

No. 629,508.

Patented July 25, 1899.

J. N. KELLER.
INSULATED CONDUCTOR.

(Application filed Sept. 7, 1898.)

(No Model.)

Fig. 1.

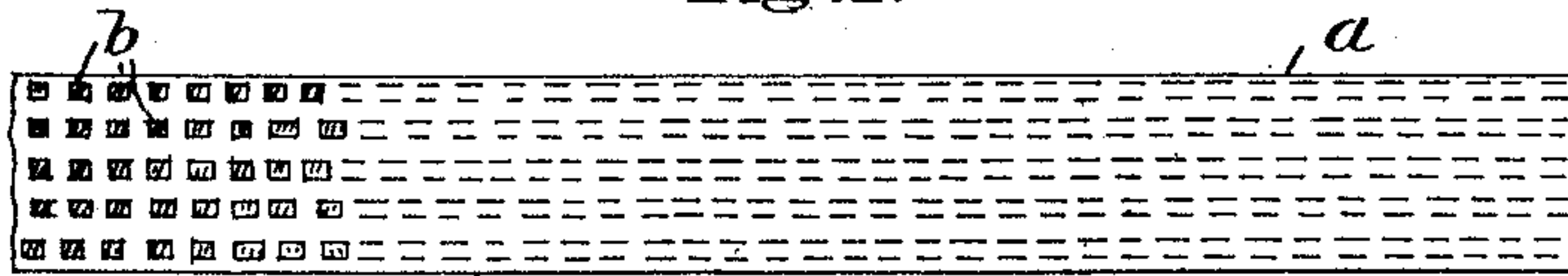


Fig. 2.

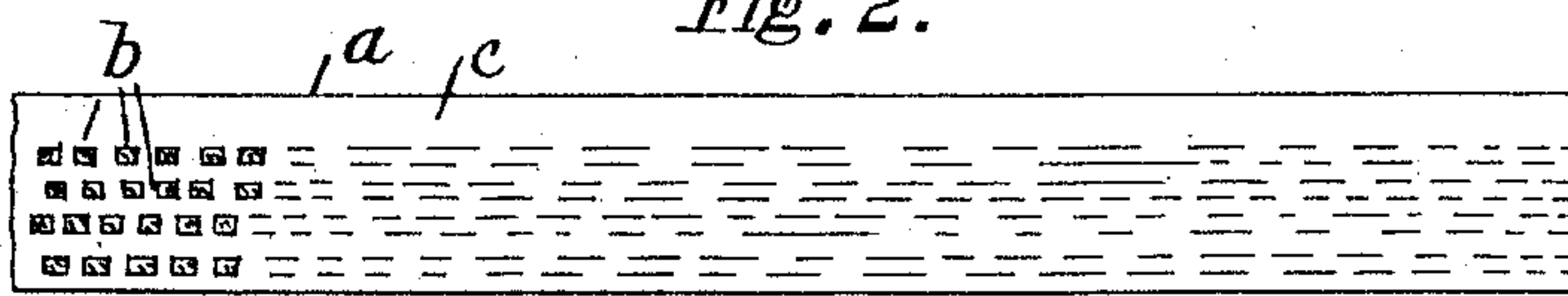


Fig. 3.

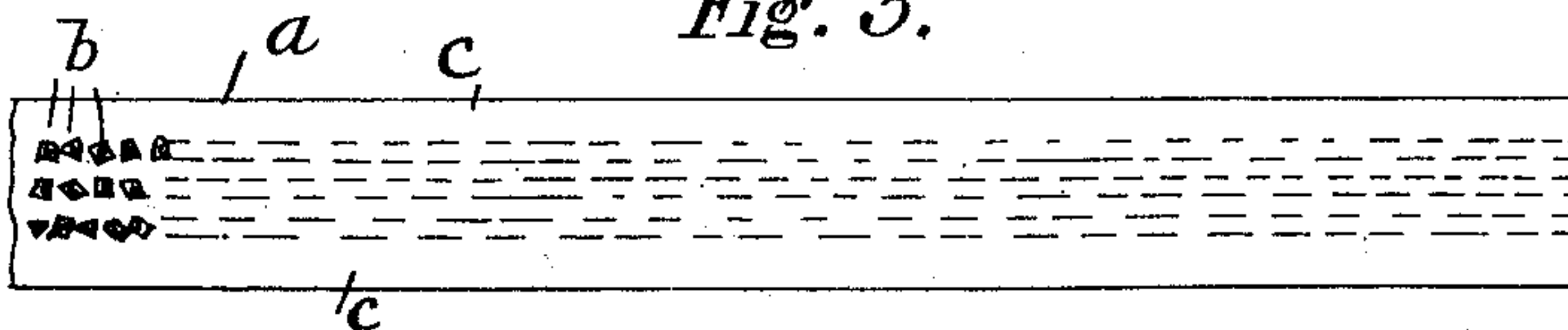


Fig. 4.

