

No. 855,300.

PATENTED MAY 28, 1907.

W. GIFFORD.
LIGHTNING ARRESTER.
APPLICATION FILED APR. 21, 1906.

Fig. 1.

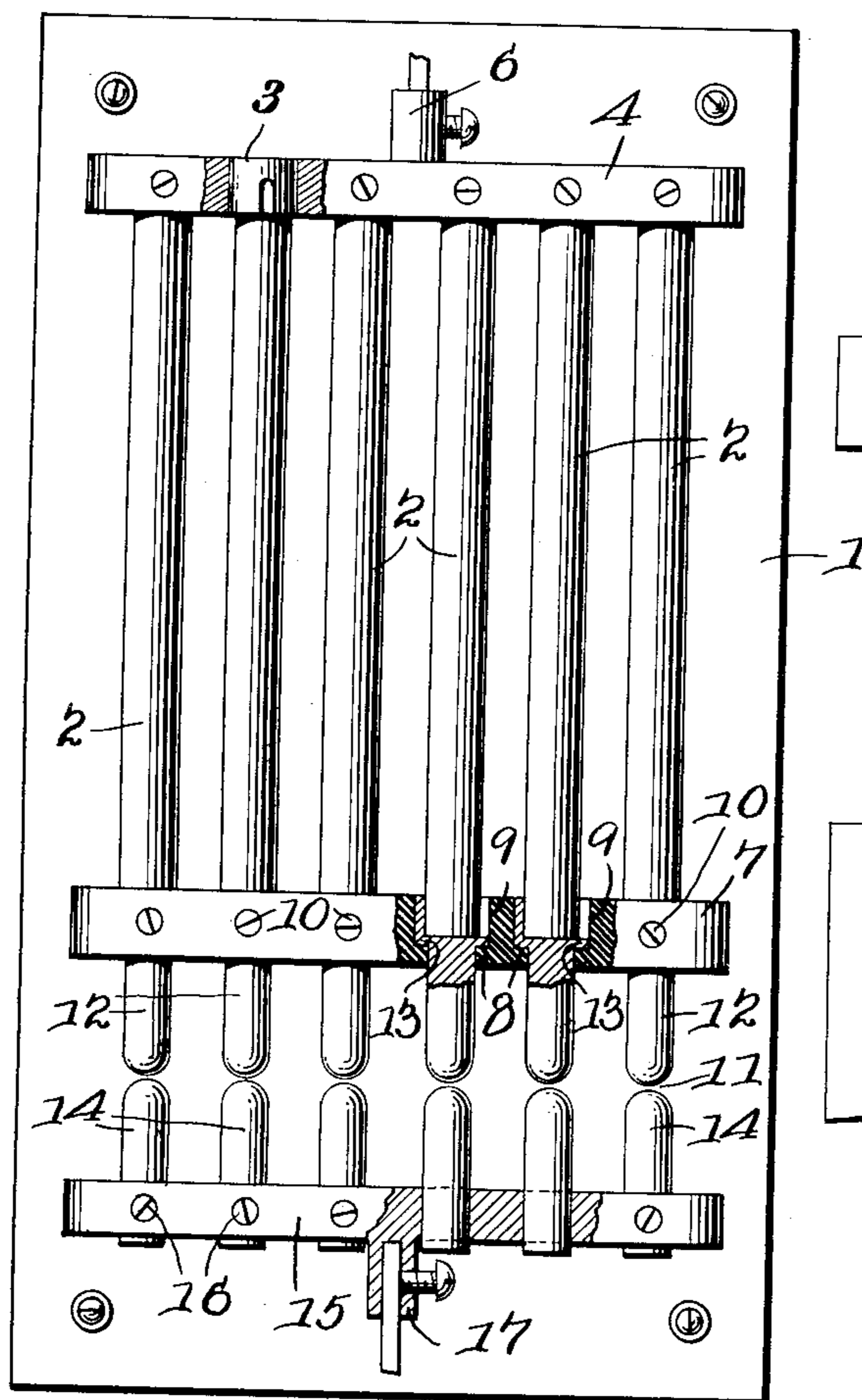


Fig. 2.

