

L. L. MAST.
LIGHTNING CONDUCTOR.
APPLICATION FILED DEC. 16, 1910.

1,119,973.

Patented Dec. 8, 1914.

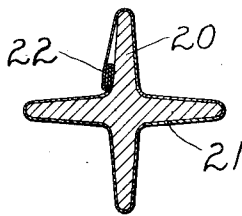


Fig. 1

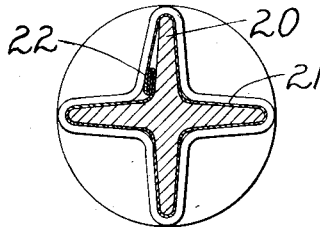


Fig. 2

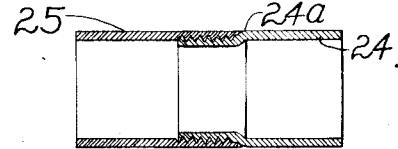


Fig. 3

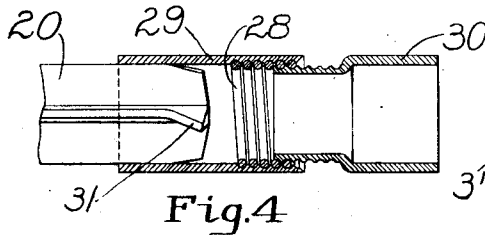


Fig. 4

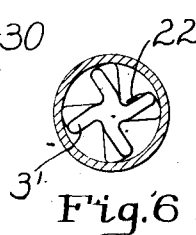


Fig. 6

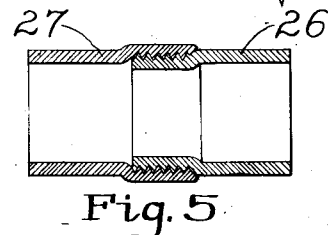


Fig. 5

Fig. 7

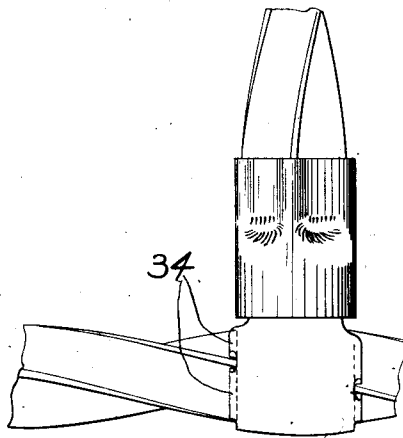
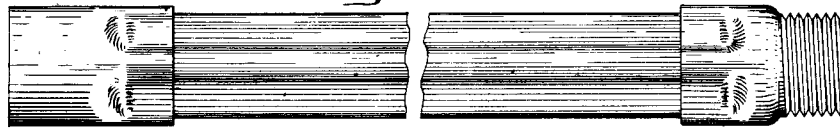


Fig. 10

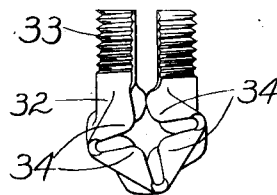


Fig. 8

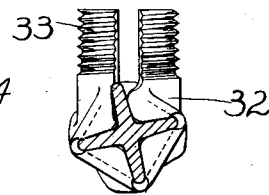


Fig. 9

32

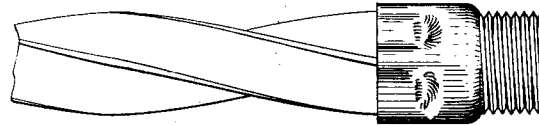


Fig. 11

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LIGHTNING-CONDUCTOR.

1,119,973.

Specification of Letters Patent.

Patented Dec. 8, 1914.

Application filed December 16, 1910. Serial No. 597,682.

To all whom it may concern:

Be it known that I, LOUIS L. MAST, a citizen of the United States, residing at West Milton, in the county of Miami and State of Ohio, have invented certain Improvements in Lightning-Conductors, of which the following is a specification.

