H. W. SPANG.

Lightning-Conductor.

No. 196,493. Patented Oct. 23, 1877.

Fig. 1

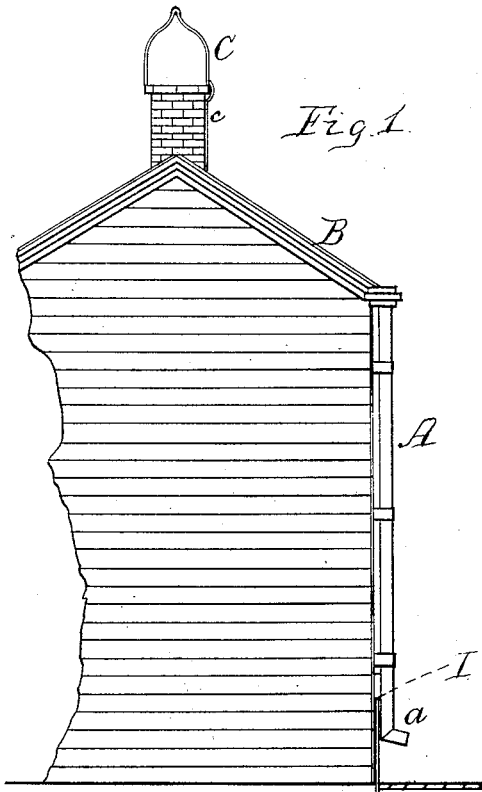


Fig. 2

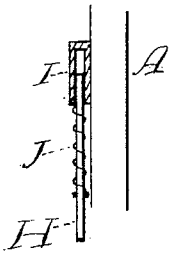
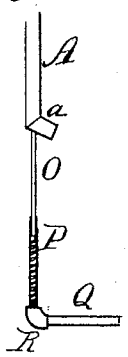


Fig. 3



WITNESSES:

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HENRY W. SPANG, OF READING, PENNSYLVANIA.

IMPROVEMENT IN LIGHTNING-CONDUCTORS.

Specification forming part of Letters Patent No. **196,493**, dated October 23, 1877; application filed July 31, 1877.

To all whom it may concern:

Be it known that I, HENRY W. SPANG, of Reading, in the county of Berks and State of Pennsylvania, have invented certain new and useful Improvements in Lightning-Conductors; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawing, and to the letters of reference marked thereon, which form a part of this specification.

My invention consists, first, in an improved earth-terminal for lightning-conductors, consisting of one or more plates of iron bent into a cylindrical, or other suitable and equivalent space-inclosing shape, and having their lateral edges separated, so as not to entirely surround the interior space, but leave a slit or opening, through which water may escape from said interior space and moisten the surrounding earth, said slit or opening also serving to facilitate the expansion of the terminal when water freezes therein; second, in the combination of the earth-terminal with a stationary metallic conductor, by means of a slip or yielding-joint device or devices, so that the earth-terminal can expand by water freezing therein, and also be moved by the frost in the earth during the winter season, and at the same time maintain a good electrical connection with said stationary metallic conductor; third, in the combination of a rain-pipe, or other metallic conductor, with a stationary metallic conductor, by means of a slip or yielding joint device or devices, so that the rain-pipe can readily expand or contract when exposed to excessive heat or cold, and at the same time maintain a good electrical connection with said stationary metallic conductor; fourth, in the combination of a metallic cap, placed over the opening of a chimney or ventilator upon the top of a building, with a lightning conductor or conductors, and employing said metallic cap as the air-terminal of said lightning conductor or conductors, for the purpose of intercepting a lightning-discharge and preventing it from entering the building.

The details of construction involved in my invention, and the operation thereof, will be fully explained in the following specification, with reference to the accompanying drawing, in which—

Figure 1 is a view, in elevation, of a building, with my invention applied thereto. Fig. 2 is a sectional view of the slip or yielding joint, by which a rain-pipe or other lightning-conductor is connected with a stationary metallic conductor, which connects said pipe or other lightning-conductor with an earth-terminal; and Fig. 3 is a modification of the same.