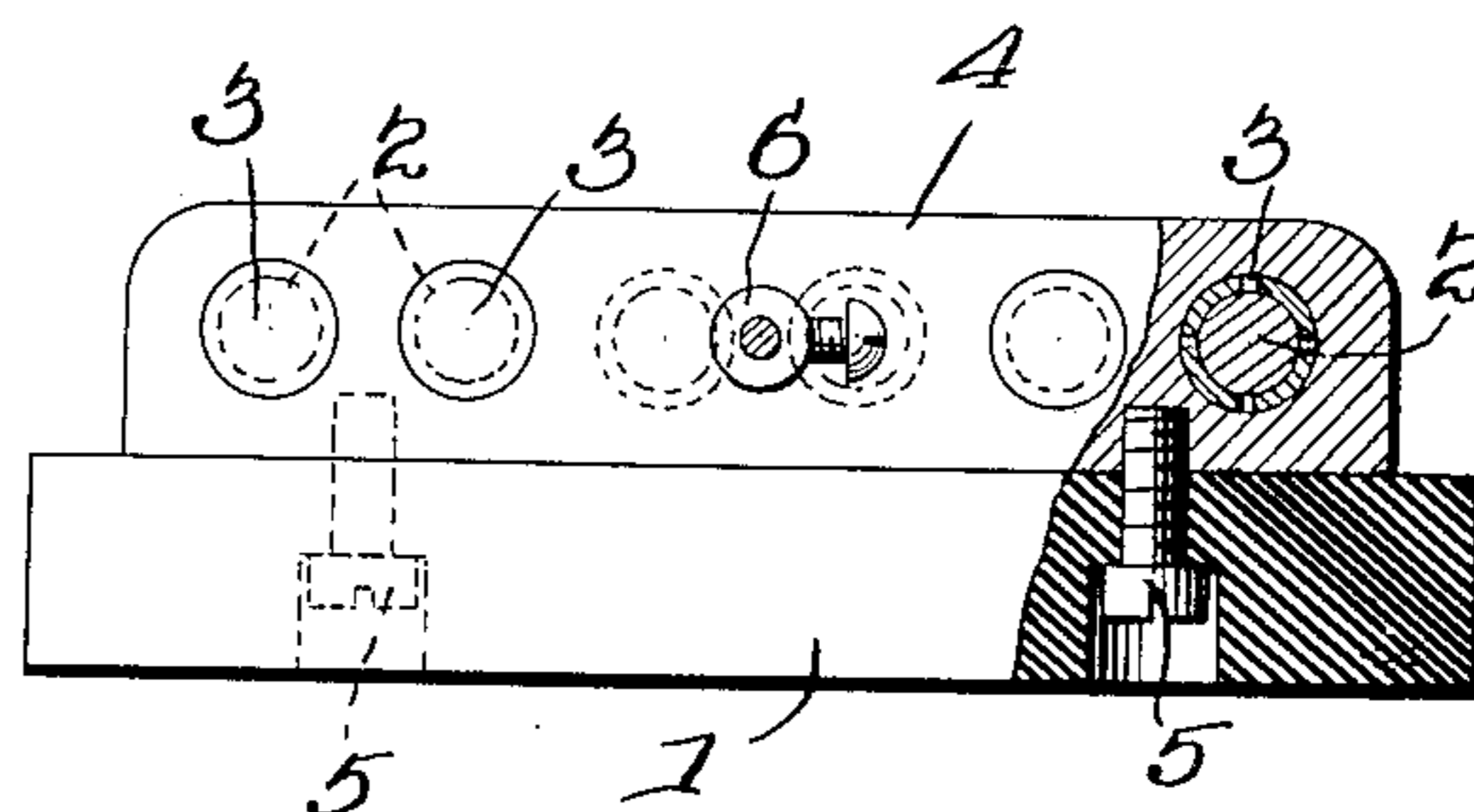


Fig. 3.

