G. S. KNAPP.
Lightning Rod.

No. 196,235. Patented Oct. 16, 1877.

Fig. 1

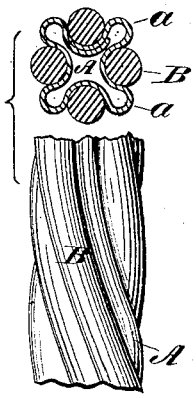


Fig. 5.

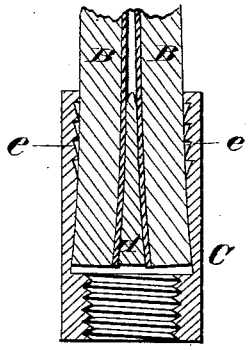


Fig. 2.

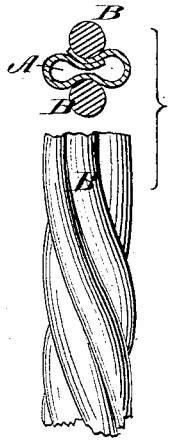


Fig. 3.

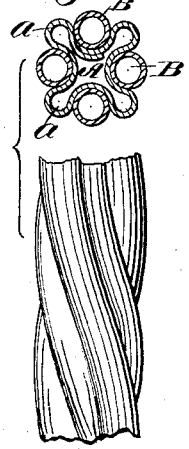


Fig. 6.

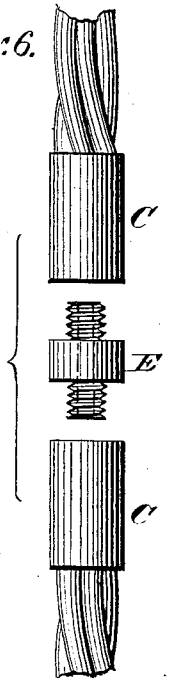
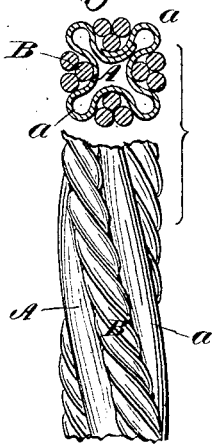


Fig. 4.



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UNITED STATES PATENT OFFICE.

GEORGE S. KNAPP, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN LIGHTNING-RODS.

Specification forming part of Letters Patent No. **196,235**, dated October 16, 1877; application filed January 27, 1877.

To all whom it may concern:

Be it known that I, GEORGE S. KNAPP, of Chicago, in the county of Cook and State of Illinois, have invented certain Improvements in Lightning-Rods, of which the following is a specification:

My invention consists in a spirally-fluted sheet-metal core or body, provided with exterior strands seated in the grooves or flutes, and in a coupling of peculiar construction for uniting the lengths or sections of the rod one with another.

Figures 1, 2, 3, and 4 represent different forms or modifications of my rod, each figure showing a cross-section and a side view of one form of the rod. Figs. 5 and 6 are, respectively, a section and a side view, illustrating the construction of my coupling.

The rod represented in Fig. 1 consists of a central copper core, A, and four outside iron or steel wires or strands, B, the core being formed by folding a single sheet of metal into a star-like form, so that it presents four exterior beads, *a*, of a hollow or tubular form, and four corresponding flutes or channels between the beads, to receive the strands or wires, as shown.

During the process of manufacture, the entire rod is twisted, in order to give the beads a spiral form and carry the strands around the rod, in the manner shown, thereby uniting the core and the strands securely, and adapting the rod to be coiled for transportation without injury.

The rod represented in Fig. 2 is similar to that represented in Fig. 1, except that it has two beads and two outside strands instead of four.

The rod represented in Fig. 3 is the same as that shown in Fig. 1, except that the outside strands B are made tubular instead of solid.

The rod represented in Fig. 4 differs from those shown in Figs. 1 and 3 in having each strand composed of three wires twisted together instead of a single wire or tube, as in the other forms.

Although differing somewhat in form it will be observed that the four rods shown consist each of the spirally-fluted sheet-metal core and outside strands seated therein, and that, consequently, the four forms are substantially the same in construction.

A rod constructed in the manner shown presents a very large surface in proportion to the amount of metal employed, is cheap, strong, and durable, and is in every respect a superior conductor.

My improvement in the coupling consists, mainly, in providing the common screw socket or neck to which the ends of the rod are attached with an opening enlarged at the bottom, and in spreading or enlarging the end of the rod therein by means of a key or pin driven into the center. In Figs. 5 and 6, C represents the sockets or sleeves into which the ends of the rod are inserted, and *d* the tapering key or pin, driven through the end of the sleeve or socket into the center of the rod, in such manner as to expand the latter tightly within the conical or flaring interior of the socket. The pin or key thus inserted not only secures the rod firmly and neatly, but also insures a close contact between the rod and socket, so that the electric fluid may flow readily from one to the other. In order to secure the socket with still greater firmness upon the rod, the former may be provided, as shown in Fig. 5, with internal annular grooves or teeth *e*, which will engage with the rod when it is expanded by the key or pin.

The coupling-sockets may be made as usual—one with a male and the next with a female screw—so that they may be screwed directly together; but it is preferred to make them all with either female or male screws, and to connect them by means of coupling-necks E, having their two ends provided with threads to fit the sockets, as in Fig. 6, as by this arrangement I am enabled to unite any two sockets and to connect the sections of the rod, one with another, without the necessity of bringing particular ends together, as usual.

I am aware that conical or flaring sockets are in common use for the purpose of holding the ends of rope; but I am not aware that any one has hitherto produced a coupling consisting of two such sockets united by a screw-neck in such manner as to admit of their applica-

tion to a lightning-rod for the purpose of uniting two lengths or sections of the same in the manner shown.

Having thus described my invention, what I claim is—

1. The lightning-rod consisting of the spirally-fluted sheet-metal body A and the exterior strands B, seated therein, as shown.

2. The lightning-rod coupling consisting of the two metal sockets C, made of a conical or tapering form in the interior, and united by a screw-neck, as shown, in combination with the two ends of the rod inserted therein, and secured by the central pins, as shown.

GEORGE S. KNAPP.

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