A is an ordinary metallic rain-pipe of suitable size and conductivity, and having its joints well fitted or soldered together, and it is also well connected with the metal roof B at the gutter *b* thereof. C is a suitable metallic cap, which covers the opening of a chimney or ventilator upon the top of a building, and is connected with metal roof B by a flat bar, *c*, or other suitable conductor.

It is a well-known fact that the heated air from a chimney, or vapor from new-mown hay in a barn, or ice in an ice-house, is frequently selected by a lightning-discharge as part of its path, and it is quite evident that any metallic cap which covers the opening from which the heated vapor or air escapes is a much better medium for intercepting the discharge, and preventing it from entering the building, than the ordinary air-terminal conductor or rod, which extends along and above the chimney, or a metallic conductor, which rests upon the brick-work of a chimney, but does not extend over the opening thereof.

D is an improved earth-terminal, and, as illustrated in the drawing, consists of a single plate of rolled iron, shaped in a cylindrical or other space-inclosing form, and having a slit or opening, *d*, through its entire length, so as to allow any water which may enter said terminal to escape and moisten the earth surrounding as well as beneath it. The said earth-terminal is more simple than the earth-terminal described in my patent dated September 7, 1875, and numbered 167,415, reissued January 4, 1876, and has the important advantage of fully providing for the expansion of the terminal by the freezing of water therein. The terminal may also be perforated, so as to allow a larger quantity of water to enter the sur-

rounding earth. The said terminal should be placed at a suitable distance from a building to permit a considerable area of earth to be moistened, and to prevent the foundation-walls of the building from becoming saturated with the water. Its top should be about six inches below the surface of the earth, in order that it may not be exposed to the sun in hot weather, and become so heated as to dry up the surrounding earth, and also that it may not be forced above the surface of the earth by frost in winter.

In order to prevent the earth from falling into the terminal D a rolled-iron frame or shield, E, formed like said terminal, but of greater diameter and shorter, is placed around the top thereof, but not in contact therewith. In the top of frame E an iron screen, F, is set, through which the rain and waste water, flowing along a gutter, G, can readily enter and fill terminal D and frame E, but the passage of trash therein will be prevented.

Connection between the rain-pipe A and earth-terminal D may be made by means of a single bar of iron of suitable conductivity, but in many cases it will be more convenient to employ two and even three separate conductors, well joined together.

To the rain-pipe A, above the lower or elbow portion *a* thereof, is secured a piece of iron or copper, I, having a hole, *i*, bored therein, as shown in Fig. 2. Into the said hole *i* an iron bar, H, or other suitable conductor, is inserted for a few inches, and fits snugly therein, thus forming a slip-joint between said bar and the rain-pipe. In order to improve the electrical connection between bar H and tubular piece I, a helical spring, J, is arranged between the lower end of the tubular piece I and a pin, *h*, which is set in bar H. Or said spring may be placed in the hole *i*, between the top of bar H and top of tube I. The bar or conductor H may be fastened to the wall of the building, and when the rain-pipe A is exposed to excessive heat or cold, and expands or contracts, the slip-joint, heretofore described, will allow said pipe to move up or down without breaking its electrical connection with bar H. The bar H also serves to hold pipe A in position.

To the earth-terminal D a conductor, K, is secured by means of bolts, which pass through the opening or longitudinal slit *d*, and a washer-plate, M, and said bolts, shown by N N, are secured by nuts *n n*. This arrangement permits the terminal D to be expanded by water freezing therein, and also to be moved upward or downward by frost, and at the same time maintain a good electrical connection with conductor K for a lightning-discharge.

The bar H, before mentioned, is bent so as to lap under bar K, as shown in Fig. 1, and the two bars are held in close contact by a tight-fitting sleeve, L.

