(No Model.) 2 Sheets—Sheet 1.

E. W. VAN BRUNT & W. M. RAYNOR.

LIGHTNING ARRESTER.

No. 461,991. Patented Oct. 27, 1891.

Fig. 1.

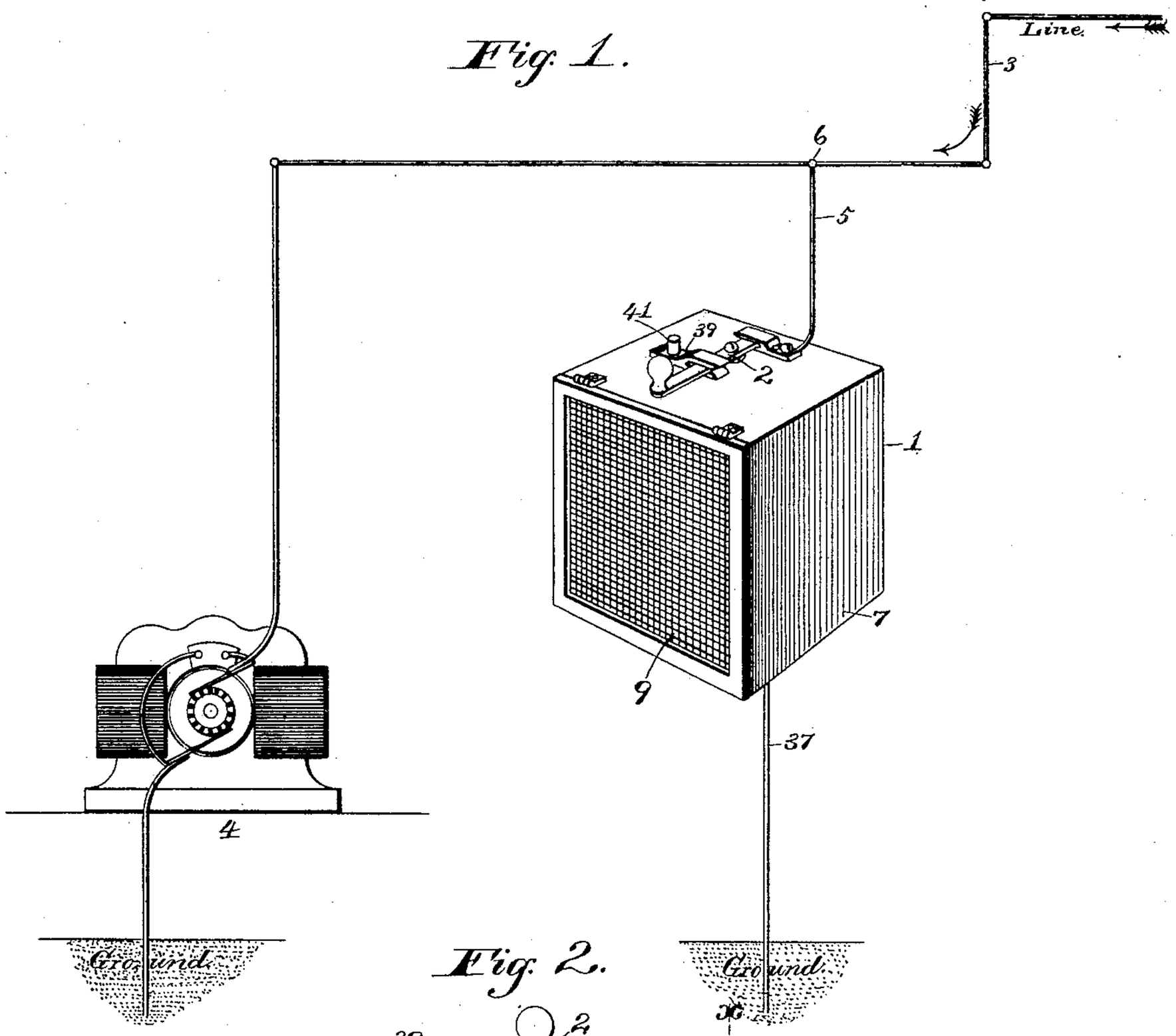


Fig. 2.

