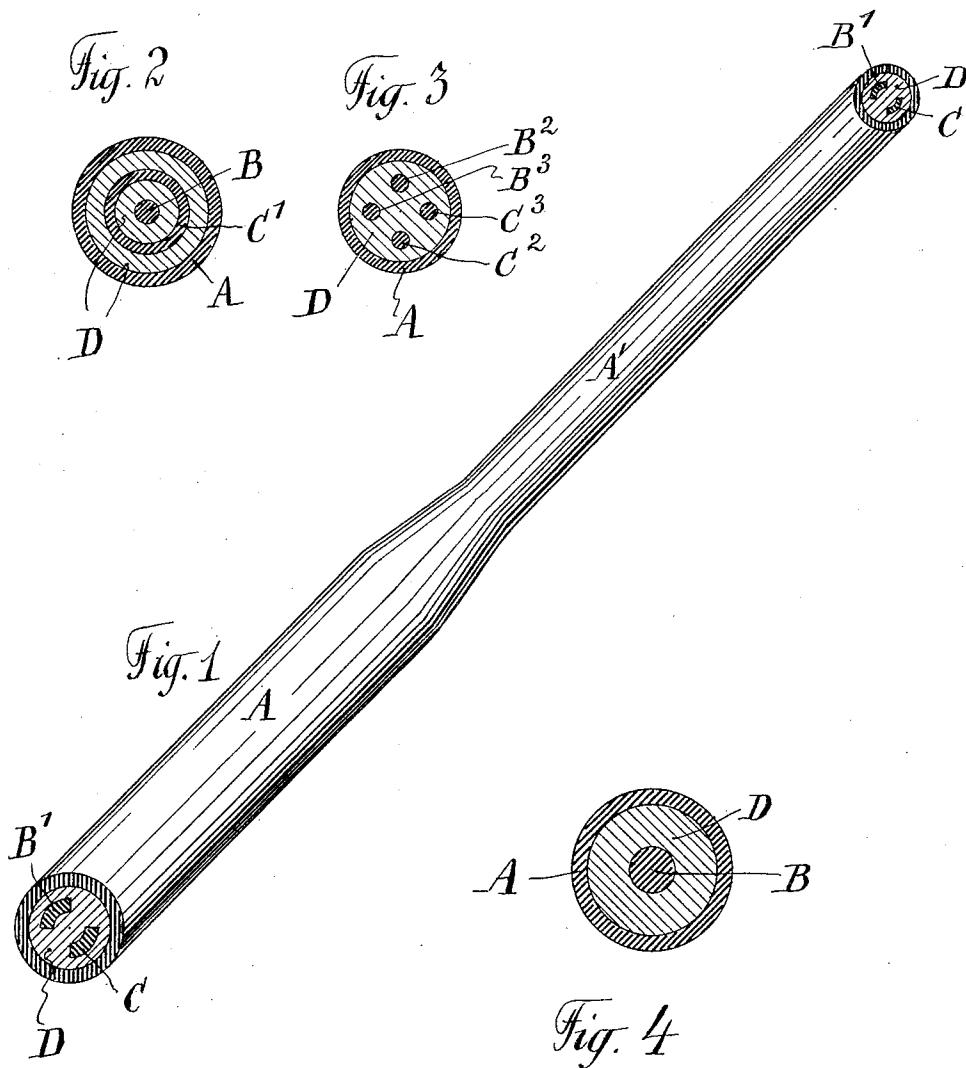


(No Model.)

F. BOREL.
ELECTRIC CABLE.

No. 573,176.

Patented Dec. 15, 1896.



Witnesses:
J. Stair
Chas. H. Smith

Inventor:
François Borel
by L. W. Serrell & Son
attys.

UNITED STATES PATENT OFFICE.

FRANÇOIS BOREL, OF CORTAILLOD, SWITZERLAND.

ELECTRIC CABLE.

SPECIFICATION forming part of Letters Patent No. 573,176, dated December 15, 1896.

Application filed January 7, 1896. Serial No. 574,608. (No model.)

To all whom it may concern:

Be it known that I, FRANÇOIS BOREL, doctor of sciences, of Cortaillod, canton of Neuchâtel, Switzerland, have invented certain new and useful Improvements in and Relating to the Manufacture of Electric Cables, of which the following is a specification.

The invention relates to certain new and useful improvements in and relating to the manufacture of electric cables formed of one or more metallic conductors, a metallic envelop, and an insulating material separating the two parts from one another.

In carrying out my invention I take a copper tube or envelop and place within the same one or more copper conducting wires or rods and tightly fill the intervening space with a refractory material and a non-conductor of electricity, such as asbestos. These parts are then heated and by a drawing, rolling, or similar operation while in a heated condition are reduced in diameter and the conductor elongated. In this operation the asbestos is unaffected by the heat, and the same is not frangible in the bending of the conductor.

In the drawings, Figure 1 is a perspective view illustrating part of a cable made according to my invention. Figs. 2, 3, and 4 show cross-sections of cables of various forms which may be made according to my invention.

I first provide a tube A of rather small length but relatively large diameter and thick walls, made of a malleable metal, such as copper, adapted to be stretched or rolled by means of a rolling-mill or draw-plate, the said tubes being intended to form the external coating of the cable to be manufactured. Into the aforesaid metallic tube I then place, in the geometrical axis of the same, (in case of manufacturing a cable with only one conductor,) a cylindrical rod B of suitable diameter and of the same length as the aforesaid metallic tube, made of copper or similar metal to form the electric conductor. I fill up the whole space between the said cylindrical rod and the metallic tube with asbestos D, the same being a refractory and insulating material adapted to withstand high temperatures without being softened or injuriously affected. (See Fig. 4.) The ingot thus formed is then heated to a suitable degree of heat for the purpose of rendering the

external coating of metal soft enough to be rolled or stretched by means of a rolling-mill or draw-plate until it has been reduced to the desired diameter for the electric cable, and in this operation all the parts are proportionately reduced in diameter and elongated.

In Fig. 1 the smaller portion of the cable, A', has been reduced by an elongating, rolling, or drawing operation, and the larger portion A is of the original size. In Fig. 4 a single rod B is shown within the cable-tube A and surrounded by the insulating material D. In Fig. 1 two conductors B' C are shown. In Fig. 2 the central conductor B is surrounded with a tube C' intermediate between the tube A and conductor B. In Fig. 3 four equidistant conductors B² B³ C² C³ are employed within the tube A and surrounded by the insulating material D. The insulating material in all cases separates the conductors from each other and from the outer tube A.

These cables are especially intended to be executed in small dimensions, for instance, for indoor electric circuits, and I do not limit myself to the number or character of conductors placed in the outer tube and separated by the insulating material.

I am aware that heretofore a glass tube or surfaces of glass have intervened between the outer metal covering of a cable and the internal metal conductor and that it was proposed to heat and reduce the diameter of the same; but as glass is brittle and frangible and softens at a comparatively low temperature it is not adapted to use as the insulating material between the conductor and the inclosing tube.

I claim as my invention—

The herein-described improvement in electric cables consisting in a conductor of copper, an inclosing tube of copper, and intervening asbestos forming the insulating material, such asbestos not being injured by heat and not injuring the conductor in the rolling or drawing operations, substantially as specified.

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

FRANÇOIS BOREL.

Witnesses:

BENJ. H. RIDGELY,
E. F. BARRY.