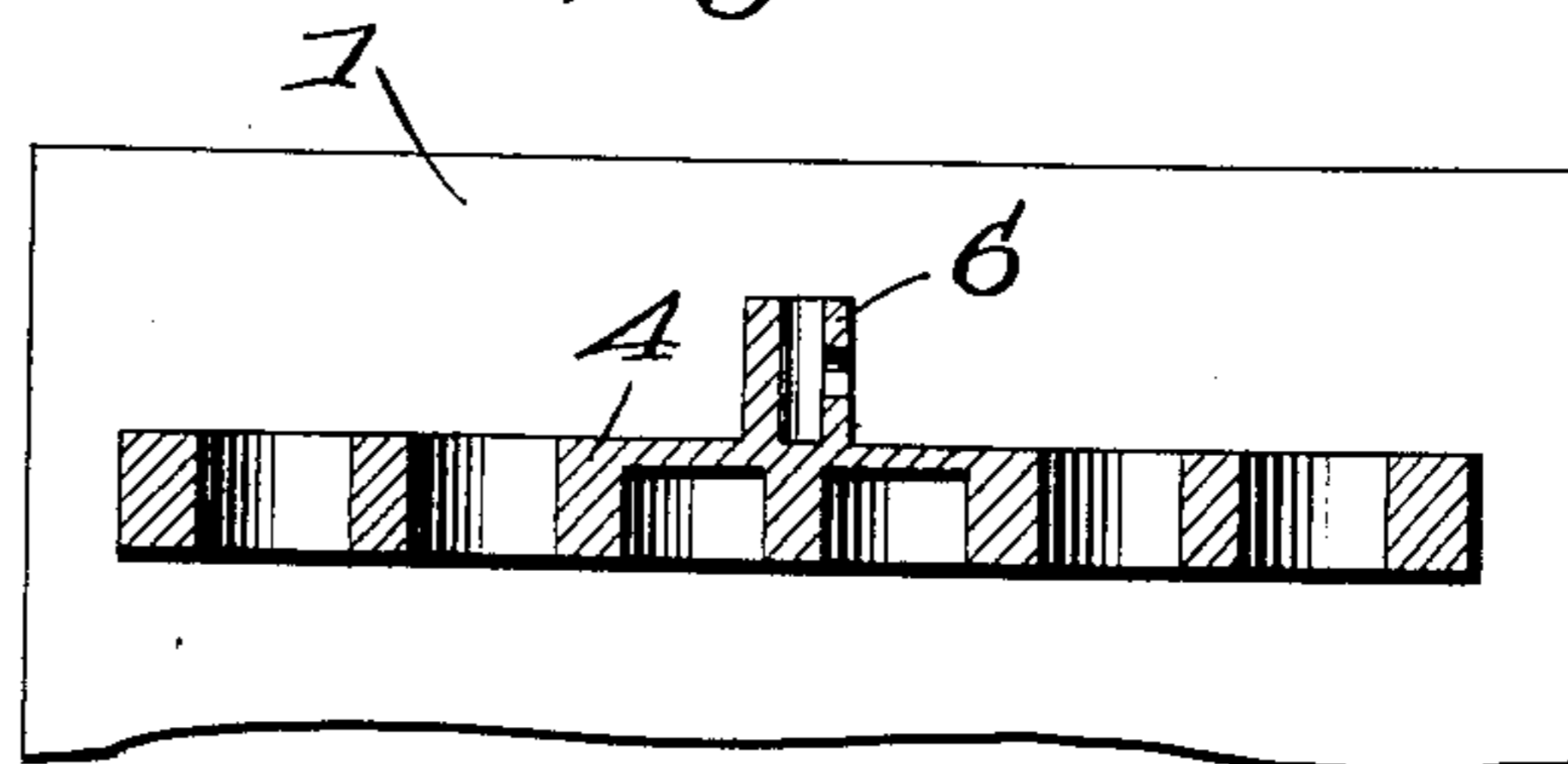


Fig. 4.