My invention relates to means for constructing and assembling lightning conductors in such manner as to secure the maximum of efficiency consistent with the material of which the conductor is made, and it relates more particularly to that class of conductors wherein a metal core is covered by a sheathing of metal possessing the property of high electrical conductivity. In conductors of this class it is customary to make the core of iron and the sheathing of copper, the former for its strength and rigidity and the latter for its conducting properties. An eminent authority has said that "A given weight of metal is much more effective as a rapid carrier when in the form of a ribbon or tape", which statement expresses the consensus of opinion of many who are best qualified to know, and it is upon this theory that the sheathed conductor is based.

Lightning conductors are commonly called "lightning rods" or "rods" and hereinafter I will generally refer to them by one of those terms. The core usually comprises four thin wedge shaped longitudinal ribs, radiating from a common center, and the sheathing is made to conform to the contour of this core. By this means a ribbon of considerable width is reduced to a compact form, while retaining its efficiency as a rapid conductor.

In a Patent, No. 395,399, issued to me January 1, 1889 a sheathed rod was shown and described, and one of the objects of my present invention is to improve on the manner of interlocking the edges of the sheathing shown in my former invention.

Much of the benefit derived from the above described construction will be lost, and has been lost heretofore in similarly constructed rods, by having imperfect joints between the several lengths of rod required in an installation. Therefore, the main object of my present invention is to construct and attach the couplings, or burs as they are frequently called, to the rod in such manner and make them of such material that the

conductivity of the joints will equal the conductivity of the rod.

It is a well known fact that the efficiency of nearly all lightning rod installations is seriously impaired by imperfect electrical connection at joints and branches. This is true of plain rods as well as copper sheathed ones, and my improvement in this respect resides in making the couplings of a more ductile and less resilient metal than has been used in the past, to make them of a metal having conductivity at least equal to that of the rod itself, and secure them to the rod in such manner as to insure mechanical strength and a good and permanent electrical contact between each coupling member and the rod it is joined to.

In the accompanying drawing, Figure 1 is a section through a section of rod. Fig. 2 is a similar section but showing a coupling at the distant end. Figs. 3, 4 and 5 show different way of making the coupling. Fig. 6 shows the manner of bending the longitudinal ribs to prevent coupling being pulled off. Fig. 7 is a rod with couplings swaged on, and Figs. 8 and 9 show a clamp for attaching a branch rod. Fig. 10 shows a branch rod connected. Fig. 11 shows the customary manner in which rods are twisted.

Similar numerals indicate like parts throughout.

A core 20 of the usual ribbed section is covered by the sheathing 21, which conforms to the contour of the core. The two edges of the sheathing, one folded inwardly and the other outwardly, are hooked together, forming the interlock 22, and by placing the fold; i. e., the portion of the sheathing which is actually bent when the edges are folded, of the inwardly turned edge at the junction of two ribs, the interlock is quite concealed. Besides appealing to the esthetic eye, this disposition of the interlock has the advantage of bringing the exposed fold close to the axis of the rod, where it will be subjected to least strain when the rod is bent; and it has the further advantage of causing each member of the interlock to be positively held by the other member, thereby preventing displacement of either member without displacing the other. It is in the above described manner of disposing the interlock that its superiority over the method I formerly employed resides. In the inter-

lock shown in the patent referred to, there was practically nothing but friction to keep one member attached to the other.

Fig. 3 shows my improved coupling before being attached to the ends of the rod. As will be seen, it is composed of members 24 and 25, male and female respectively, both of which are made of seamless drawn tubing, the former being contracted at one end and a thread cut on the contracted end. The end of the member 25 abuts the shoulder 24^a when the coupling is screwed together. The couplings are swaged on the ends of the rod, as in Figs. 7, 10 and 11. To facilitate swaging, the tubing should be made of a very ductile metal. It should also have electrical conductivity at least equal to that of the rod on which it is used. Copper and aluminum are both well adapted to the purpose, especially the former because of its superior conductivity, while the latter answers the purpose very well on ordinary galvanized iron rods.

As before stated, ductility is one of the requisites in the material of which the couplings are made, and to secure the desired ductility, the tubing, which is hard when it comes from the drawing dies, may be annealed. The member 24 should be annealed before the end is contracted, which operation will again harden the portion to be threaded, while leaving the end to be swaged, soft. But if the member 25 is annealed, the thread will be quite soft, and the portion of the member protruding beyond the rod after it is swaged on, may be easily injured in handling. It may therefore be preferable to use the female without annealing, in which case, more care may be necessary in swaging it on the rod.