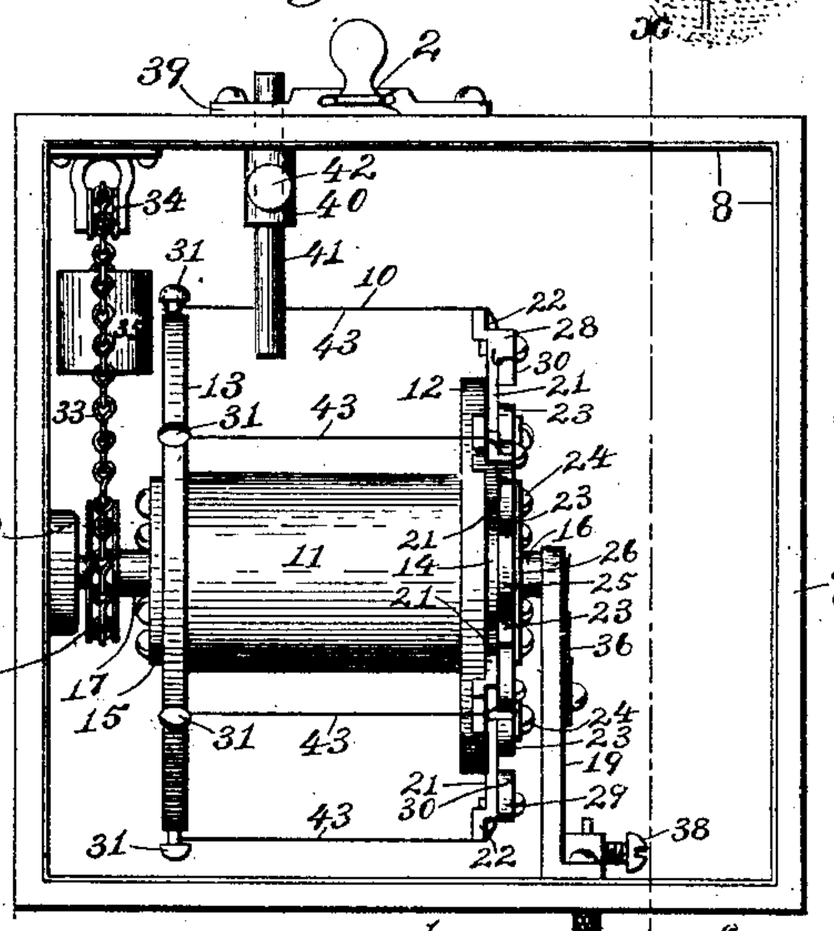


Fig. 5.

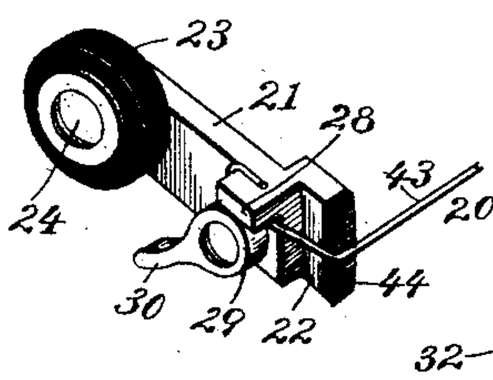
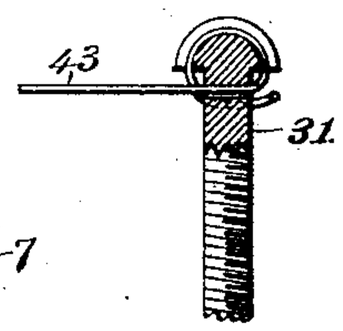


