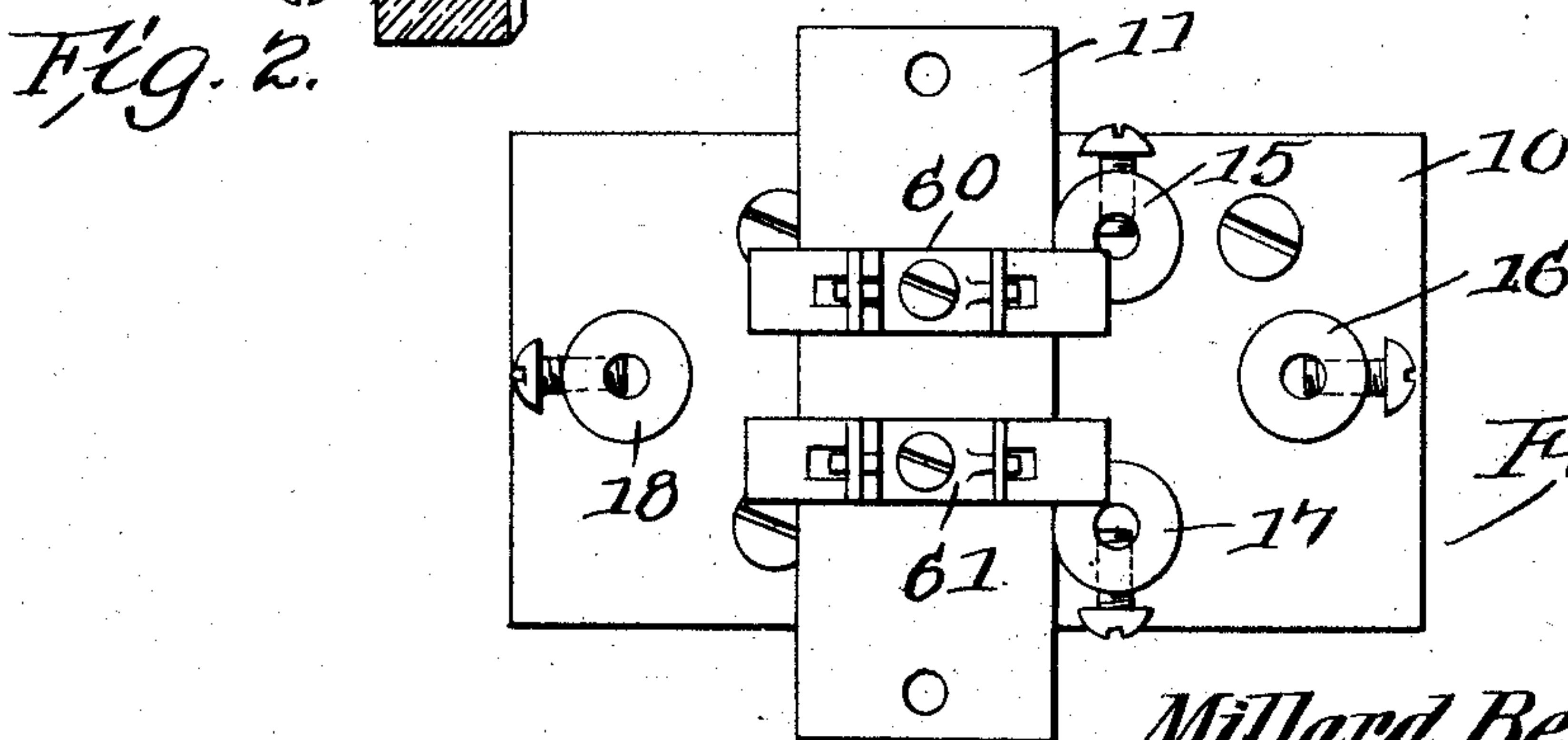
