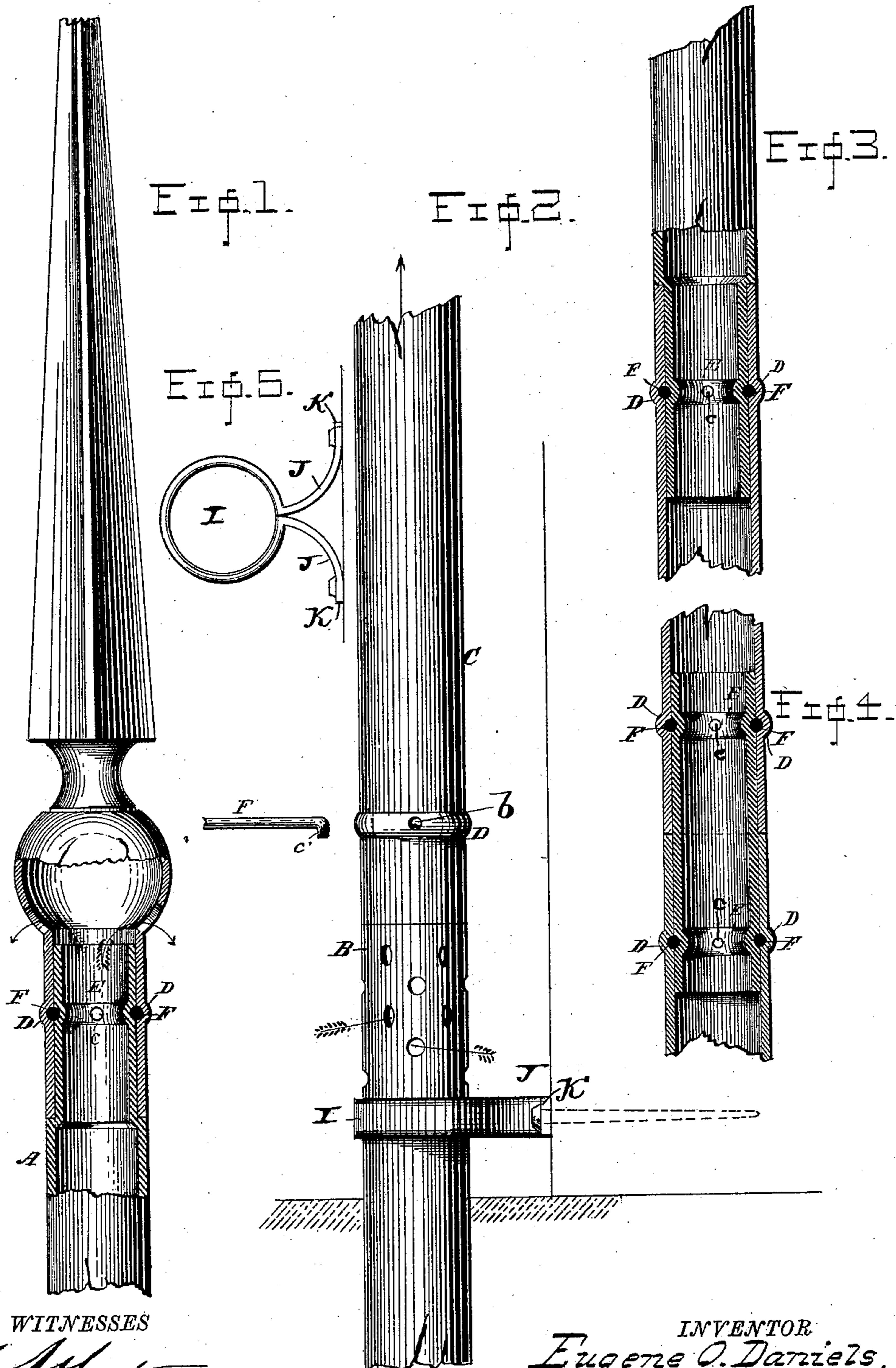


(No Model.)

E. O. DANIELS.
LIGHTNING ROD.

No. 362,064.

Patented May 3, 1887.



WITNESSES

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UNITED STATES PATENT OFFICE.

EUGENE ORA DANIELS, OF SPRINGFIELD, OHIO.

LIGHTNING-ROD.

SPECIFICATION forming part of Letters Patent No. 362,064, dated May 3, 1887.

Application filed January 15, 1887. Serial No. 224,421. (No model.)

To all whom it may concern:

Be it known that I, EUGENE ORA DANIELS, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Lightning-Rods, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to tubular lightning-rods; and my invention consists, first, in providing for the maximum conducting-surface by utilizing both the exterior and the interior of the tubular sections composing the rod, admission of the lightning to the interior being secured through apertures in the rod, preferably at or near the base of the point.

My invention consists, secondly, in keeping the normal temperature of the rod at the minimum or lowest degree by establishing and maintaining a draft of air through the tubular rod, the influx being near the earth, where the air is naturally coolest, and the exit at or near the upper end, whereby the physical law that maximum electrical conductivity is obtainable only through normal low temperature of the conductor is, as far as practicable, complied with.

