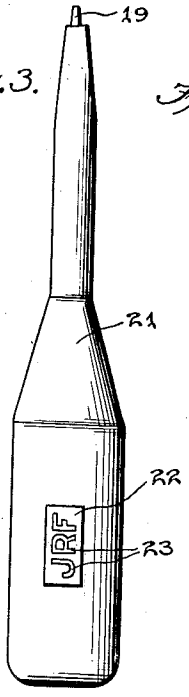

Fig. 4.

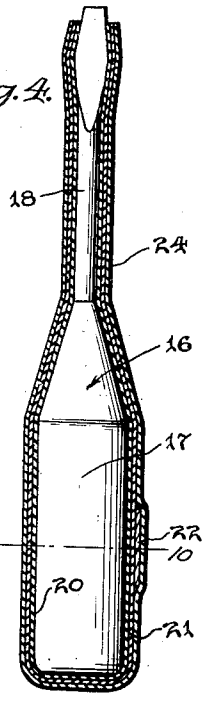

Fig. 5.

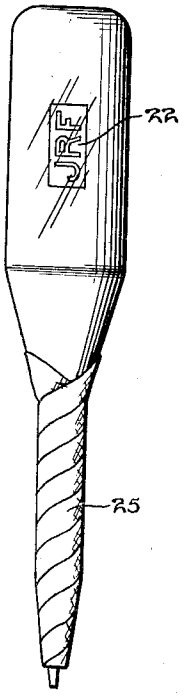

Fig. 6.

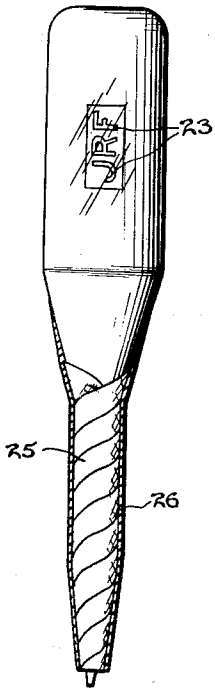

Fig. 7.

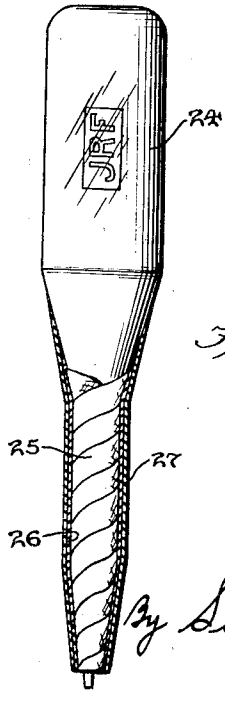

Fig. 8.

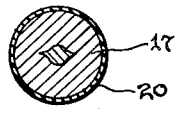

Fig. 9.

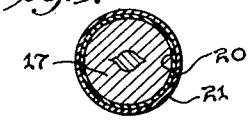

Fig. 10.

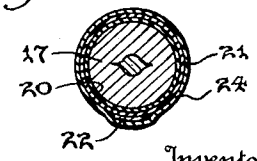

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Fig. 11.

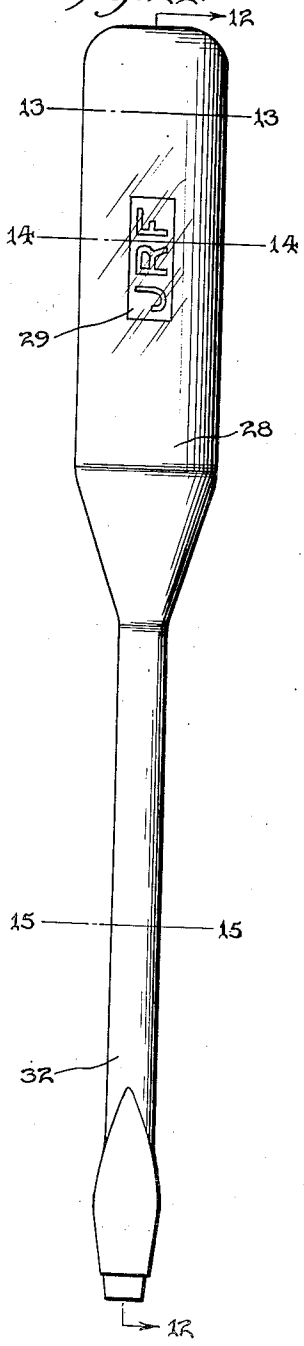


Fig. 12.