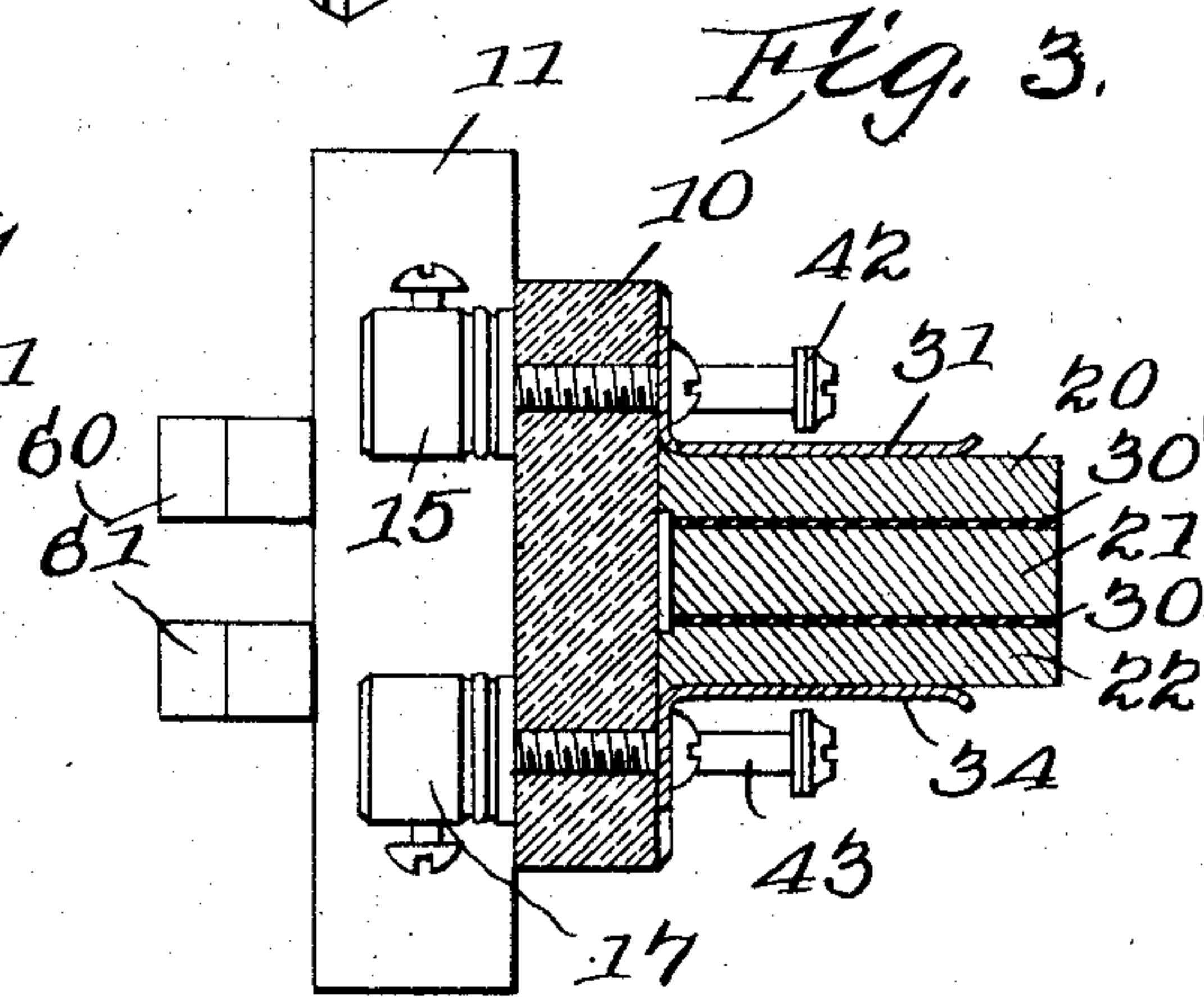
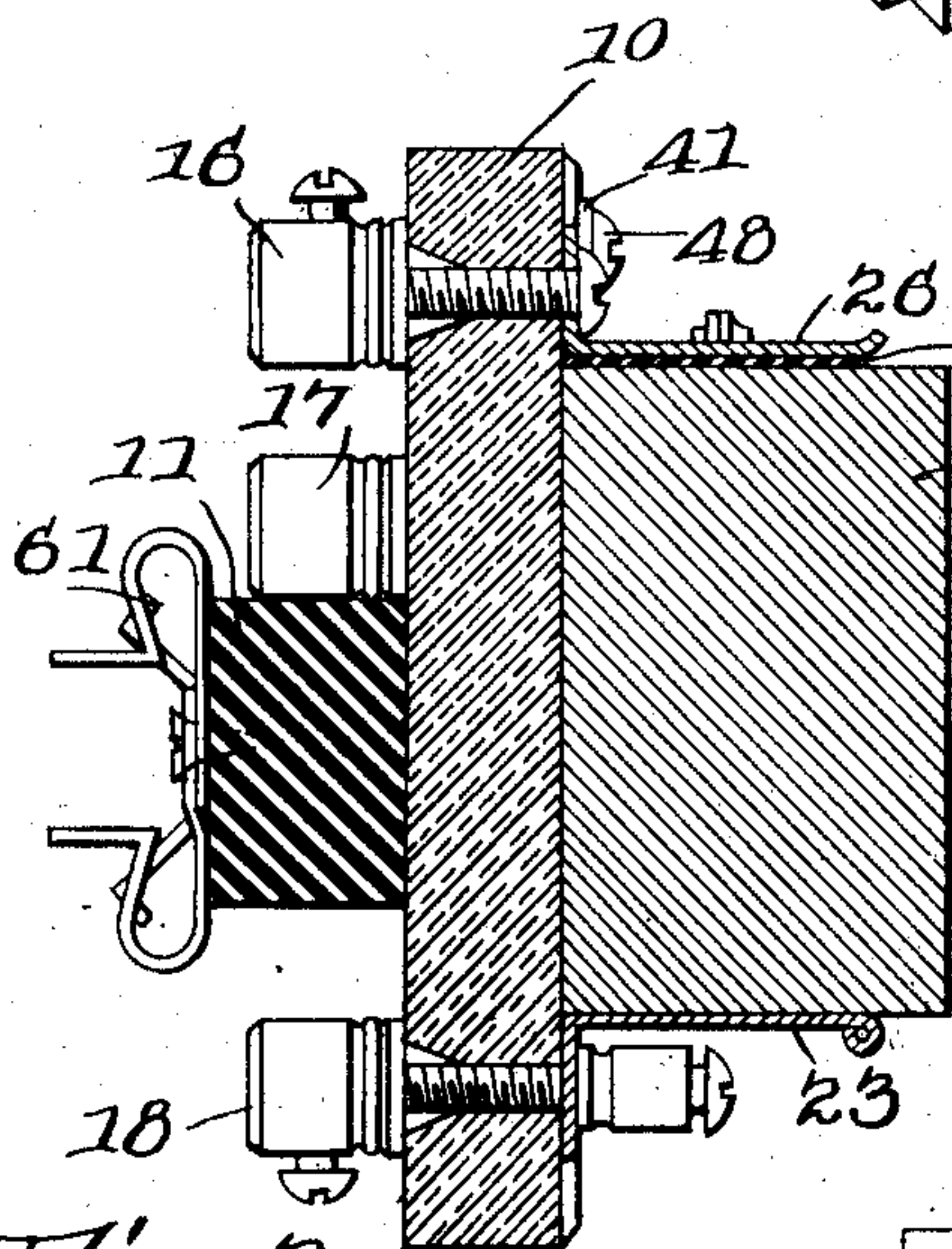
