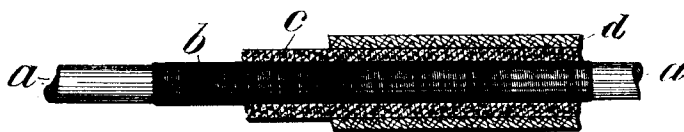


(No Model.)

L. W. DOWNES.
MANUFACTURE OF ELECTRICAL CONDUCTORS.

No. 541,921.

Patented July 2, 1895.



Witnesses,

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UNITED STATES PATENT OFFICE.

LOUIS W. DOWNES, OF PROVIDENCE, RHODE ISLAND.

MANUFACTURE OF ELECTRICAL CONDUCTORS.

SPECIFICATION forming part of Letters Patent No. 541,921, dated July 2, 1895.

Application filed April 2, 1895. Serial No. 544,163. (No model.)

To all whom it may concern:

Be it known that I, LOUIS W. DOWNES, of Providence, Rhode Island, have invented a new and useful Improvement in the Manufacture of Electrical Conductors, which improvement is fully set forth in the following specification.

This invention has reference to insulated conductors, and more particularly to the manufacture of insulated conductors for concealed work in houses and other buildings. Many attempts have been made to produce an insulated conductor fulfilling all the requirements for this kind of work, the chief aim being to obtain fire-proof insulation, capable of resisting the effect of heat, either from overload of current or from external flame. It is difficult to fulfill these conditions, even to a degree fairly satisfactory, without introducing other difficulties and objections, such as extreme bulkiness, expense, or sheathings whose insulating properties are impaired by moisture. At the present time most of the underwriters' boards require for use in concealed work a wire having a rubber or similar insulating coating, which may therefore be regarded as the most suitable conductor for the above purpose at present available. A wire heretofore in use and known as the "underwriters' wire" which would ignite only with great difficulty, has been discarded because its insulating properties became seriously impaired when exposed to moisture.

The great objection to the rubber-covered wires is that, when once ignited, the flame travels rapidly along the wire from one part of the building to another, and many fires are due to the inflammable nature of this insulating material.

The object of the present invention is to produce a commercially useful insulation, which possesses not only very high electrical resistance, but also almost perfect incombustibility. This result, I have found, can only be obtained by a proper combination of combustible with incombustible substances, all the materials employed by me having been used, or proposed for use, for a similar purpose.

In carrying out my invention, I first cover the wire with a fine fibrous winding, pref-

erably of asbestos, though for this purpose cotton may be employed, and then pass it through a very thin solution of nearly pure rubber gum, dissolved in benzene or other suitable solvent, to which may be added sufficient sulphur for vulcanization. In this way I obtain a very perfect, at the same time a very thin, film of rubber. By repeating the dipping process three or four times an insulative resistance of more than five megohms per one thousand feet can be obtained, although the thickness of the rubber film is very minute. This insulation is unaffected by dampness, or any of the ordinary conditions of use, while the quantity of rubber present, is insufficient, with the additional safeguards presently described, to cause or communicate ignition. The thin coating of rubber may of course be applied in any other way. Upon this coating I wrap or wind a moderately heavy coating of asbestos yarn, napping this to secure a dense compact body as described in Letters Patent No. 534,785, granted to me February 26, 1895. The rubber film is then vulcanized by any of the well known methods, and a braided asbestos covering is applied around the asbestos winding. Just previous to entering the braider the wire is passed through a solution of silicate of soda or equivalent material. After applying the braided covering the surface is napped with a fine brush and finished by coating with a suitable moisture repellant and incombustible cement, which binds the exposed fiber raised by the napping wheel, producing an even and dense surface. There are many cements that can be employed for this purpose. A cement that will answer well may be made by a mixture of starch-paste, zinc, or lead white, and linseed oil. The principal function of this cement is to toughen and condense the outer coating, so as to prevent injury in handling. It is not intended to, and does not, contribute materially to the fire-proof property of the insulation as a whole.

When a wire insulated as above described is subjected to a very heavy current the rubber covering will volatilize, passing off as a white vapor, but small in quantity, so that little risk of its ignition exists. In such case the presence of the silicate of soda diminishes the risk. The latter is employed not only as

a fire-proof cement to hold the outer covering firmly to the inner; but also because, when decomposed by heat, the incombustible vapor it gives off will combine with the vapor from the rubber, making the latter much less combustible.

Flame and heat attacking this insulated conductor from the outside make absolutely no impression upon it.

10 The accompanying drawing illustrates in longitudinal section and on an enlarged scale a portion of a conductor having my improved fire-proof insulation applied thereto.

15 *a* represents the metallic conductor; *b*, the insulating coating of fiber having a continuous film of vulcanized india-rubber; *c*, the winding of asbestos saturated with silicate of soda or equivalent material, and *d* the braided asbestos covering impregnated with fire-proof cement.

20 What I claim as my invention is—

1. The process of applying an insulating covering to an electric conductor, said process consisting in surrounding the core with
25 a thin film of rubber, applying thereon a winding of asbestos-fiber, vulcanizing the rubber

film, saturating the asbestos winding with silicate of soda or similar substance, applying a braided covering and coating the latter with incombustible cement, substantially as described.

2. An insulated electrical conductor comprising a wire, a continuous film of vulcanized rubber surrounding the same, a dense compact winding of asbestos fiber saturated with soluble glass, and an exterior braided asbestos covering coated with fire-proof cement, substantially as described.

3. An insulated electrical conductor comprising a wire, a fine fibrous covering coated with a film of rubber, a compact winding of asbestos fiber saturated with soluble glass, and an exterior braided asbestos covering coated with fire-proof cement, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

LOUIS W. DOWNES.

Witnesses:

GILMAN E. JOPP,
THOS. A. MILLETT.