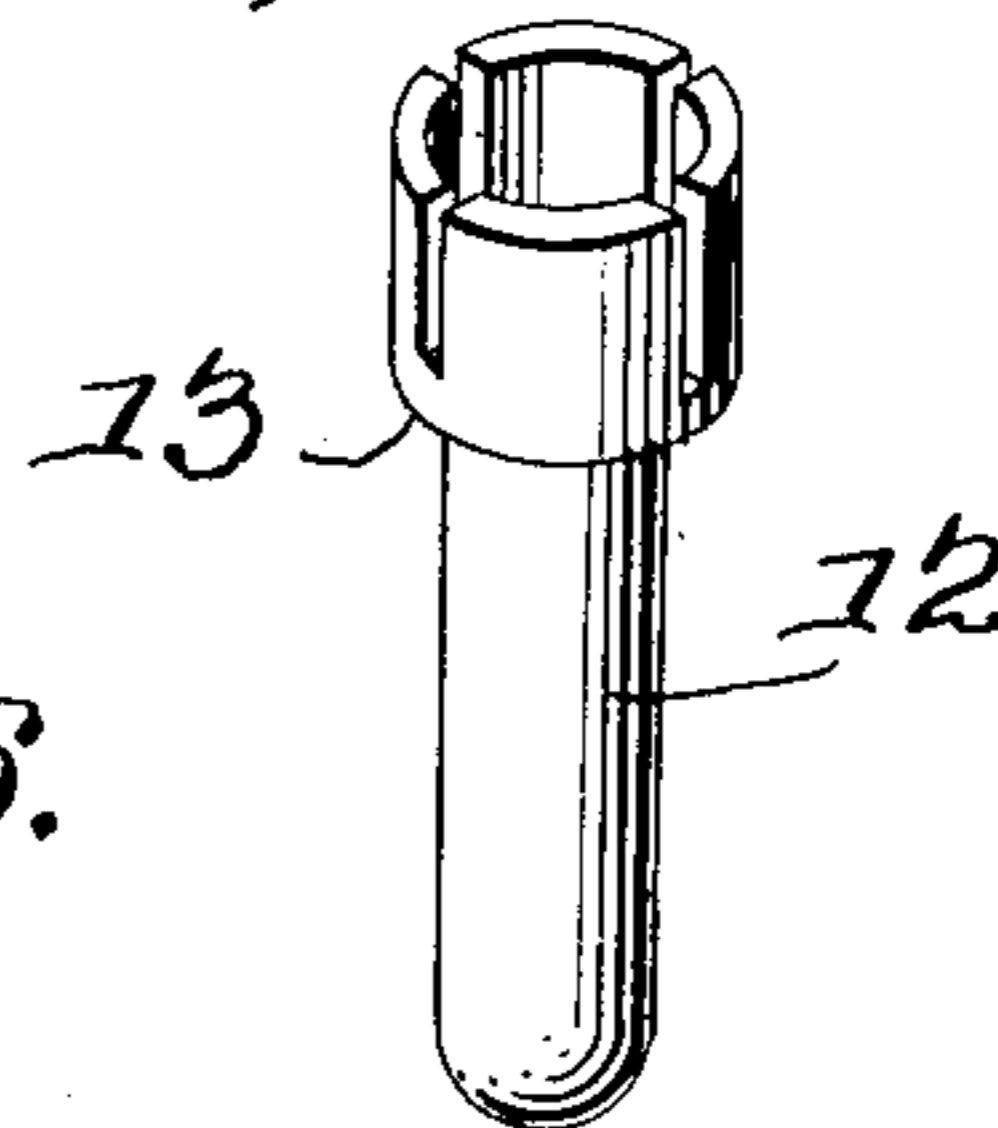


Fig. 5.

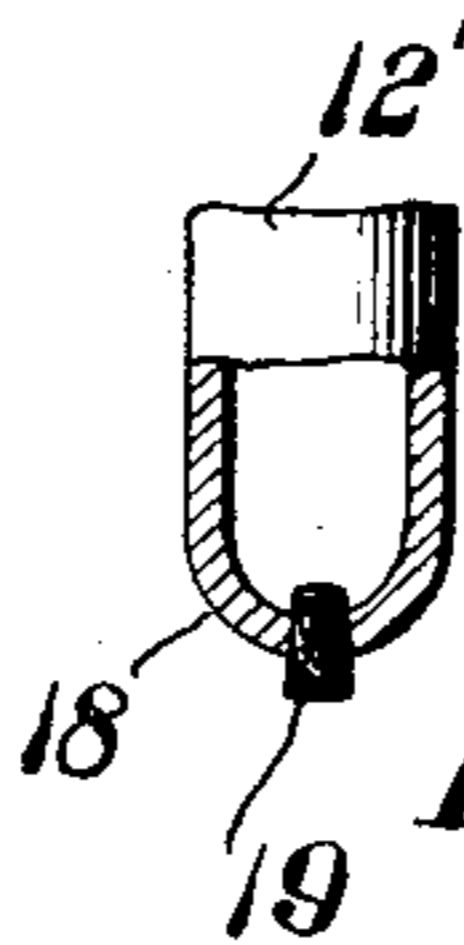
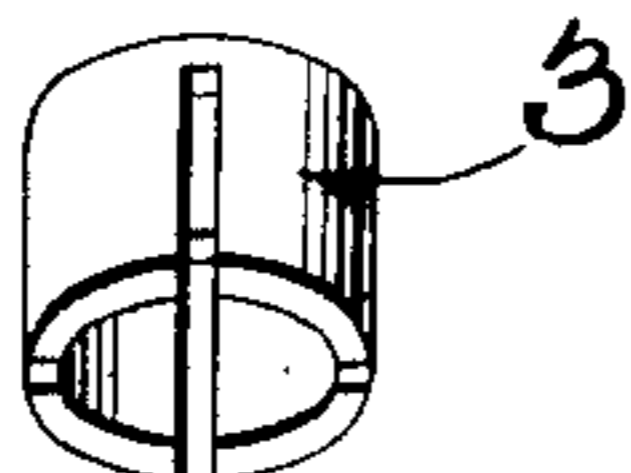