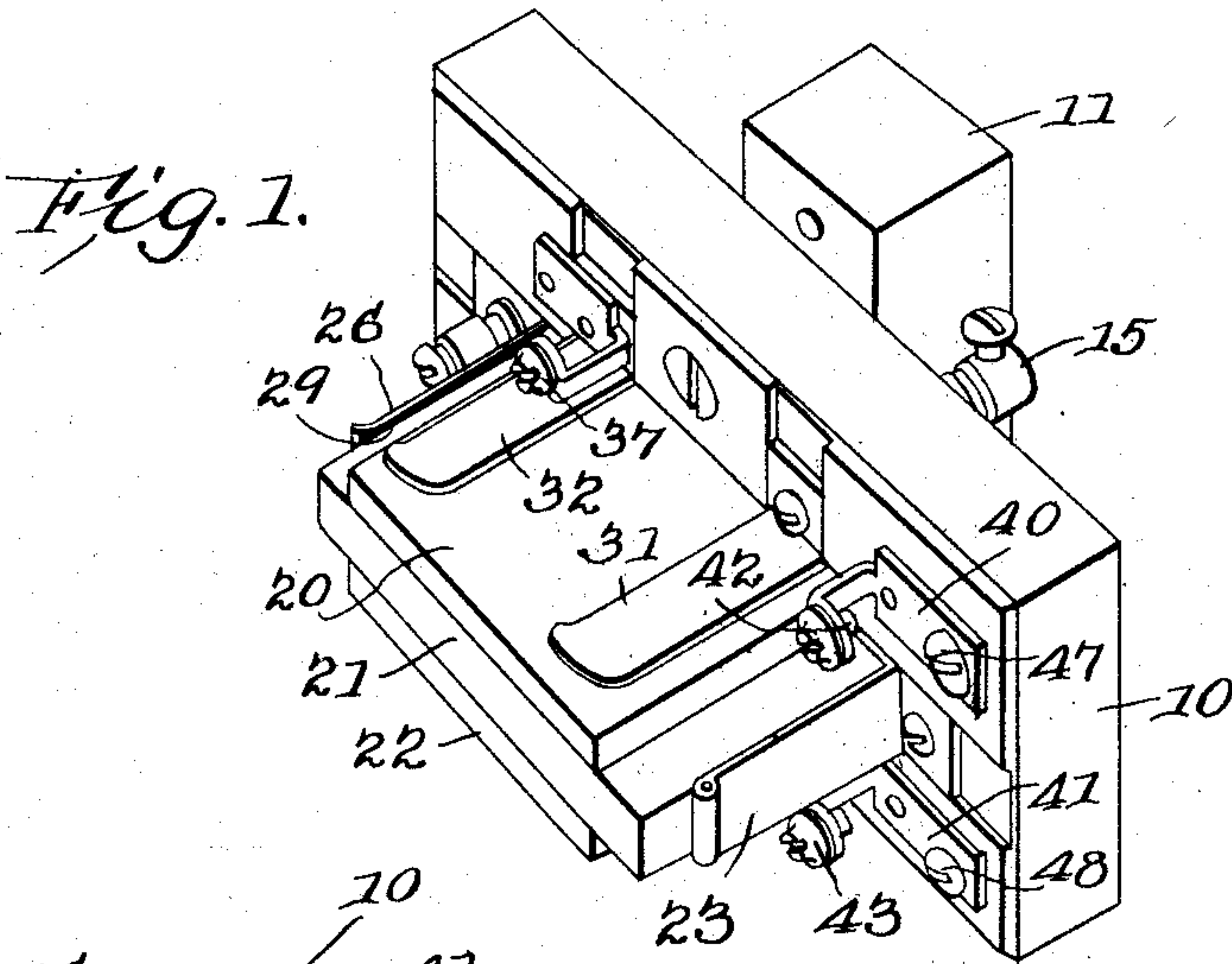


