

(No Model.)

R. S. WARING.

ELECTRIC CABLE.

No. 294,543.

Patented Mar. 4, 1884.

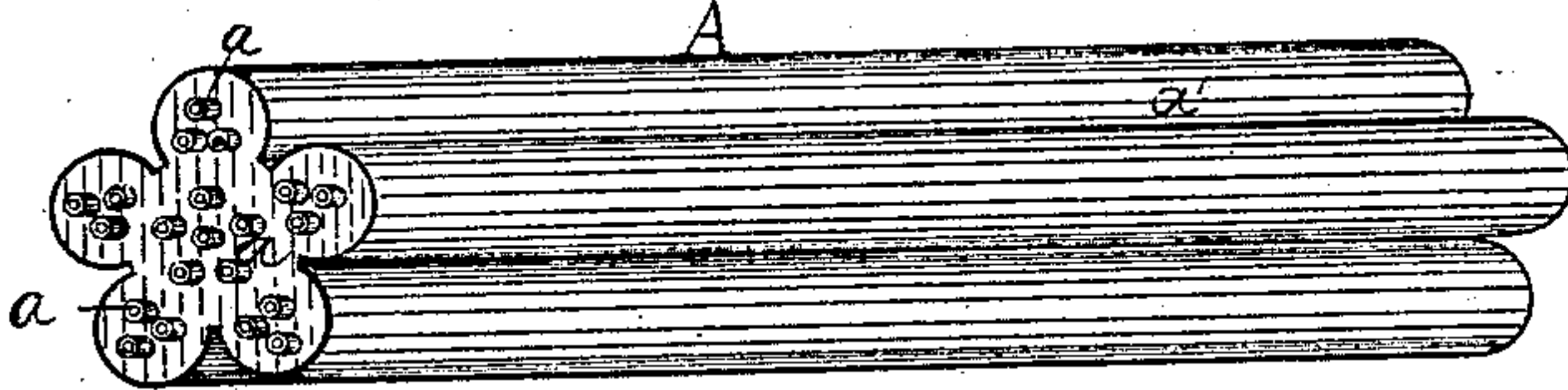


Fig. 1.

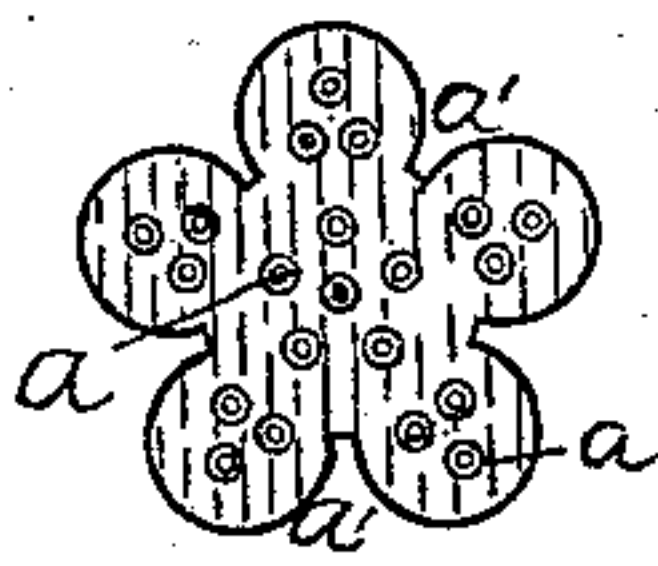


Fig. 2.

