

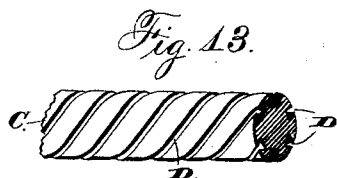
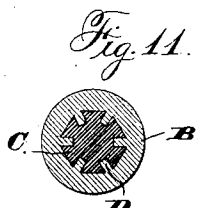
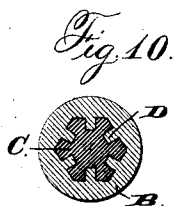
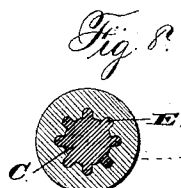
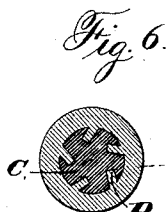
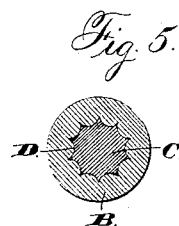
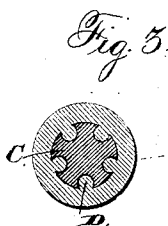
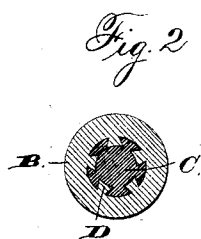
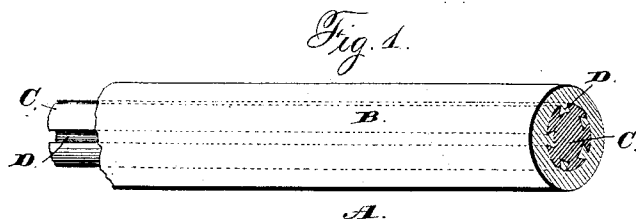
(No Model.)

F. CHILLINGWORTH & P. G. RUSSELL.

COMPOUND WIRE.

No. 309,439.

Patented Dec. 16, 1884.



Witnesses:
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UNITED STATES PATENT OFFICE.

FELIX CHILLINGWORTH, OF NEW HAVEN, CONN., AND PHILIP G. RUSSELL,
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COMPOUND WIRE.

SPECIFICATION forming part of Letters Patent No. 309,439, dated December 16, 1884.

Application filed February 28, 1884. (No model.)

To all whom it may concern:

Be it known that we, FELIX CHILLINGWORTH, of New Haven, in the county of New Haven, State of Connecticut, and PHILIP G. RUSSELL, of Washington, District of Columbia, have invented certain new and useful Improvements in Compound Wires; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 shows a perspective view of a compound wire made according to our invention; Fig. 2, a transverse section of the wire, showing the shape of the core; Figs. 3, 4, 5, 6, 7, 8, 9, 10, and 11 similar views, showing modified forms of cores; Fig. 12, a perspective view of a core provided with another form of means for interlocking portions of the core and envelope, and Fig. 13 a similar view of a core with the grooves or corrugations running in a spiral direction.

The object of our invention is to provide a compound wire in which the envelope and core shall be so locked or fastened together that they cannot separate; and to this end it consists in the wire, as hereinafter described, and more specifically pointed out in the claims.

In the drawings, A designates the wire, which consists of the envelope B and core C. The envelope is preferably formed of copper or some alloy or metal which is a good conductor of electricity. We prefer to make the core of steel or iron, though we do not limit ourselves to such material. Of whatever metal or alloy the core is made it is intended to be of greater tensile strength, so as to form a stiffening and strengthening backbone for the wire.

In the compound wires as heretofore made there has been no means provided for mechanically fastening the envelope to the core so as to prevent any chance of the separation of the two. The surface of the core has been provided with no notches or corrugations, but has been made smooth. There would then be no interlocking of portions of the outer surface of the core and the inner surface of the envelope. It is very necessary to prevent the separation of the envelope from the core, which is apt to take place when a com-

pound wire is bent. Where such separation occurs the envelope cracks and breaks during the bending, and the core and inside of the envelope are exposed to the rapidly deteriorating influences of the atmosphere and the moisture contained therein.

