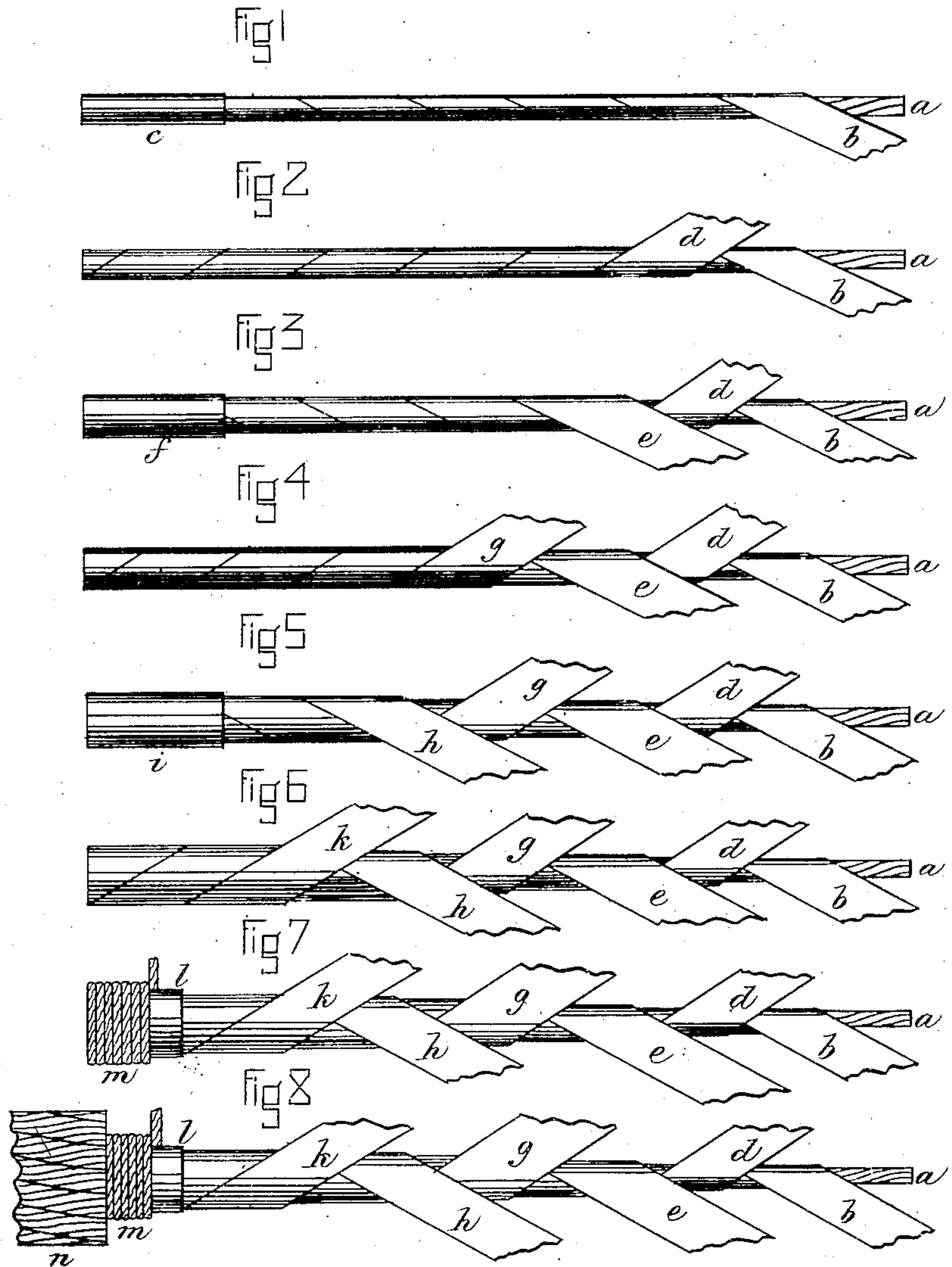


(No Model.)

H. C. SPALDING.  
SUBMARINE ELECTRICAL CABLE.

No. 327,484.

Patented Sept. 29, 1885.



WITNESSES

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# UNITED STATES PATENT OFFICE.

HENRY C. SPALDING, OF BOSTON, MASSACHUSETTS.

## SUBMARINE ELECTRICAL CABLE

SPECIFICATION forming part of Letters Patent No. 327,484, dated September 29, 1885.