Fig. 5 shows a coupling in which the male, 26, is contracted, while the female, 27, is expanded. As expanding metal hardens it as well as contracting it does, this female may be annealed before it is expanded, and as only the portion expanded will be hardened, the portion to be swaged will remain soft.

Fig. 4 shows a third coupling, in which a wire spiral, 28, is screwed or sprung into the thread of the female 29, friction being sufficient to keep the wire in place and prevent it turning when the male, 30, is screwed in or out. By this means the member 29 may be annealed, and the wire, preferably hard drawn copper, will act as the thread.

The use of very ductile metal, nearly or wholly devoid of resiliency, not only insures good electrical connections between rods and couplings, but it insures mechanical strength at the joints as well. But to entirely eliminate the possibility of pulling a coupling off of the rod, the ends of the ribs may be bent over as at 31 Figs. 4 and 6, before swaging the couplings to the rods.

Good electrical connections between a rod and its branches are as important as good connections in the main rod itself, and for making branch connections I use a clamp, 32, which may be placed at any point on the rod. The clamp is preferably made of sheet metal and is in the form of a strap which encircles the rod. The ends of the strap are curved into semi-cylindrical shape and the two together form a tube on which the thread 33 is cut. At suitable intervals along each edge of the strap, tongues 34 are formed; these tongues are bent so that when the strap is on the rod they will point toward its center. The tongues are just the shape of the angle between adjacent ribs, and when the strap is placed around the rod, its ends pressed together and the female member of a coupling screwed on, the strap is drawn tightly around the rod, pressing the edges of the tongues 34 against the parts not touched by the strap, thereby making a good electrical connection, as well as a very rigid one mechanically. The three parts of the strap lying between the tongues can be easily bent to permit of the strap being placed on the rod. These straps are especially useful for attaching "points" wherever they are wanted. For example, a rod may be run along the ridge of a roof and at suitable intervals these straps are placed on the rod and a point of suitable length screwed on. It is customary to twist the rod as shown in Figs. 10 and 11, and when the strap is used on a twisted rod it is obvious that a slight longitudinal movement on the rod will cause a corresponding rotary movement. Therefore, it is a very simple matter to clamp the strap at a place where it will hold the point perfectly plumb, and it is certain to stay plumb.

Minor changes may be made in the various parts of my invention without departing from its nature or scope.

I claim:

1. A coupling for lightning conductors, comprising two pieces of tubing, one end of each piece being hardened while the remainder of the piece remains soft, said hardened ends being threaded so one may be screwed into the other.

2. A lightning conductor having a core with a plurality of substantially longitudinal ribs radiating from a common center, and a sheathing which conforms to the contour of the core; the sheathing being formed from a strip of sheet metal having its longitudinal edges folded over upon itself, one inwardly and toward the core, the other outwardly and away from the core, the latter having a second bend in the same direction as the first, the second bend being approximately opposite the edge which was turned out by the first bend and being placed at the junction of two ribs of the

core, the inwardly turned edge of the sheathing being confined in the tube formed by the two outward bends of the other edge.

3 A clamp for connecting a branch to
5 another lightning conductor, comprising a tapped member attached to the branch, and a band encircling the conductor, said band having semi-cylindrical threaded extensions which, when parallelly juxtaposed, form a
10 screw on which said tapped member attached to the branch may be screwed, thereby drawing said extensions toward each other and causing the band to grip the conductor, said band having a succession of inwardly projecting tongues arranged along
15 its edges, the contour of said tongues being complementary to and for the purpose of engaging and forming electrical connection with portions of the conductor not touched
20 by the body of the band.

4. A lightning conductor composed of

longitudinal ribs radiating from a common center, the ends of the ribs being bent laterally so as to form a pronounced angle with the adjacent portion of the rib, where-
25 by a coupling member secured to and conforming to the normal contour of the rod will be prevented from slipping off of the rod.

5. In a lightning conductor, the combination of a rod having longitudinal ribs radiating from a common center, the ends of the ribs being bent so as to form a pronounced angle with the part of the rib adjacent thereto, and a coupling member
30 on the rod said member having a portion which conforms to the contour of the ribs adjacent to their bent ends.
35

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Witnesses:

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