No. 883,280.

PATENTED MAR. 31, 1908.

M. BERRY.
LIGHTNING ARRESTER.
APPLICATION FILED OCT. 18, 1906.

2 SHEETS—SHEET 1.



WITNESSES:

E. H. Stewart
W. E. Parker

Millard Berry,
INVENTOR.

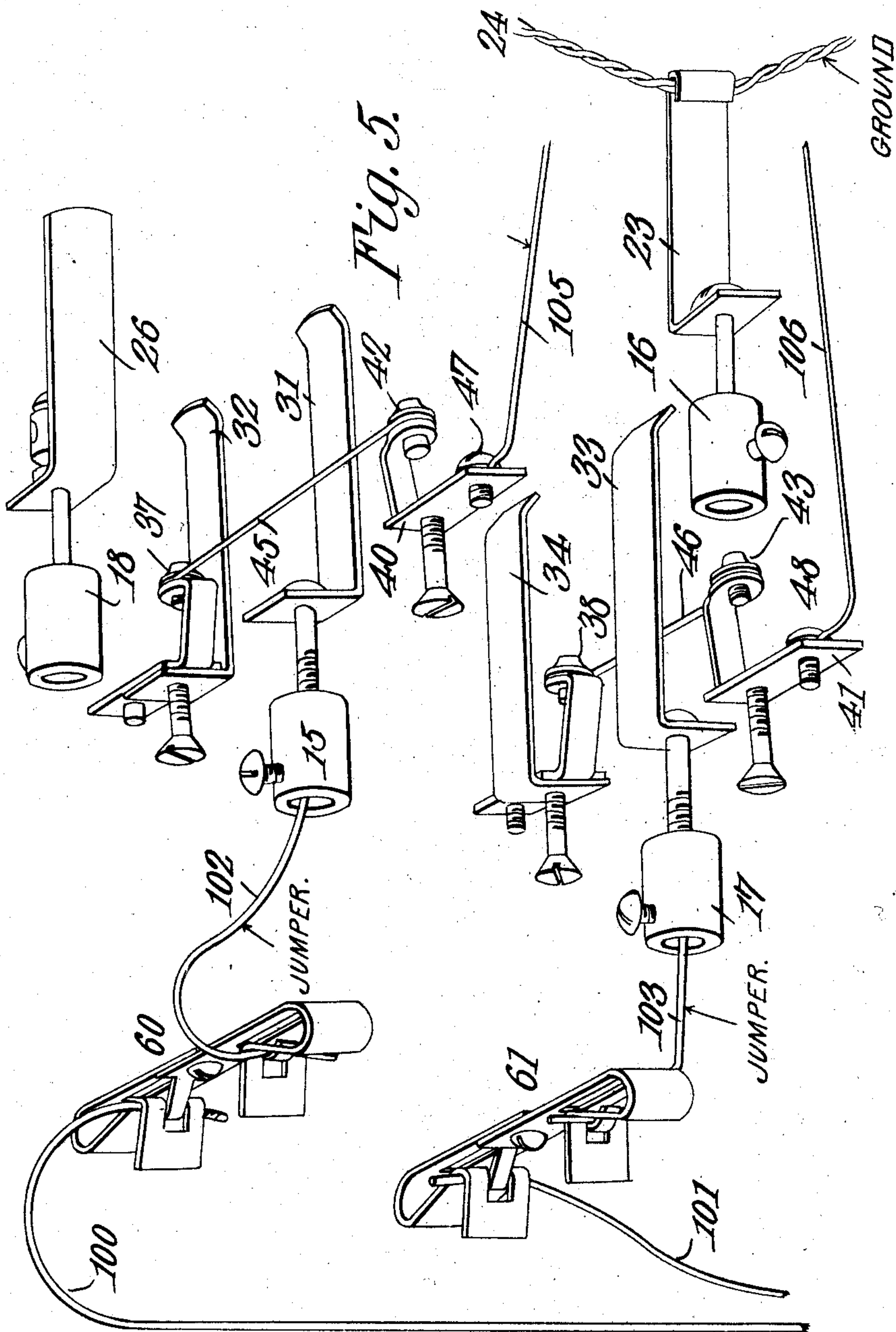
By *C. A. Snow & Co.*
ATTORNEYS

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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

MILLARD BERRY, OF FAYETTEVILLE, ARKANSAS.

LIGHTNING-ARRESTER.

No. 883,280.

Specification of Letters Patent.

Patented March 31, 1908.

Application filed October 18, 1906. Serial No. 339,567.

To all whom it may concern:

Be it known that I, MILLARD BERRY, a citizen of the United States, residing at Fayetteville, in the county of Washington and State of Arkansas, have invented a new and useful Lightning-Arrester, of which the following is a specification.

This invention relates to lightning arresters for electrical instruments, and is intended more especially for the protection of telephones and telephone switchboards.

The principal object of the invention is to provide an arrester which may be conveniently and economically used as part of a distributing board, and which is of such construction as to permit ready connection of the cable or line wires, the common return wires and ground wires, as well as the jumper wires, bridle wires or cross-connecting wires, from the rear face of the insulating base of the arrester, and is intended for use on any convenient form of lightning arrester mounted on a base of porcelain, slate, glass, rubber, fiber or other insulating material.

A further object of the invention is to provide a lightning arrester mounted on a base, or block of nonconducting material, and provided at the front with means for diverting static or other dangerous currents of electricity, especially of lightning and currents induced thereby, to the ground, and provided at the rear face of the insulating base with binding posts, clips, screws or other suitable connections to which the wires may be secured.

A still further object of the invention is to improve the efficiency and convenience of the lightning arrester, and to adapt the same for use as a combined protector and cross connecting device on a distributing board, or rack, in any central telephone office using either full metallic circuits, common return circuits or grounded circuits, or any combination thereof on the same board or rack.

A still further object of the invention is to provide a new, novel, convenient and useful means for compactly connecting the line wires, the line carbon blocks, and the fuses or fuse strips, in series on the same base and without the necessity of enlarging the base, and without danger of "crossing," "shorting" or "grounding" the lines or circuits at the arrester, which is accomplished in this invention by placing binding posts for line wires on the back, or rear face of the insulating base of the arrester, and making the cir-