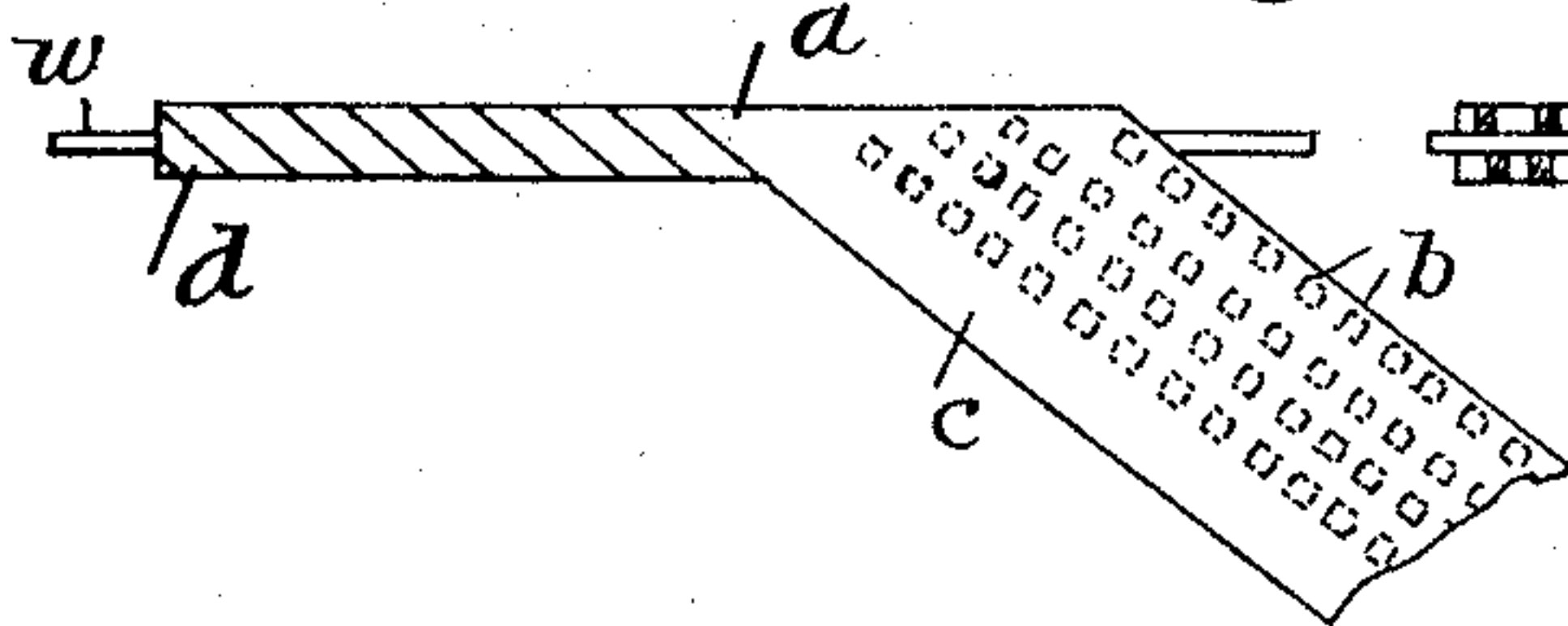


Fig. 5.