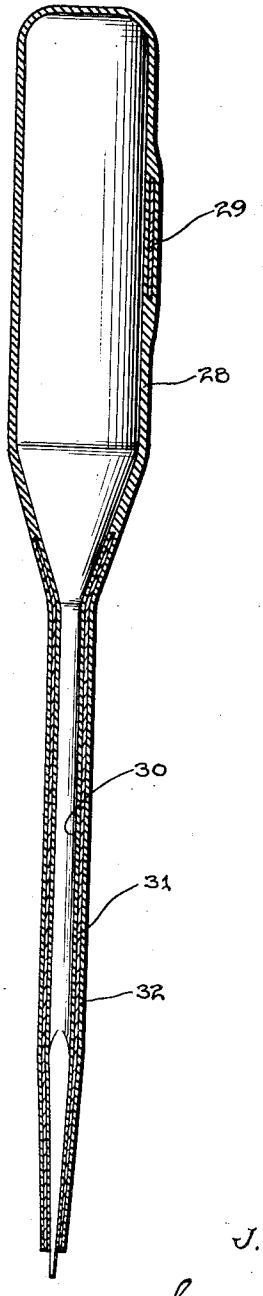


Fig. 13.

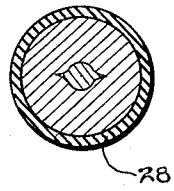


Fig. 14.

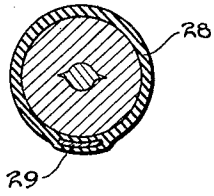
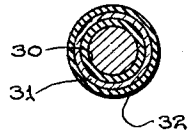


Fig. 15.



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Patented Mar. 21, 1933 1,902,438

UNITED STATES PATENT OFFICE

JOHN RUSSELL FOLEY, OF NEW YORK, N. Y.

INSULATED ARTICLE

Application filed January 23, 1932. Serial No. 588,425.

This invention relates to improvements in methods for insulating hand tools, such as screw drivers, pliers, hack saws, track lifting irons, crow bars, wrenches, etc., and to improved hand tools or the like for general use and practice in connection with high voltage electrical equipment and the like.

Heretofore it has been proposed to insulate tools and the like employed by operators working about high voltage electric current, but such insulation will not withstand the tests required by the specifications for such tools. For example, one specification requires:

1. Dielectric strength test.—Samples shall not be broken down electrically by a voltage up to 3000 volts.

2. Impact test.—Samples shall be tested allowing a three pound weight with a 90° sharp V-edge to fall on the insulation. The insulation shall not crack internally or externally, chip, peel, or puncture at a voltage of 110 volts applied during this test when the above weight falls freely a distance of 2 feet or less.

3. Torsion strength test.—Samples shall be tested in accordance with the test as described in the U. S. Navy specification for screwdrivers, No. 41S27a, dated September 1, 1927. This requires a torsion test between the tip of the blade and the handle as follows:

3 inches	50 in lbs.
4 inches	75 in lbs.
6 inches	100 in lbs.
8 inches	200 in lbs.

The screw drivers are to withstand the above tests without any indication of weakness.