cuits thence through said base block from its rear face to and through the line carbon blocks on the front, and thence to and through the fuses, all of which is hereinafter more clearly set forth.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in certain novel features of construction and arrangement of parts, hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in form, proportion, size and minor details of the structure may be made without departing from the spirit, or sacrificing any of the advantages of the invention.

In the accompanying drawings:—Figure 1 is a perspective view, looking from the front of a lightning arrester constructed, arranged and assembled in accordance with my invention. Fig. 2 is a sectional plan view of the same, and the arrester in reversed position. Fig. 3 is a transverse sectional view of the arrester. Fig. 4 is an elevation looking from the rear of the block after the same has been attached to the frame of a distributing rack. Fig. 5 is a diagram of the wiring for a full metallic circuit.

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

As adapted for use on a distributing or cross-connecting board or rack, combined with its use as a protector against lightning or other currents of electricity of either high or low potential dangerous to the coils and wires of a telephone switchboard, the main parts of the lightning arrester are supported on a suitable base plate, 10, that is formed of porcelain or other non-conducting material, there being one of these arresters for each incoming subscriber's circuit, or for each drop on the switch board. Each base plate is secured by screws or otherwise to a vertically disposed bar, 11, that preferably is formed of wood, though it may be of any suitable non-conducting material, which bar, 11, and as many others as needed to hold the required number of arresters constitute a part of the distributing board, the bars 11 being fastened to the frame of the distributing board so that they may be adjusted laterally to accommodate the lacing, or "fanning out" of cables of various sizes. The vertical strip or bar 11 is comparatively

narrow, so that it will engage with only a portion of the rear face of the base 10, leaving a relatively large surface area at either side of the strip 11, to which exposed surface areas are attached, and from which project, binding posts 15, 16 and 17 on one side of the strip, and a single binding post 18, on the other side of the strip, these binding posts, or similar connections so placed on the rear face of the base plate serving to engage the various conductors hereinafter described.