Fig. 6.

WITNESSES:

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WILLIAM GIFFORD, OF THOMPSONVILLE, MICHIGAN.

LIGHTNING-ARRESTER.

No. 855,300.

Specification of Letters Patent.

Patented May 28, 1907.

Application filed April 21, 1906. Serial No. 313,073.

To all whom it may concern:

Be it known that I, WILLIAM GIFFORD, a citizen of the United States, residing at Thompsonville, in the county of Benzie and State of Michigan, have invented a new and useful Lightning-Arrester, of which the following is a specification.

The present invention relates to protective devices for electric circuits, and relates more particularly to non-arcing, non-inductive lightning arresters of the type disclosed in the United States Letters-Patent No. 812,126 granted to me February 6, 1906.

The objects of the invention are to provide a construction employing set resistances of such material that the size of the arrester for a given capacity and the cost of manufacture can be materially reduced, while at the same time producing a highly efficient piece of apparatus. Or expressed in another way, in the same space occupied by an arrester of my former construction I am enabled to use a larger number of resistances and accompanying air gaps, so that the efficiency of the apparatus is materially increased.

With these and other objects in view, the present invention comprises a plurality of suitable resistance rods which are at corresponding ends mechanically and electrically connected to a metal cross piece or rack which serves at the same time as a means for supporting the rods on the insulating base. The opposite ends of the resistances are held in shouldered openings provided in a rack of fiber or other insulating material which also serves to secure them on the supporting base and insulates the lower ends of the resistance rods from each other so that the dividing charge cannot unite until after the spark gap is passed. For providing good electrical contact, the ends of the rods are covered with metal caps. The lower caps have attached thereto shanks of metal of good conducting properties, such as copper, or brass, rounded at their ends, and which serve to form one set of terminals of the air gaps. The tips of the terminals of the spark gaps may be bored out and fitted with carbon plugs. These plugs can be easily removed and replaced by new ones when they become damaged or worn, without having to take the arrester apart. The other set of terminals are shaped correspondingly, and like the first are of substantial dimension, so as to readily distribute the heat generated by the bridging arcs accompanying a static discharge. The lower

set of terminals are adjustably secured in a cross bar of brass or other metal, by which the arrester is connected to ground. By this arrangement the discharge passes directly from the line through the resistances by a number of parallel paths, thence through the air gaps and to ground.

For a further understanding of the invention, reference is to be made to the following description setting forth more fully the details of construction, and to the claims appended hereto.

In the accompanying drawings which illustrate one embodiment of the invention, Figures 1 and 2 are, respectively, a front view and plan of a lightning arrester with portions broken away. Fig. 3 is a longitudinal vertical section through the upper rack. Fig. 4 is a perspective view of one of the upper terminals of the spark gaps. Fig. 5 is a perspective view of the upper cap for the resistance rods. Fig. 6 is a detail view of a modified form of terminal for the spark gaps.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