It is the primary purpose of the present invention to provide insulated articles capable of meeting or passing such specifications, and while I have found substantially non-inflammable cellulose plastics particularly useful for this purpose, I prefer to employ a base consisting of cellulose acetate. When cellulose is treated with acetic anhydride in the presence of a trace of concentrated sulfuric acid, the cellulose is changed into the triacetate. $C_6H_7O_8(OC.CH)_3$. This is readily soluble in acetone, alcohol, ethyl lactate, acetylene tetrachloride, methyl cellosolve (ethylene glycol mono-methyl ether) and other plastecele solvents. The acetate is deposited from solution in the form of a tough film as solvent evaporates. This film may be dyed any color or made into any desired thickness, but the time necessary for the solvent to be completely evaporated is quite lengthy in the greater thickness.

In accordance with the present invention, the article to be insulated is dipped to any desired extent into such a solution, but as the solution itself will not adhere to metal except by contraction, I prefer to cover the metal portion of the tool or the like during the dipping treatment, with a lamination of linen tape or the like which may be wound into place.

Another object of the invention is to label the tool or the like while insulating the same, in such manner that the label cannot be destroyed without mutilating the insulation.

With the foregoing objects outlined and with other objects in view which will appear as the description proceeds, the invention consists in the novel features hereinafter described in detail, illustrated in the accompanying drawings, and more particularly pointed out in the appended claims.

In the drawings,

Fig. 1 is an elevation of an ordinary screw driver after a single coat of the triacetate has been placed on the same by a dipping operation, such insulation being shown in section.

Fig. 2 is a similar view after the second dipping.

Fig. 3 is an elevation of the partially insulated tool after an identification label has been placed on it.

Fig. 4 is a view like Fig. 2 after the label has been placed in position and the tool has been subjected to a third dipping.

Fig. 5 is an elevation of the tool shown in Fig. 4, after the shank portion of the screw driver has been wrapped with linen tape or the like.

Fig. 6 is a similar view after the taped

portion has been subjected to a single dipping.

Fig. 7 is a like view after the taped portion has been subjected to a second dipping.

Fig. 8 is a transverse sectional view of the tool on the line 8—8 of Fig. 1.

Figs. 9 and 10 are similar views taken respectively on the lines 9—9, and 10—10 of Figs. 2 and 4.

Fig. 11 is an elevation of the finished tool.

Fig. 12 is a longitudinal sectional view of the same on the line 12—12 of Fig. 11.

Figs. 13, 14 and 15 are sectional views taken respectively on the lines 13—13, 14—14 and 15—15 of Fig. 11.

Referring to the drawings, it will be noted in Figs. 1 to 10 inclusive that the thickness of the films of insulation is greatly exaggerated to facilitate illustration, and while the invention is illustrated in connection with a screw driver, it will be noted that it is applicable to all hand tools or the like in general use and practice with reference to high voltage electrical equipment or the like.

In practicing the invention, I preferably use two solutions of triacetate, comprising a solvent which may readily evaporate. One of these solutions is of maximum density, and the other of less density. In proceeding, an ordinary screw driver 16 or the like is dipped in the solution of maximum density to cover the handle 17 and all of the metal shank 18, with the exception of its tip 19, with a film or coat 20 of such insulating material. When the tool is removed from the solution, the coat is permitted to dry for a period of from 15 to 90 minutes. Then the tool is again dipped in the solution of maximum density to provide it with a second coat or film 21 of the insulating material. Before this coat dries, a label 22 is placed on the handle portion by superposing the label on the second coat of insulation.

In making a suitable label, I paste letters 23 on sheet of hard triacetate and coat over these letters with a thin film of one of the triacetate solutions. It is preferred to use a label 22 of a color contrasting to the color of the films or coats, and as a single coat of the material is more or less transparent, it will be understood that such label will be displayed even after the tool has been dipped the third time into this solution of less density to form the film or coat 24.

Instead of employing a label of the above type, I may use a printed label on which the lettering will be of a color contrasting to the background. Such background may be gummed paper which will be pasted over the tool after the second dipping, and of course, the label will be coated and transparently covered during the third dipping.

After this third coat is applied, the tool is permitted to dry for a period of about twenty-four hours, and this completes the insulation of the handle.