At the front of the insulating base 10, are arranged the usual number of spring clips which serve as supports for carbon plates 20, 21, and 22. One end of the central plate 21 which is somewhat longer than the other plates as such arresters are now made, is in engagement or contact with clip 23, that is connected to a wire 24, as shown in Fig. 5, extending along and connected to the corresponding clips on all of the arresters on the bar 11, and running to the ground, this clip 23 being electrically connected through the base plate 10 to the binding post 16, through which the return side of the circuit from the switchboard may be grounded most conveniently by connecting post 17 and post 16 across the rear face of the base plate when the arrester is being used in a grounded circuit. The opposite end of the carbon plate 21 is held in place by a spring clip 26 that is to be connected to all of the similar clips carried by one of the bars 11, and to the proper common return wire where the telephone system is provided with one or more common return wires for either all or any number of the circuits. This clip 26 is electrically connected to the rear binding post 18 on the back of the base plate 10 by a conducting connection passing through the base, and to which post 18 the return side of the circuit from the switchboard may be connected if the arrester is to be installed in any circuit using a common return wire, the said return side of the circuit from the switchboard first passing to 48, the circuit continuing thence to 41, 43, through fuse to 38, spring clip 34, carbon 22, spring clip 33, and thence to post 17, and thence to post 18 either by way of a jumper and clip 61 or directly across the back of the same arrester to post 18, or to any other post connecting to the proper common return wire by means of bridge wires or cross connecting wires, the necessary cross connecting wires being run to the various common return wires of the system, should there be more than one common return wire, a multiplicity of independent, separate and distinct common return wires being possible, practical and convenient in connection with this invention, and is advisable in practice as a precaution against "cross talk" and other disturbances incident to a congested common return. It is here observed that this arrester

is provided with a plurality of connecting means, and circuits which may be thereby formed within itself so that a single type of arrester may be used for all metal or full metallic circuits, grounded circuits, or common return circuits, or any combination thereof.

To make the foregoing connections possible with the style of arrester shown on the drawings submitted, the clip 26 is held from electrical contact with the central or ground carbon plate 21, by means of a strip of insulating material 29, formed of mica or other suitable material, to prevent grounding the common return wire where it is desirable to use an entirely aerial return. The carbon plates 20 and 22 are held from electrical contact with the central ground plate 21 by the usual method of inserting narrow, thin strips of mica between them while the carbon plate 20 is pressed in the direction of the central plate 21 by means of the spring clips 31 and 32, while clip 31 according to my invention is electrically connected through the base of the arrester to binding post 15 located on the rear face of the base plate. The lower carbon 22 is pressed toward the central plate 21 by means of the usual pair of spring clips 34 and 35, of which the clip 34 according to my invention is electrically connected through the base of the arrester to binding post 17 located on the rear face of the base plate. The clips 32 and 33 are also provided with the usual fuse holding screws 37 and 38 respectively, for holding what is known as the Postal style of fuse, although for the screws the usual shackles or spring clamps for holding what is known as the Western Union fuse may be substituted, or any holder for securing any other fusible device may be substituted.

At the front of the base plate is arranged a pair of metallic plates shown on the drawings as 40 and 41, carrying the usual fuse holding screws shown as 42 and 43, or the shackles or clamps or other fuse holding device which are connected by fuses 45 and 46 respectively, to similar fuse holding screws 37 and 38, shackles, clamps or such other fuse holding device as may be preferred. These plates 40 and 41 are further provided with binding screws 47 and 48 to which the wires of the switchboard cable or the cable connecting the switchboard with the distributing board may be fanned out and numbered, the two wires forming each circuit or line being connected to the plates by means of the binding screws 47 and 48 and thence through fuses 45 and 46 to spring clips 32 and 34 and thence to and through carbons 20 and 22 to spring clips 31 and 33 and thence through base of arrester to binding posts 15 and 17 and thence to the desired line, common return, or ground connections by means of cross-connecting wires from binding posts

15 and 17 across the rear face of the arrester forming the distributing board, frame or rack.