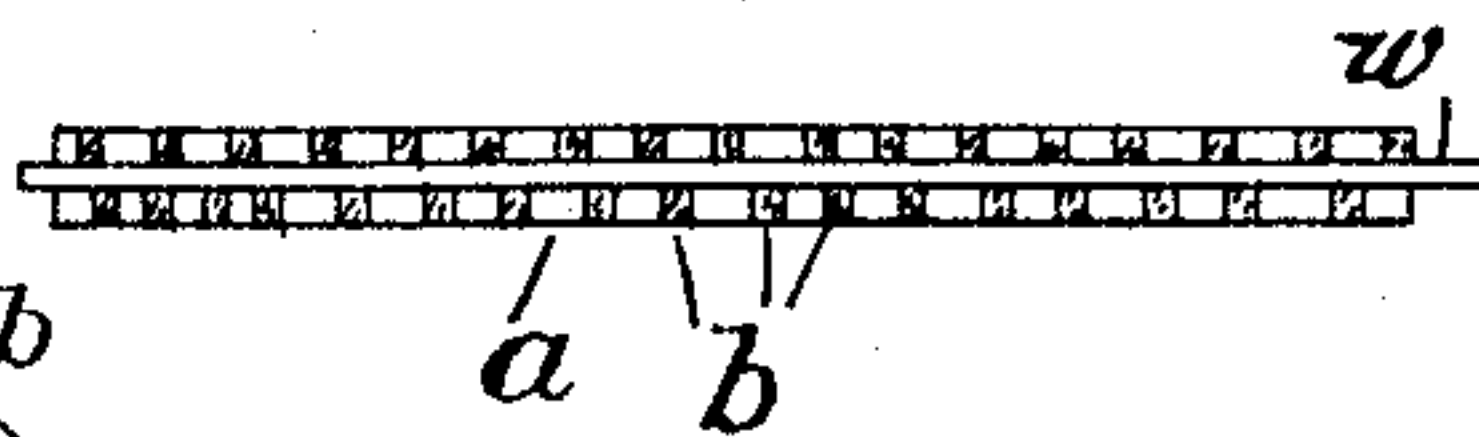


Fig. 6.



Fig. 7.

