

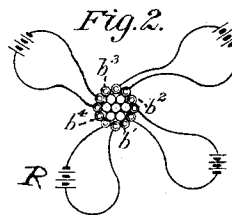
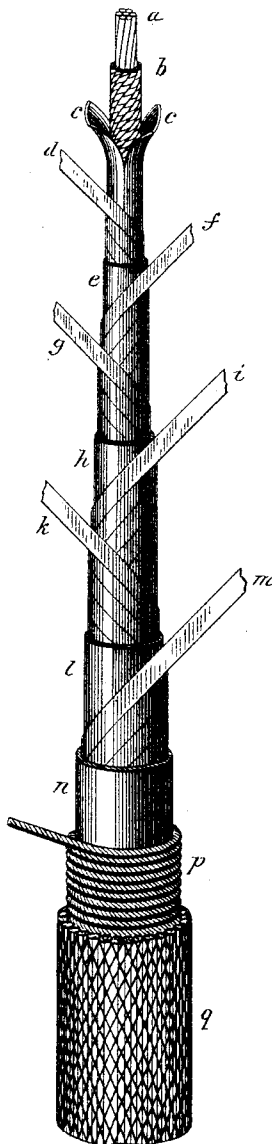
(No Model.)

H. C. SPALDING.
TELEGRAPH CABLE.

No. 327,461.

Patented Sept. 29, 1885.

Fig. 1.



Attest:
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UNITED STATES PATENT OFFICE.

HENRY C. SPALDING, OF BOSTON, MASSACHUSETTS.

TELEGRAPH-CABLE.

SPECIFICATION forming part of Letters Patent No. 327,461, dated September 29, 1885.

Application filed May 21, 1885. (No model.)

To all whom it may concern:

Be it known that I, HENRY C. SPALDING, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Telegraph-Cables, of which the following is a specification, reference being had to the drawings accompanying and forming a part of the same, this application being a division of an application filed by me December 7, 1883, No. 113,868.

The invention subject of this application relates to a telegraph-cable, the invention having reference rather to the mode of using the same for the transmission of signals, or, in other words, to the combinations into which certain parts of the cable enter, together with the batteries and instruments used in operating the lines formed by the conductors which the cable contains.

By referring to the drawings I will describe the construction in detail of a cable embodying my invention.

Figure 1 is a view of a section of my improved cable, showing parts of the successive layers. Fig. 2 is a section of the central core and the conductors surrounding the same.

The letter *a* designates a core, which is composed of iron, steel, or other wires or strands. Around this a number of insulated copper wires, *b*, are laid or wound, preferably in spirals or helically, as indicated in Fig. 1. Around these wires are applied two oppositely-laid strips of plastic material, *c*, such as gutta-percha or caoutchouc or like material, which by compression may be caused to enter the depressions and irregularities in the surface of the core, made up of wires *a* and *b*, and form a smooth and round surface for the succeeding layers. Around the material *c* is wound a spiral strip of metal foil, *d*, and then follow, as in the cables elsewhere described by me in numerous applications, a coating of resinous varnish, *e*, a strip of paper, *f*, wound spirally on the varnish, a layer of metal, *g*, spirally wound, a second layer of paper, *i*, on a coating of varnish, *h*, a third layer of metal, *k*, a coating of varnish, *l*, and a final wrapping of paper, *m*. The cable is still further strengthened and protected by a coating, *n*, of a viscous bituminous substance, such as pure Trinidad

asphalt and petroleum residue. Over this is wound a spiral covering of stout twine, *p*, which becomes thoroughly saturated with the bituminous compound, and the whole is inclosed by a braided or woven jacket of stout cord or wire, *q*.

I have found that the objects which are sought are attained by a cable constructed in the precise manner described. My invention is not limited, however, to this special form, as it is obvious that various insulating materials may be used and applied in many different ways; that one or more of the metallic or insulating layers may be omitted, and the exact order of the sheathings may be varied. When a core of iron or steel wires *a* is used, they are not insulated, and, though they may be parallel, I prefer to twist them slightly in order to make a stronger cable. Of the insulated wires *b* a certain number are "dead"—that is to say, they are not used directly in the transmission of signals—while the remainder form the leading and return conductors of two or more circuits. The number of these wires is only limited by the size of the cable, it being possible to use a comparatively large number. Two wires or two pairs of wires may be utilized for each circuit. In either event a dead wire will be interposed between the conductors of each circuit. For instance, in Fig. 2, *b'*, *b''*, *b'''*, and *b''''* represent the dead wires as distinguished from the useful wires of the circuits. The wires *b'*, *b''*, &c., may be grounded at one or more points, as also may be the core *a*, and one or more of the insulated metal screens incorporated in the covering of the wires *b*.

In Fig. 2 I have illustrated the above-described arrangement. Each pair of working-wires *b* is shown as including a battery or generator, *R*. A cable thus constructed possesses many advantages in an electrical sense. As between the separate circuits inductive influences are nearly if not quite obliterated by the interposed dead wires, the tendency to interference in this respect being the more effectually checked by using round-wire circuits in conjunction with the dead wires, as the signaling-currents co-operate to neutralize the currents induced in the dead wires. The metallic screens also prevent the effect of retarda-

tion and extraneous electrical influences, and in this they are assisted by the central core.

I am aware that a cable has been constructed in which a central metallic core is surrounded by spiral layers of wires in which circuit-wires are alternated with dead or ground wires; and I am also aware that in a cable having a central metallic core surrounded by spiral layers of insulated wires the latter have been connected in pairs to form metallic circuits, the wires of each pair having interposed between them one of the wires of another pair. I do not claim either of these constructions.

What I claim is—

1. In an electrical cable, the combination of a metallic core and a series of insulated conducting-wires helically wound thereon, a portion of said wires being grouped in pairs, so as to form metallic circuits, and the remaining

portions being disposed so as to intervene between the several circuits, in the manner set forth.

2. An electrical cable having its conducting-wires helically wound and grouped in pairs to constitute metallic circuits, the several circuits being separated from one another by intervening wires, substantially as set forth.

3. An electrical cable consisting in the combination of insulated conducting-wires helically wound and grouped in pairs to form metallic circuits, the two wires forming each circuit being separated from each other by an intervening wire, and a conducting-core consisting of iron or steel wires or strands, as set forth.

HENRY C. SPALDING.

Witnesses:

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