The most simple form of electrical connection and circuit through the parts described is where a leading in wire connects from one end of clip 60 on rear of bar 11 with binding post 15, and thence through base plate to clip 31, thence to and through carbon block 20, clip 32, fuse 45, plate 40, switchboard conductor 105 to the switchboard, and back from the switchboard over conductor 106, a second plate 41, fuse 46, clip 34, carbon plate 22, clip 33, binding post 17, one end of clip 61 on bar 11 immediately in the rear of the arrester and out through wire 101, each side of the circuit connecting the line carbon blocks 20 and 22 in series with the fuse named, so that any current of high potential such as that generated by a lightning stroke, encountering the counter electro-motive force generated by the switchboard instruments will pass from the block 20 or 22 to the block 21 over the intervening gap formed by the mica plate 30 and thence to the ground since, as is well known, the resistance offered by such gap to the high potential currents generated by lightning strokes is far less than that offered by the counter electro-motive force of the instruments protected. Should, however, a heavy current, such as might come from the crossing of a lighting circuit with the telephone circuits, pass, the instruments will be protected by the fuse 45 or 46. This invention, however, contemplates further, a simple means for connecting the street or leading in cables or wires with any desired lightning arrester in the system and its corresponding switchboard drop, and the return side of the switchboard drop to any desired common return wire in the system or to the ground, all by means of removable and changeable bridle wires, jumper or cross connecting wires, all within the limit of the space occupied by the rear faces of all the arresters installed; and for this purpose metallic clips of any suitable design, or two-way binders shown on drawings as 60 and 61, are secured in pairs to the rear face of the bar 11, there being a pair of such clips, or binders, for and at the rear of, each lightning arrester.

When an all metal circuit is used in the system the street, or leading-in cable is "fanned out" so that a pair of conductors will be connected to one side of the clips 60 and 61, while the opposite ends of the clips 60 and 61 are to be connected to the binding posts 15 and 17, or they may be connected to the corresponding binding posts on the back of any other lightning arrester on the distributing board bearing the number it is desired to give the subscriber, thus simplifying the switchboard connections and the process of connecting any incoming line to any desired number on the switchboard, the lightning

arresters on the distributing board being numbered consecutively and connected to corresponding numbers on the switchboard.

When it is desired to use a grounded line, the line wire leading in from the street should be connected to one of the clips only on the rear of bar 11, the upper, or 60, being preferably, while the opposite side of the clip 60 may be connected to binding post 15 of any lightning arrester on the system bearing the number which it is desired to give the subscriber on the ground line being brought in, while post 17 of the same arrester is connected by jumper wire corresponding to 103 in the drawings to any ground post 16.

When a common return circuit is being installed, the line wire leading in from the street would be connected to one of the clips only on the rear of bar 11, the upper, or 60, being preferable, while the opposite side of the clip 60 may be connected by wire 102 to binding post 15 of any lightning arrester on the system bearing the number which it is desired to give the subscriber on the common return circuit being brought in, while post 17 of the same arrester is connected by jumper wire corresponding to 103 in the drawings, to any common return post 18 connected to the particular common return wire which reaches the subscriber's station.

The arrangement of the circuit as connected for a full metallic return is illustrated in Fig. 5. While but one lightning arrester is shown in this figure, it is to be understood that in practice several lightning arresters, of which there is one for each subscriber, are mounted on the vertical strips 11, each strip carrying twenty-five, more or less, arresters, and these being arranged in comparatively close relation, so that bridle or jumper wire connections may be made between them.

The construction of the arresters is such that various forms of connections may be readily made. For instance for a full metallic circuit between the subscriber and the switchboard, the wires of the street cable will be fanned out, and the two wires belonging to any given subscriber will be soldered or otherwise connected to the clips 60 and 61. These two wires are designated 100 and 101 in the present instance, in order that the circuit may be traced. Each of the blocks bears a number, but if the number of the block to which the straight wires are connected is not the same as the subscriber's switch board number, jumper wire connections must be used to connect the block to the one bearing a number corresponding to that of the switch board jack. Two wires, therefore, are led from the clips 60 and 61, the wire 102 being connected to the upper clip and extending to the binding post 15 of the block bearing the proper switchboard number, while wire 103 extends between the clip 61 and the binding post 17. At this

switch board block the switchboard cable is fanned out and the two wires 105 and 106 belonging to the subscriber are connected, respectively, to the screws 47—48. This completes a circuit which may be traced from the subscriber's leading-in wire 100 to clip 60, jumper 102, binding post 15, clip 31, carbon block 20, clip 32, fuse screw connection 37, the fuse, fuse screw connection 42, its base plate 40, binding screw 47, wire 105, to the switchboard. The return wire 106 from the switchboard leads to screw 48, base plate 41, fuse screw connection 43, the fuse, clip 34, carbon block 22, the clip 33, binding post 17, jumper wire 103, clip 61, to the wire 101 of the street cable, thus completing a full metallic circuit.