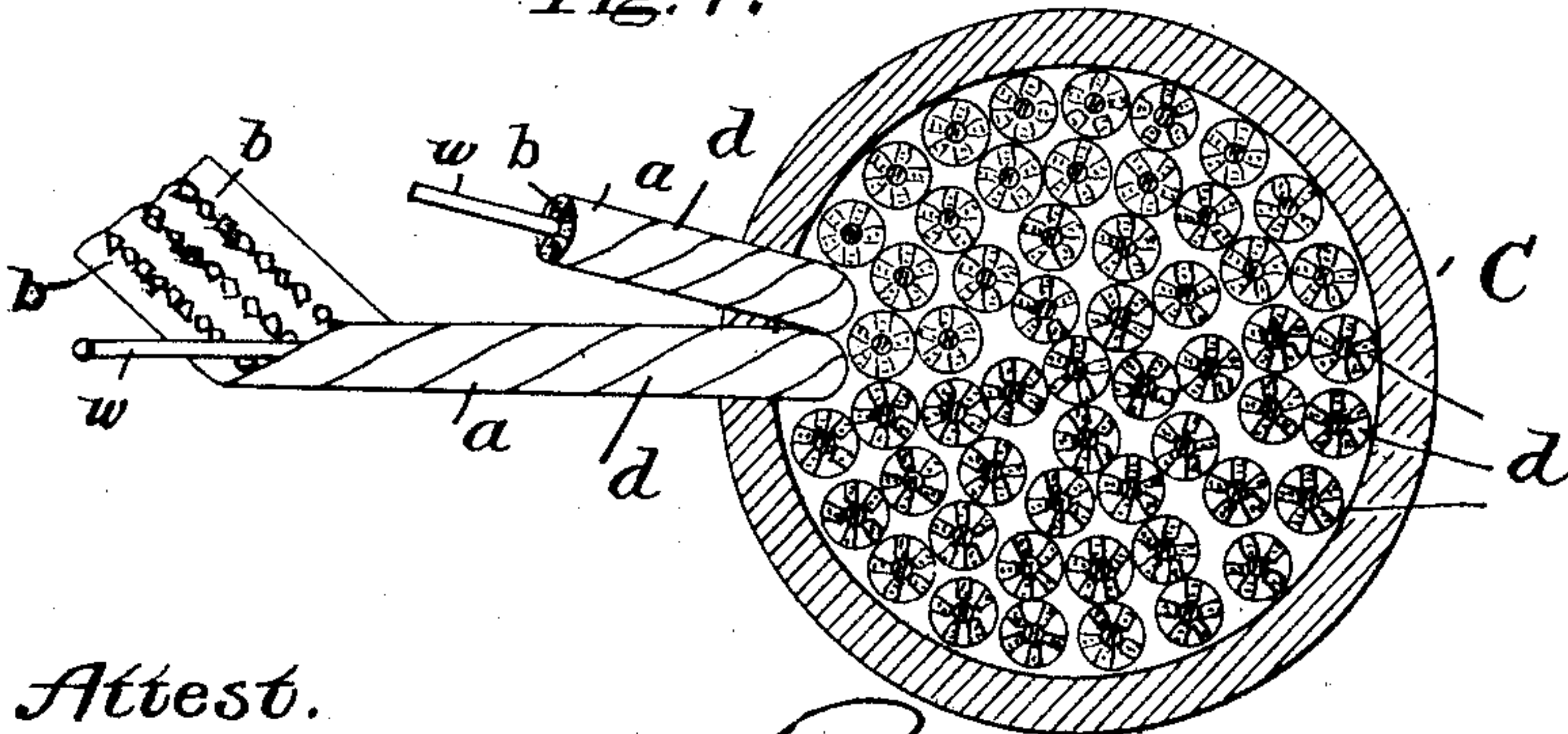


Fig. 8.



Attest.

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INSULATED CONDUCTOR.

SPECIFICATION forming part of Letters Patent No. 629,508, dated July 25, 1899.

Application filed September 7, 1898. Serial No. 690,440. (No model.)

To all whom it may concern:

Be it known that I, JASPER N. KELLER, residing at Newton, in the county of Middlesex and State of Massachusetts, have invented certain Improvements in Insulated Conductors, of which the following is a specification.

The present invention relates to improvements in the construction of insulated electric conductors and cables, consisting of a plurality of such conductors, which have a low static capacity.

It is well recognized in the present art that dry air in the vicinity of a conductor very materially reduces its static capacity, and many improvements have been made in the construction of the insulating-coverings for conductors in which air-spaces are provided between the conductors and their coverings, and the herein-described invention relates to new and novel means whereby such air-spaces are obtained.

The invention has special reference to conductors for cables which are to be used in pairs or metallic circuits and in association with long telephone-lines on poles extending across the country and in which it is necessary and requisite that the electrostatic capacity between the conductors of each circuit in the cable and between each pair of metallic circuits shall be reduced to as low a point as possible consistent with the size and cost of the cable.

In carrying out the invention I inclose the conductor in a loose layer of fine insulating material, such as cork or other similar material, which is held to the conductor by an envelop of suitable insulating material. I prefer to cut the cork into cubes or to grind it and pass the same through sieves to exclude too large and too small pieces, so that pieces having a uniform size will be retained, depending upon the desired separation of or distance between the conductors when in a cable. The pieces of cork, &c., are attached to the surface of a narrow fillet or tape of paper, preferably in rows, though this is not material, at a slight distance apart to leave air-spaces between each piece. A convenient method of covering the tape with cork would be to draw the tape at a uniform speed beneath brushes carrying glue or melted rosin, &c., and allowing the cork to fall or feed down

upon the tape as it is traveling, and if it be deemed necessary to place the pieces of cork at regular and exacting intervals upon the tape it could be easily done by simple mechanical means. After suitably preparing the tape with the cork, &c., the wires to be insulated are covered by winding the tape spirally about them. One edge of the tape may be made to overlap the preceding layer to give permanence and rigidity to the insulation, all of which I will now proceed to describe, and point out in the appended claims.

Of the drawings, Figures 1, 2, and 3 represent one surface of a portion of fillet or tape *a*, to which are attached at intervals pieces of insulating material *b*—such as cork, bits of fiber, pulp, &c.—the dimensions of the pieces depending upon the diameter of the conductor to be inserted in a cable-sheath, those shown being about one-sixteenth of an inch cubes. Fig. 4 shows a wire *w*, around which the prepared tape *a* is being wound. Fig. 5 is a longitudinal section of a conductor, showing the invention; and Fig. 6 is an end view of such a conductor. Fig. 7 is a representation of the end view of a cable composed of a plurality of said conductors. Fig. 8 is a modification.

Fig. 1 shows a fillet or tape of paper, &c., *a*, to which are attached the insulating-pieces *b* by means of glue or other suitable adhesive substance. In this case the pieces cover the whole width of the tape, while Fig. 2 shows a tape having a clean margin *c*, the pieces *b* being in rows upon the remaining part of the tape.