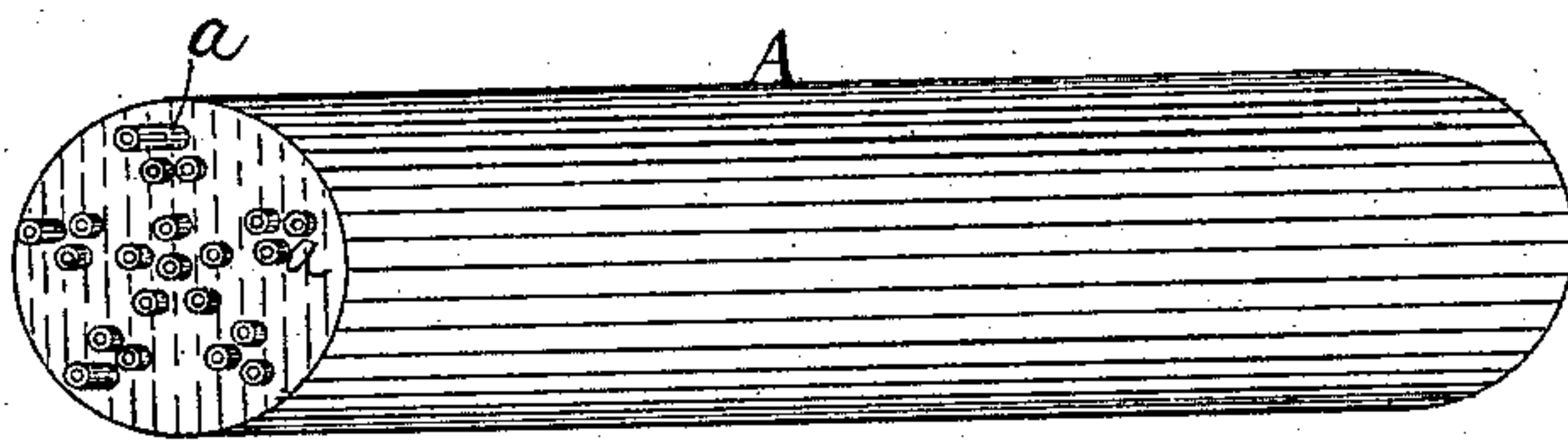


Fig. 3.

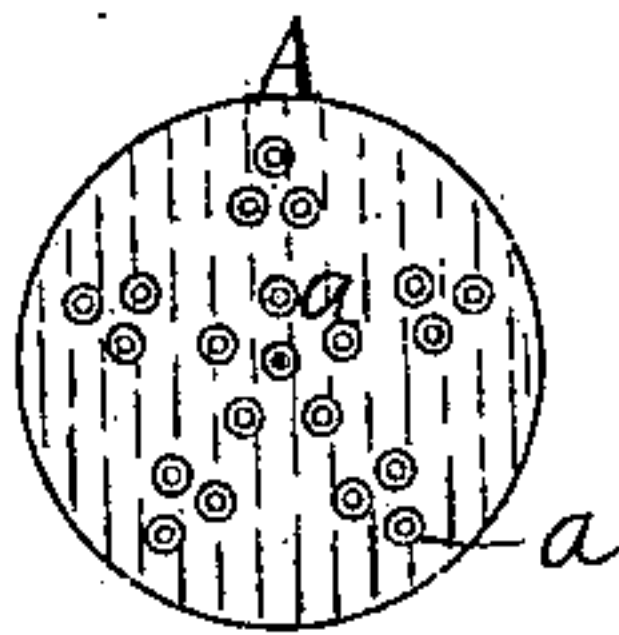


Fig. 4.

Witnesses.

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UNITED STATES PATENT OFFICE.

RICHARD S. WARING, OF PITTSBURG, PENNSYLVANIA.

ELECTRIC CABLE.

SPECIFICATION forming part of Letters Patent No. 294,543, dated March 4, 1884.

Application filed August 9, 1883. (No model.)

To all whom it may concern:

Be it known that I, RICHARD S. WARING, a citizen of the United States, residing at Pittsburg, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Electric Cables; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—like letters indicating like parts—

Figure 1 is a perspective view of my improved compound cable. Fig. 2 is a transverse sectional view of the same, and Figs. 3 and 4 are views similar to Figs. 1 and 2, showing substantially the same features of invention in grouping the wires, but with a smooth round exterior instead of a lobed form of exterior covering of the cable.

My invention relates to certain improvements in compound electric cables; and, in general terms, it consists of a body of lead or other equivalent soft ductile metal or alloy, such body having passages therethrough inclosing insulated conducting-wires, the wires being arranged in a series of groups in circular order around a central group, as hereinafter more fully described and claimed.

In the drawings, A represents the body portion of my improved cable, formed by preference of lead, though other soft ductile metal or metallic alloy may be employed adapted to be worked as lead is worked in a press. This body of metal incloses insulated conducting-wires *a*, each in its appropriate passage, such wires being inclosed by flow of lead around the same at the point of the mandrel of an ordinary cable-press, the lead being formed into adhesive union between and around the wires by the pressure to which the lead is subjected in the press.