If the number of the block to which the street cable is connected should correspond to the subscriber's switchboard number, a shorter jumper wire connections are simply made between the clips 60—61 and posts 15 and 17 of the same block. The line is protected in this case by the connection between the central carbon block 24 and the clip 23 or 26. Either one of these clips is connected directly to ground, and either may be used as a common return for other wiring systems, in which instance the insulating strip 29 is placed between it and the end of the carbon block.

If the subscriber's line is on a common return and only one wire comes in from the street cable that wire, 100, is connected to the upper clip 60, the lower clip 61 not being used. If the number of the block to which the street wire is connected differs from his switchboard number, it is necessary to run a jumper wire which in this instance may be the wire 102 from the opposite end of the clip 60 to the binding post 15 on the rear face of the arrester of the proper number, and this completes the circuit in the manner heretofore described to the wire 105 of the switchboard cable to the switchboard, thence back through wire 106 from the switchboard to the binding post 17, from whence a jumper or cross connecting wire leads to any binding post 18 which latter, in this instance, is connected to the common return wire, while the clip 23 of this binding post is insulated from the carbon block 21 of the arrester, the clip 26, in this instance, being grounded. Again the subscriber's wire which comes in from the street cable may be a ground circuit in which case only one line wire 100 is connected to the clip 60 as before described, clip 61 not being used. This subscriber's wire is connected to the proper arrester corresponding to his switchboard number, and the circuit is completed to the switchboard in the manner before described through wires 105, 106, fuses, etc., back to the binding post 17. A jumper wire is then run through the binding post 17 to the ground post 16 on the rear

face of the same arrester, this post being connected to ground as before described.

This lightning arrester is particularly adapted for use in connection with telephone switchboards since no change in the leading in wires is necessary and much time may be saved in making the necessary connections and changes of connections which will occur from time to time as the subscribers change.

No claim is made generally to the use of the three-block type of lightning arrester or to the use of fuses for taking care of heavy currents in connection with a lightning arrester of the type necessary for protecting the instruments against alternating currents of high potential such as generated by lightning discharges. By, however, mounting such protecting device upon one side of the insulating base and carrying the circuit-terminal-receiving means out from the other side of the base all the circuit-receiving terminals are made readily accessible, so that while means are provided for protecting the instruments from damage various changes of circuit may be made without trouble.

I claim:—

1. In an apparatus of the class described, a base plate of insulating material, an insulating strip to which said base plate is secured and from each side of which the base plate projects, a lightning arrester carried by said base plate on the side remote from the strip, connections between the terminals of the lightning arrester through and to the rear of the base plate, wire connecting means forming the terminals of said connections, and wire clips carried by the insulating strip at a point adjacent to the rear of the base plate.

2. In an apparatus of the class described, a distributing board frame including a vertically disposed strip of insulating material, a base plate also formed of insulating material and secured to the front of the strip and having end portions of its rear face projecting beyond the edges of said strip, metallic clips secured to the front of the base plate, wire connecting means accessible from the rear face of the base plate and connected to said clips, other metallic clips secured to the front of the base plate, fuse connections carried by said last-named clips on the front of the base plate, other fuse connections also carried on the front of the base plate, a plurality of carbon blocks held in place by the clips and insulated from each other, and wire clips carried by the insulating strip at a point adjacent to the rear of the base plate.

3. In apparatus of the class described, a base plate of insulating material, a set of carbon blocks thereon insulated one from the other, metallic clips engaging the ends of one of the blocks and located near the ends of the base plate, wire receiving means on the rear face of the base plate near the ends thereof

and electrically connected through the base plate to the clips, a pair of clips engaging each of the other carbon blocks at points near the ends of the respective blocks, one of
5 said clips carrying a fuse support, a wire receiving means at the rear face of the block for each other one of the last-named pairs of clips, said wire receiving means being electrically connected through the base to the
10 respective clips, and other fuse supports upon the face of the base plate.

4. In apparatus of the class described, a distributing board frame including a vertically disposed strap of insulating material,
15 a base plate also formed of insulating material and secured to the front of the strip and having end portions of its rear face pro-

jecting beyond the edges of said strip, a plurality of metallic clips secured to the front of the base plate, a plurality of carbon blocks 20 held in place by the clips and insulated from each other, wire connecting means accessible from the rear face of the base plate, and wire clips carried by the vertically disposed strip at point adjacent to the rear of the base 25 plate.

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

MILLARD BERRY.

Witnesses:

W. E. SHARP,
THOS. J. DAVIS.