However, as the coats on the metal shank 18 will not tenaciously adhere to the latter, I wrap the coated shank portion of the tool with a strip of linen tape 25 or the like, as shown in Fig. 5, and this acts as an absorbent binding sleeve or annular lamination which prevents the insulating material from peeling off or cracking.

In the event of the handle itself being of an insulated material through which no metal projections are visible, it is not essential to carry the binding tape over so as to tape the handle. It only becomes necessary to tape the handle in such cases where metal portions of the tool are exposed at the handle surface. This condition exists in various types of tools, and it results in increasing the torsion strength of the handle to prevent it from turning on the metal shank. Provision to prevent such turning does not always extend, however, to the surface of the handle, and in such case, it is unnecessary to extend the taping over the handle. It will be understood, however, that where metal surfaces are exposed at the handle, I propose to tape the handle as well as the metal shank.

After the tool has been taped, the taped portion of the tool is dipped into the solution of maximum density to cover this portion with a fourth film or coat 26 of triacetate solution, and then this fourth coat is permitted to dry from about 15 to 90 minutes. Afterwards, the taped portion of the tool is again dipped in the solution of less density to provide a fifth coat 27, and then this coat is permitted to dry for a period of about twenty-four hours.

Manifestly, the invention is applicable to tools having handles of various materials, and in some instances, I have applied the insulation to tools having handles made up wholly or in part of plastic woods of the kind which can now be purchased on the open market. Such plastic woods have a dielectric strength of their own, and of course, when I insulate such a tool, the dielectric strength of the handle of the tool is augmented.

As a final operation, the outer surface of the insulating material is dipped in a solvent such as acetone, and is rubbed down by the bare hands to smooth the outer surface of the insulation and to eliminate wrinkles and the like.

As illustrated in Figs. 11 to 15 inclusive, it will be understood that when the tool is finished, the handle will be covered with a homogeneous shell 28 of the insulating material which will only be interrupted by the label 29, while the metal shank will be covered with an inner shell 30 of insulating material, an intermediate layer or lamination

31 of absorbent shock absorbing tape or the like, and an outer shell 32 of the insulating material.

Such a tool will meet with the specifications heretofore mentioned, and the insulation has sufficient toughness to withstand the rough usage to which such tools are subjected throughout the life of the tool.

While I prefer to use a protective coating containing cellulose acetate, it will be evident that other similar substances may be employed, such for instance, as phenolic condensation products, which can be applied in a liquid condition, and which may subsequently set into a hard condition on the article.

From the foregoing it is believed that construction and advantages of my invention may be readily understood by those skilled in the art, and it is apparent that changes may be made in the details disclosed, without departing from the spirit of the invention, as expressed in the claims.

What I claim and desire to secure by Letters Patent is:

1. A tool or the like, coated with electric insulation material having the dielectric characteristic of cellulose acetate, and a label embedded in said material, covered over by the material and visible through the latter.

2. A screw driver comprising a handle and a metal shank, said screw driver being entirely covered with the exception of its tip with a shell of insulating material having the dielectric characteristics of cellulose acetate, and a label incorporated in said insulating material, covered by the latter and visible through said insulating material.

3. A conventional tool coated with electric insulating material, consisting mainly of cellulose acetate, and a tubular lamination of absorbent shock absorbing material embedded within said insulating material and spaced from the metal of the tool by said insulating material.

4. A conventional screw driver comprising a handle and a metal shank rigidly united with the same, said screw driver being entirely covered with the exception of its tip with a shell of insulating material consisting mainly of cellulose acetate, and a tubular lamination of textile shock absorbing material embedded within said insulating material and spaced from the metal of the tool by said insulating material.

5. A conventional screw driver comprising a handle and a metal shank rigidly united with the same, said screw driver being entirely covered with the exception of its tip with a shell of insulating material consisting mainly of cellulose acetate, and a tube of absorbent shock absorbing material arranged within the portion of the insulating material which surrounds said shank, and spaced from said shank and from the exterior surface of the insulating material by said insulating material.

In testimony whereof, I have signed this specification.

JOHN RUSSELL FOLEY.