A special feature of my improvement in this cable is the arrangement of wires embodied therein, whereby provision is made for including a comparatively large number of wires in a cable of small sectional area and light weight, and also continuous unbroken walls of lead covering are secured between and around each and all the wires, not only in the outer parts, but also in the inner or central parts of the

cable. This feature of improvement may, in general terms, be described as an arrangement in groups, one group of wires occupying the central core or axial part of the cable, and other groups being arranged at equal intervals around such center, with open spaces between the groups of the outer circle, through which lead may flow, both to the spaces between wires in the central group and also along the sides of the outer groups to the spaces between their several wires. The central group, as shown in the drawings, consists of a circular arrangement of wires around a common center. Surrounding this central group is a series of groups composed of three wires each, such groups occurring at equal intervals around the center. These outer groups are separated from each other a greater distance than the individual wires of each group, and they are also placed, by preference, in the radial lines of the wires composing the circle of the central group. This provision is made with reference to passing lead between the outer groups into the spaces between wires of the central group, and also with reference to applying lead to each of the outer groups both upon their outer and their adjacent sides. The lead thus supplied is afforded comparatively wide passages between groups, so that an adequate amount can be introduced to the inner parts of the cable without obstruction to flow, and without danger of displacing wires by pressure of lead thereon; also, the three wires composing an outer group occupy relative positions corresponding to the angles of a triangle. By this provision the greater part of the surface of each wire is exposed directly to the channels for lead-supply, consequently the wires in such a group can be brought close together and still sufficient lead be passed into the inner space between wires to fill the same. This is the more readily accomplished because, properly speaking, lead simply passes into these narrow spaces from different sides to fill the same, and does not flow through them to fill some space beyond. For these reasons I prefer to form each outer group of three wires occupying relative positions, as shown; but I do not wish to limit my invention to this specific number and arrangement, because the

groups of the outer circle may have more or less than three wires and still secure substantially the same open or free channels for flow of lead between groups, both to the center of the cable and also to the spaces of the outer groups from their adjacent or inner sides.

If desired, the exterior of the cable may be given a round form, as illustrated in Figs. 3 and 4. I prefer, however, to give the exterior a lobed form, as in Figs. 1 and 2. This is done by means of grooves *a'*, formed longitudinally in the body A, between the outer group of wires. Not only is greater economy secured in the use of lead by this feature of construction, but also greater flexibility of the cable, because the several ribs which inclose the outer groups of wires can move toward or from each other somewhat, and thereby facilitate bending the cable without danger of unduly compressing the inclosed wires. This feature of construction is fully set forth in patent granted to me November 28, 1882, No. 268,060; but in such prior patents single wires only occur where a group of several wires are now contained.

By the features of arrangement herein described I am enabled to multiply greatly the number of wires over that shown in my prior patent without enlarging materially either the sectional area or the weight of the cable. This is in practice a very important feature, looking to economy in manufacture and commercial success in use.

In a separate application for patent I have described and claimed a mandrel specially adapted to make the cable forming the subject-matter of this case. I do not wish, however, to limit my invention thereby, because, if desired, other forms of mandrel may be employed giving substantially the same features of arrangement of wires in groups, with similar advantages resulting therefrom in directing flow of lead between the outer groups to the inner spaces, not only of the central part of the cable, but also of or around the individual wires in the separate outer groups.

I claim herein as my invention—

1. An electric cable having a body of soft ductile metal or metallic alloy inclosing insulated conducting-wires, each in its appropriate passage through the body, such wires being arranged in distinct groups at intervals around a central group, the distance between adjacent wires of a group being less than the distance between the successive groups composing such outer circle, substantially as set forth.

2. An electric cable having a body of soft ductile metal or metallic alloy inclosing insulated conducting-wires, each in its appropriate passage through the body, such wires being arranged in distinct groups in circular order around a central group, the central group being composed of wires arranged in circular order around a common center, the wires of such circle occurring in the radial lines of the surrounding groups, substantially as set forth.

3. An electric cable having a body of soft ductile metal or alloy inclosing insulated conducting-wires in separate passages there-through, such wires being arranged in distinct groups around a central group, the outer groups being composed of three wires each, the distance between such wires being less than the distance between successive groups, substantially as set forth.

4. An electric cable having a body of soft ductile metal or alloy inclosing insulated conducting-wires in separate passages there-through, such wires being arranged in distinct groups arranged in circular order around a central group, with grooves made longitudinally in the exterior surface of the body, between the groups composing the outer circle, substantially as set forth.

In testimony whereof I have hereunto set my hand.

RICHARD S. WARING.

Witnesses:

C. L. PARKER,

R. H. WHITTLESEY.