In sections of the country where the winters are not severe it is not necessary to remove the lower or elbow portion *a* of the rain-pipe, on account of ice forming therein, and the modified arrangement of conductors shown in Fig. 3 may be used.

O is a round iron bar, attached to the foot of the rain-pipe, and fitting snugly in pipe P for about three inches. The horizontal pipe Q is connected by a suitable slip or yielding joint with earth-terminal D, and with pipe P by an ordinary elbow, R. In the vertical pipe P a helical spring, S, is placed, which serves as an additional electrical connection between conductor O and conductors P and R. Instead of connecting conductor O with the lower portion *a* of rain-pipe A, it may be connected by means of two or three branch conductors with that portion of rain-pipe A above the elbow portion *a*. The conductor O may be a pipe of same diameter as pipe P, and an adjustable rod may be set in pipe O and moved into or out of pipe P as desired, and thereby allow the lower portion *a* of the rain-pipe and conductor O to be readily removed from rain-pipe A, and replaced as desired.

I do not confine myself to any particular form of slip or yielding joint device or devices for maintaining connection between earth-terminal D and conductor K, or between rain-pipe A and conductor H; and, in order to prevent corrosion and maintain a good electrical conductivity at the joints, the interior of the slip-joint devices I and P, and the sleeve L, and the ends of conductors H, K, and O can be coated with copper or other suitable metal.

When two dissimilar metals, like copper and iron, are joined together and exposed to constant moisture, a chemical action and decomposition of metals take place; but if two pieces of iron well coated with copper or other suitable metal are in contact with each other, the chemical action caused by moisture is very small. As moisture, which is a good conductor of electricity of a high potential, generally exists at the joint between conductor K and earth-terminal D, there is no necessity for coating the parts of said joint with copper or other metal.

I do not confine myself to any particular form of cap for covering the opening of a chimney or ventilator. Should the roof of the building be composed of wood, slate, or other poor conducting material, the conductor *c* should be extended and connected with rain-pipe A, or, if necessary, with earth-terminal D.

Instead of a metallic cap upon a brick or wooden chimney or ventilator, a metallic chimney or ventilator may be employed as the air-terminal.

When the earth-terminal D is employed in sandy soils it is necessary to make the longitudinal slit or opening narrow, or else place suitable screens before or behind said slit or opening and the large perforations in the plate, so as to prevent the sand from running in and filling up the terminal.

The terminal D may also be composed of two or more similar sections, electrically connected, said sections to be about five feet long each, and to be joined together as they are

driven into the earth. The bottom section should be pointed, to facilitate driving into the earth, as should also a single section when such is used; but it may, of course, be placed in the earth in any convenient way.

When a sectional terminal is used the joints should be flush on the outside, so as to allow the earth to contact closely with the whole length of the terminal.

In driving the terminal into the earth I prefer to use a pointed device, which may be set in the lower opening of said terminal loosely, and when said terminal has been driven to a proper depth I propose to drive said pointed device farther and away from said terminal by means of a rod, so as to leave the bottom of the terminal open, in order that the water may flow freely therefrom into the earth.

Having now fully explained the construction and operation of my invention, I claim—

1. The earth-terminal D, composed of one or more hollow slitted sections, electrically connected with a lightning-conductor, substantially as described.

2. The combination of rain-pipe A and conductor H, when connected by a slip or yielding joint, substantially as and for the purpose set forth.

3. The slip or yielding joint, composed of socket I, spring J, and rod H.

4. The combination of shield or frame E and screen F with terminal D.

5. The combination of the metallic cap, covering the opening of a chimney or ventilator, with a lightning-conductor, for the purpose and substantially as set forth.

6. The combination of chimney-cap C, of metal rain-pipe A, and earth-terminal D, substantially as set forth.

In testimony that I claim the foregoing as my own invention I affix hereto my signature in presence of two witnesses.

HENRY W. SPANG.

Witnesses:
J. WARREN TRYON,
C. T. SELLERS.