Application filed April 12, 1884. Renewed February 28, 1885. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY C. SPALDING, a citizen of the United States, and a resident of Boston, in the county of Suffolk and State of Massachusetts, have invented a certain new and useful Improvement in Submarine Electrical Cables, of which the following is a specification, reference being had to the accompanying drawings, forming a part of this application, which is a division of an application filed by me November 30, 1883, and numbered 113,231.

In other applications filed by me I have shown and described forms of electrical cables in which one or more insulated sheathings of metal are combined with conducting cores or wires and protective jackets or armor. To these cables my present invention relates, the improvements involved therein being in the materials used in insulating and protecting the metal sheaths, and in the method of applying the same, and also in the material of the sheaths, as will be more fully hereinafter described.

The appended drawings illustrate a complete cable embodying my improvements, the several figures showing the cable in the successive stages of its manufacture.

Figure 1 shows the core *a*, composed of one or more electrical conductors arranged in any preferred manner, and covered by a spirally-wound strip of paper, *b*, which is saturated with paraffine and then coated with a layer, *c*, of a varnish, composed wholly or in part of any resinous substance, though I prefer to use a varnish made of ninety parts of shellac and ten parts of boiled linseed oil brought to the desired consistency by the addition of alcohol. In Fig. 2 is shown the next layer, *d*, which is of metal foil, wound on over the varnish *c* before the same has hardened or dried. Fig. 3 shows a spirally-wound wrapping of paper, *e*, over the foil *d*, and a coating of varnish, *f*. Fig. 4 shows the core with the second wrapping or sheath of metal foil, *g*. Fig. 5 shows the same inclosed by a layer of paper, *h*, and a coating of varnish, *i*. Fig. 6 shows the core with the outer layer of paper, *k*. Over this, as shown in Fig. 7, is applied a thick coating of a bituminous substance, *l*, into which is wound a serving of twine, *m*, and

over this is applied the jacket or armor *n*, as shown in Fig. 8.

The layer *l* is composed of pure Trinidad asphalt, with some substance to render it permanently viscous—such as linseed-oil or the residuum of the petroleum-still. When the twine *m* is wound into this material, it becomes saturated with it and forms an impervious coating of great flexibility.

The functions of the insulated metal sheaths are mainly to shut off induction, as has been more fully described in my other applications above referred to. The inner sheath, or that designated by the letter *d*, may therefore be of any good conducting and pliant metal. The outer sheath, however, should be capable of resisting the corrosive action of the substances usually found in solution in sea-water, and should afford complete protection against destructive insects—such as the well-known borers. I therefore use for this a non-corrosive metal, such as pure tin.

Instead of the specified varnish and bituminous substance which I have described, I may use any resinous varnish and any bituminous compound that possesses practically the same qualities of plasticity and insulation as those named.

The several layers on the core may be formed or applied in any other way, though I prefer to wind spiral strips upon the core, winding the successive strips in opposite directions, as indicated in the drawings.

I do not confine myself herein to any special form of conducting wire or core, nor to the specified construction of protective armor; nor do I claim the specific forms shown apart from the sheathings of metal and intermediate layers of paraffined paper, inasmuch as these are matters involved in other applications for Letters Patent now on file.

What I now claim, is—

1. An electrical cable consisting of a central wire or wires, a layer of insulating material composed of paper saturated with paraffine and coated with a resinous varnish, sheathings of metal insulated from one another, and an external insulation, as set forth.
2. The combination, in an electrical cable, with a conducting wire or wires, of sheaths or layers composed of paper saturated with



paraffine and coated with a resinous varnish, and of metal, the latter being interposed between the layers of paper, so as to be completely insulated thereby, as set forth.

5 3. The combination, in an electrical cable, with a conducting wire or wires, of a layer of paper saturated with paraffine and coated with a resinous varnish, layers or sheaths of metal insulated from each other, and a protective jacket or armor surrounding the same,  
10 as described.

4. An electrical cable consisting of a central conducting wire or wires, a layer of insulating material composed of paper saturated  
15 with paraffine and coated with a resinous varnish, two sheathings of metal insulated from one another and from the central core, a serv-

ing of twine or cord wound in a bituminous coating, and a protective armor or jacket surrounding the whole, substantially as set forth. 20

5. In an electrical cable, the combination, with a central conducting wire or wires, of sheathings of metal insulated from one another and from the conducting wire or wires, the outer sheathing being of non-corrosive  
25 metal—such as pure tin—as and for the purpose set forth.

In testimony whereof I have hereunto set my hand this 10th day of April, 1884.

HENRY C. SPALDING.

Witnesses:

JAMES W. FOSTER,  
AUGUSTINE L. BABIDGE.