My invention consists, thirdly, in a joint for the tubular sections, made by reducing the diameter of the end of one section to constitute a male portion to enter one end of the contiguous section, and in constructing these joined portions, respectively, with an interior annular bulge and an exterior annular depression, forming, when matched, an annular groove, in which a wire is placed to form a lock.

In the accompanying drawings, forming a part of this specification, and on which like reference-letters indicate corresponding parts, Figure 1 represents a partial sectional and partial side view of the upper portion of my tubular lightning-rod; Fig. 2, a side elevation of portions of two lower sections and indicating their relation to a house and to the ground; Fig. 3, a sectional view of two sections at the joint; Fig. 4, a like view showing a coupling-tube connecting the sections, and Fig. 5 a plan view of the bracket for securing the rods to buildings.

The letters A and B designate the upper

and lower sections of my improved lightning-rod, and the letter C one of the several intermediate sections which compose, essentially, the length of the rod. These sections are all tubular, and are preferably made of copper. They are united together by reducing the diameter of one end of each section by means of a reducing or compressing tool. Thus a male portion is secured, and thus the contiguous sections are fitted together. It is necessary, however, to also lock them to each other. This is done by annularly bulging the female portion from the interior outwardly, thus leaving an interior groove approximately semicircular in cross-section and an outer bead, D, of like configuration, which lends somewhat of ornamentation to the completed tubular rod, and by annularly depressing the reduced or male portion from the exterior inwardly, thus leaving an exterior groove approximately semicircular in cross-section and an inner bead, E, which, while not obstructing the passage of the air-currents through the tubular rod, yet, together with the other bead, gives some lateral stiffness to the rod on account of the angle-iron action it affords. The two semicircular grooves also form an annular seat, round in cross-section, to receive the locking-wire F. The bent end *c'* of this wire is inserted through the holes *b* and *c* of the tubes, its bent end *c'* engaging with the inner periphery of the inner tube. The two sections of the tube are then revolved in opposite directions, and the wire, being drawn farther in by the inner section, bulges the metal of both sections, one outwardly and the other inwardly, and forms semicircular grooves, thus locking the two sections together. The method of forming this joint is the subject of a claim in my application renewed December 3, 1886, Serial No. 220,632, for a method of forming joints in sheet-metal tubes.

The tubular rod is secured to the building at intervals in any desired manner, as by the brackets hereinafter mentioned. The base of the point G is preferably spherical, as at H, and from the sphere extends a short tubular section connected with the upper rod-section by the joint already described. In this sphere H, or in some convenient portion of the rod,

by preference above the roof, a number of apertures are formed, while in the ground-section, a proper distance above the ground, are formed a number of influx-apertures. A draft
 5 of air naturally passes up the interior of the tubular sections, and as the ingoing supply constantly comes from near the earth, where nature has given the air a lower temperature, the temperature of the tubular rod is kept at the
 10 possible minimum without artificial reducing agencies. Thus the heating action of the sun is largely, if not wholly, resisted, and thus the maximum electrical conductive capacity of the metallic sections is secured. It will also
 15 be observed from Fig. 3 that shoulders occur at H, which make the contact between the sections more perfect, as the female sections abut against these shoulders, and which present a more finished exterior to the rod generally.

20 In Fig. 5 I illustrate the brackets by which the sections may be secured to houses, the same consisting of an open ring, I, having projections J, which have holes in their feet K to receive fastening nails or screws. The
 25 rings being open, admit of the projections being brought closer together and the tubes firmly clamped and held.

—In Fig. 4 I have shown a short piece of inner tubing to which the adjoining sections are
 30 locked by the joint already described; but in this instance the sections are not fitted one into the other. This tube is used in cases where another whole section added to or taken from the rod would make it too long or too short,
 35 and by cutting a section and using this short tube the joint can be made on the roof without the tool for compressing the end of a section.

40 Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A lightning-rod composed of a series of tubular sections, the contiguous ends of the respective sections being fitted the one into the other, and being respectively exteriorly 45 and interiorly bulged to form coincident grooves, a locking-wire fitted to said grooves, apertures in the lower or ground section near the ground to admit of an influx of air, and apertures in the upper section above the roof- 50 line to admit of the escape of the said air, whereby a draft is formed.

2. In a lightning-rod, the combination of a series of tubular sections, one end of each section being exteriorly reduced by compression 55 to form a part to fit into the other part, and each part being respectively exteriorly and interiorly bulged to form coincident grooves, and a wire fitted into said grooves to lock the parts together. 60

3. In a tubular lightning-rod, the combination of the upper tubular section, with a point having a spherical base, and a projecting tubular section fitted to said upper section and secured in the manner set forth, and having aper- 65 tures in the said spherical base.

4. In a lightning-rod, the combination of a series of tubular sections, one end of each section being exteriorly compressed to form a male 70 part to fit into the other part, and with a distinct shoulder against which that other part abuts, and each part respectively exteriorly and interiorly bulged to form coincident grooves, and a wire fitted into said grooves to lock the parts together. 75

In testimony whereof I affix my signature in presence of two witnesses.

EUGENE ORA DANIELS.

Witnesses:

A. A. YEATMAN,
 E. S. WALLACE.