In order to insure the positive adherence of the envelope to the core and the non-separation of the two, we form said core with a number of grooves, D D. These grooves, which can be of any form in cross-section, may be made straight and longitudinal, as shown in Fig. 1, or spiral, as shown in Fig. 12. The grooves or corrugations are formed in any desired way in the bar, which constitutes the core of the compound bar from which the wire is drawn. We prefer to make the grooves or spaces between the ribs dovetailed in cross-section, as shown in Figs. 1 and 2. When the wire is formed from a compound bar having a grooved core, it is found that the shape of the grooves is substantially retained, and appears in the core of the resultant wire. We contemplate making the cores and the grooves therein of various shapes. In Fig. 3 is shown a core in which the faces of the grooves are curved. In Fig. 4 each groove is shown as having straight sides parallel with the same radius. In Fig. 5 the core is shown as simply fluted. In the construction illustrated in Fig. 6 the grooves extend into the body of the core on lines oblique to radii. In Fig. 7 a still further modification is shown in which alternate grooves extend into the core in directions oppositely oblique to the radii. A series of rounded ribs, E E, can be formed on the core, as indicated in Fig. 8. Instead of making the core cylindrical in general outline, it can be made of any angular shape, with grooves or corrugations of various forms in section. We find the best results are obtained where grooves or spaces between the ribs are overhung by the edges of the ribs. If desired, the core can be formed with rasp-like projections, as shown in Fig. 12. As indicated hereinbefore, the grooves or ribs, of whatever shape made, can be extended around the core spirally instead of in straight longitudinal lines. (See Fig. 13.)

In manufacturing our compound wire we first make an iron or steel core with ribs, pro-

jections, or grooves, as described and shown hereinbefore. Such grooves, ribs, or projections are formed either during or after the core is made. An envelope of copper or alloy is then cast around the core, in a mold provided with means for holding the core axially within it and means for insuring the inflow of the molten metal, in such a manner as to prevent bending or buckling of the core by equal heating of the same. Portions of the metal forming the envelope flow into the grooves in or between the ribs on the core or under the projections thereon. The resultant compound bar will then consist of an envelope and core having their contacting surfaces interlocked or fastened together by the portions of the surface of one extending into that of the other.

As indicated hereinbefore, we prefer the dovetailed form of groove, or one having an overhanging edge or edges, as such grooves will obviously hold the portions of the envelope projecting and fitting in them most firmly. As the bar is rolled and drawn down in making the wire, the inwardly-projecting ribs or portions of the envelope will be bitten between the walls of the grooves, so that it will be impossible for the envelope to separate from the core without the breaking or tearing off of such ribs. During the rolling and drawing operation, which can be the ordinary one, or one in which the bar and core are caused to change shape a number of times, the copper of the envelope is not only brought into most intimate contact and union with the core, but is forced into the grooves or between the ribs of the latter.

We do not limit ourselves to any method of rolling or drawing, or of putting the envelope on the core in forming the compound bar.

If desired, the envelope can be made in the form of a tube, and forced over the core while the latter or both tube and core are heated. The objection to a compound bar so made has heretofore been that it was not possible to make a perfect union or contact between the

surfaces of core and envelope, and the two were very sure to separate, and the envelope to break when the wire was bent. When a grooved core like ours is used, portions of the tubular envelope will be forced into and be bitten in the grooves during the process of drawing.

The best results in making a wire which will stand bending, and with which a telegraph-joint can be made, without any possibility of separating, cracking, or breaking the envelope, are, however, obtained where the latter is cast on the core.

Having thus fully set forth the nature of our invention, what we claim as new is—

1. As an article of manufacture, a compound wire having a steel or iron core formed so as to bite and hold projecting portions of the surrounding envelope, substantially as shown and described.

2. As an article of manufacture, a compound wire consisting of a core and envelope provided with interlocking portions, substantially as described.

3. As an article of manufacture, a compound wire consisting of a grooved core and an envelope having ribs entering the grooves, substantially as and for the purpose described.

4. As an article of manufacture, a compound wire consisting of a core provided with grooves having overhanging edges, and an envelope having ribs fitting in the grooves, substantially as and for the purpose described.

5. As an article of manufacture, a compound wire consisting of a core formed with dovetailed grooves, and an envelope having ribs or projecting portions fitting into these grooves, substantially as shown and described.

In testimony that we claim the foregoing we have hereunto set our hands, this 23d day of February, A. D. 1884.

F. CHILLINGWORTH.
PHILIP G. RUSSELL.

Witnesses:

HENRY C. HAZARD,
JAS. P. RYON.