Referring to the drawing, 1 represents the supporting base of slate or other insulating material, 2 the series of resistance sticks of suitable material, such, for instance, as graphite, which are provided at their upper ends with metal caps 3, slotted inwardly from their rims to spring over the ends of the sticks. These caps snugly fit in openings formed in the upper rack 4, which is preferably constructed of brass or other highly conducting material. This rack besides serving to connect the rods together mechanically and electrically, secures them to the supporting base by means of counter-sunk screws 5, as shown in Fig. 2, or otherwise. The upper rack is provided with a binding post 6 by which connection is made with the line of the electric circuit to be protected. The lower ends of the resistance sticks are seated in openings 9 of the rack 7 made of insulating material and secured to the base 1. By this means the resistance sticks are prevented from dropping from the racks should the clamping screw 10 become accidentally loosened. Below the resistance sticks are two sets of terminals separated to form spark gaps 11 arranged each in series with a resistance. The upper terminals 12 of these spark gaps are secured to the lower ends of the

sticks by means of caps that spring over the ends of the latter. The terminals are of metal, such as brass or copper, and are of smaller diameter than the caps so as to form shoulders 13 that engage the shoulders 8 in the fiber rack, so that they are positively prevented from dropping out of their supports and forming a short circuit with the lower terminals 14. These lower terminals are mounted in a metal bar or rack 15 which is provided with openings to receive the lower ends of the terminals, the latter being secured in place by binding screws 16. By this arrangement the lower terminals can be accurately adjusted to suit any given requirement. Formed on the lower rack is a binding post 17 to which the conductor leading to ground is secured.

According to the modified form of spark gap terminal, shown in Fig. 6, the terminal 12' is provided at its outer end with an opening 18 into which is fitted a plug 19 of carbon, or other suitable material. These plugs can be readily renewed when worn or damaged, and replaced by new ones, so that the terminals proper can be used indefinitely.

The operation of the apparatus is the same as that described in my patent hereinbefore referred to, and briefly stated is as follows:—
The static charge enters the arrester through the binding post 6 and is immediately distributed to the several resistance sticks, passing through the same in parallel paths and bridging several spark gaps and thence to ground. The terminals of the spark gaps being of substantial dimension and of good conducting material, a large current is permitted to pass without fusing the metal, so that the tips of the terminals do not rapidly wear away and tend to produce short circuits.

In practice I have found that six resistance sticks of a half inch in diameter and of about five inches in length operate satisfactorily for the circuits having a pressure of about eleven hundred volts. The resistance offered to the passage of currents tending to flow at such electro-motive force is sufficient to absolutely prevent the same, but at any rise in pressure above ten per cent. due to electro-static conditions, current will freely pass off to ground. I do not wish it to be understood, however, as limiting the invention to the employment of six resistance sticks, since by increasing the number within certain limits, the efficiency of the apparatus is also increased.

In accordance with the provisions of the patent statutes I have described the principle of operation of the invention, together with the apparatus which I now consider to be the best embodiment thereof, but I desire to have it understood that the construc-

tion shown is merely illustrative and that the invention may be carried out by other means.

What I claim as new and desire to secure by Letters Patent of the United States is:—

1. A lightning arrester, comprising an insulating base, resistance elements mounted thereon, a metal rack which secures the elements to the base and is connected with the elements to distribute the electric charge thereto, and a series of spark gaps secured to the base in coöperative relation to the resistance elements.

2. A lightning arrester, comprising an insulating base, a plurality of resistance elements, a metal rack engaging corresponding ends of the elements for securing the same to the base and distributing the electric charge thereto, a series of spark gaps arranged in coöperative relation to the elements, and a rack of insulating material secured to the insulating base which forms the sole support for one set of terminals of the spark gaps and the opposite ends of the resistance elements.

3. A lightning arrester, comprising an insulating base, a plurality of resistance sticks, a metal rack engaging one end of the elements for supporting them on the base, a rack of insulating material secured on the base which is provided with shouldered openings with which the opposite ends of the resistance elements engage, a series of spark gaps arranged on the base in coöperative relation to the resistance sticks, one set of terminals thereof being provided with shoulders which engage the shoulders on the rack of insulating material for securing the said terminals in place, and a ground connection for the other terminals of the spark gaps.

4. A lightning arrester, comprising an insulating base, a metal rack secured thereto, which is provided with a plurality of openings, a plurality of resistance elements, caps on corresponding ends of the elements that engage the openings of said rack to provide an intimate electrical connection between the latter and the elements, an insulating rack on the base having shouldered openings whose shoulders receive the opposite ends of the resistance elements, combined caps and terminals provided with shoulders that engage the shoulders of the openings in said insulating rack, terminals disposed opposite the first mentioned terminals to form air gaps, and a ground for the latter terminals.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

WM. GIFFORD.

Witnesses:

E. M. DIXON,

W. M. HALLACK.