Fig. 3 shows a tape with clear margins *c c* on each side thereof, the pieces *b* occupying the central part of the tape. The tape is wound around a bare conductor *w* by any suitable machine, with the insulating-pieces preferably inward, so that when in place the pieces will be interposed between the surface of the conductor and the paper *a*, so that a connected air-space will be provided around the conductor and the whole of its length. The margin *c* may be cemented to back of the previous winding during the process, and it may be desirable to do so in most cases. After the conductor has been incased as described it is subjected to the usual drying process to exclude all moisture that it may contain.

Fig. 7 illustrates a plurality of conductors, made as described, inclosed in a lead sheath C, two of which or a pair are shown as brought out to one side.

5 It will be seen by examining the conductor *d* that the wire *w* is held centrally by the pieces *b*, which serve as isolated supports or braces in every direction.

While the figures show the tape *a* wound about the wires *w* with the isolated pieces *b* on the inside or next to the wire, still it may be convenient to wind the tape with the cork on the outside, as shown by Fig. 8, in which the tape *a* is wound upon the conductor *w* with its smooth side next thereto and the insulating-pieces *b* project outward.

I claim as my invention—

1. An insulated conductor, consisting of a metallic conductor and an insulating-covering interposed between which are fragments or pieces of insulating material slightly separated from each other.

2. An insulated conductor, consisting of a metallic conductor and an insulating-covering between which are interposed pieces of insulating material held positively separated from each other.

3. An insulated conductor, consisting of a metallic conductor and an inclosing covering separated from each other by pieces of insulating material, at a slight distance from each other.

4. An insulated conductor, consisting of a metallic conductor and an inclosing covering separated from each other by pieces of cork at a slight distance from each other.

5. An insulated conductor, consisting of a metallic conductor and an inclosing covering separated from each other by pieces of insulating material held positively apart from each other, the interstices being occupied by air.

6. An insulated electric conductor, consisting of a metallic conductor; and an insulating-covering, composed of a fillet or tape of thin insulating substance having secured on one of its surfaces pieces of non-conducting material, wound spirally around said metallic conductor.

7. An insulated electric conductor, consisting of a metallic conductor; and an insulating-covering, composed of a fillet or tape of thin insulating substance having secured to its inner surface pieces of non-conducting material, wound spirally around said metallic conductor.

8. An insulated electric conductor, consisting of a metallic conductor; and an insulating-covering composed of a fillet or tape of paper having small isolated pieces of non-conducting material secured to its inner surface in continuous rows, wound spirally around said metallic conductor.

9. An insulated electric conductor, consist-

ing of a metallic conductor; and an insulating-covering composed of a fillet or tape of paper having small pieces of non-conducting material adhesively secured to its inner surface in continuous rows, wound spirally around said metallic conductor.

10. An insulated electric conductor, consisting of a metallic conductor; and an insulating-covering composed of a fillet or tape of thin insulating substance having secured to its inner surface small pieces of non-conducting material with a clear margin on one side, wound spirally around said metallic conductor, the said clear margin being cemented to the previous winding, as set forth.

11. An insulated electric conductor, consisting of a metallic conductor; and an insulating-covering composed of a fillet or tape of paper having secured to its inner surface small pieces of non-conducting material, with a clear margin on one side, wound spirally around said metallic conductor.

12. An insulated electric conductor, consisting of a metallic conductor; and an insulating-covering composed of a fillet or tape of paper having adhesively secured to its inner surface small pieces of non-conducting material of substantially equal thickness wound spirally around said metallic conductor; whereby the said metallic conductor is held in the center of said covering.

13. An electric cable, comprising an outer lead sheath inclosing a plurality of electric conductors composed of a fillet or tape of thin insulating substance having secured to one of its surfaces small isolated pieces of non-conducting material, wound spirally around said metallic conductor.

14. An electric cable, comprising an outer lead sheath inclosing a plurality of electric conductors composed of a fillet or tape of thin insulating substance having secured to one of its surfaces small pieces of non-conducting material in rows, with a clear margin on one side, wound spirally around said metallic conductors.

15. An insulated electric conductor, consisting of a metallic conductor; and an insulating-covering, composed of a fillet or tape of insulating material having secured to its inner surface pieces of non-conducting material, with a clear margin on one side, wound spirally around said metallic conductor the said clear margin overlapping the previous winding.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 6th day of September, 1898.

JASPER N. KELLER.

Witnesses:

PERCIVAL J. BURGESS,
ALVAN F. WORTHINGTON.