Fig. 6.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

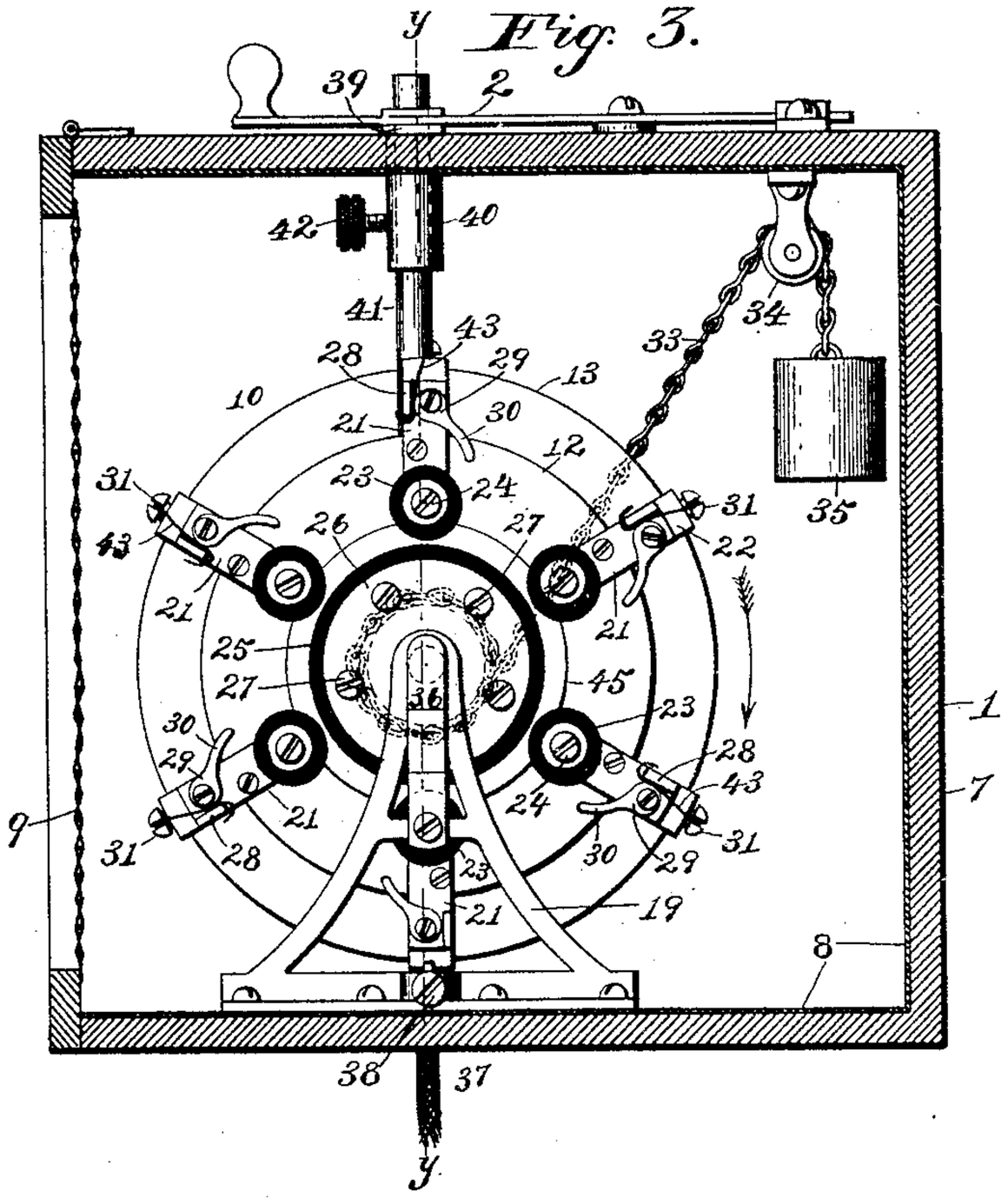
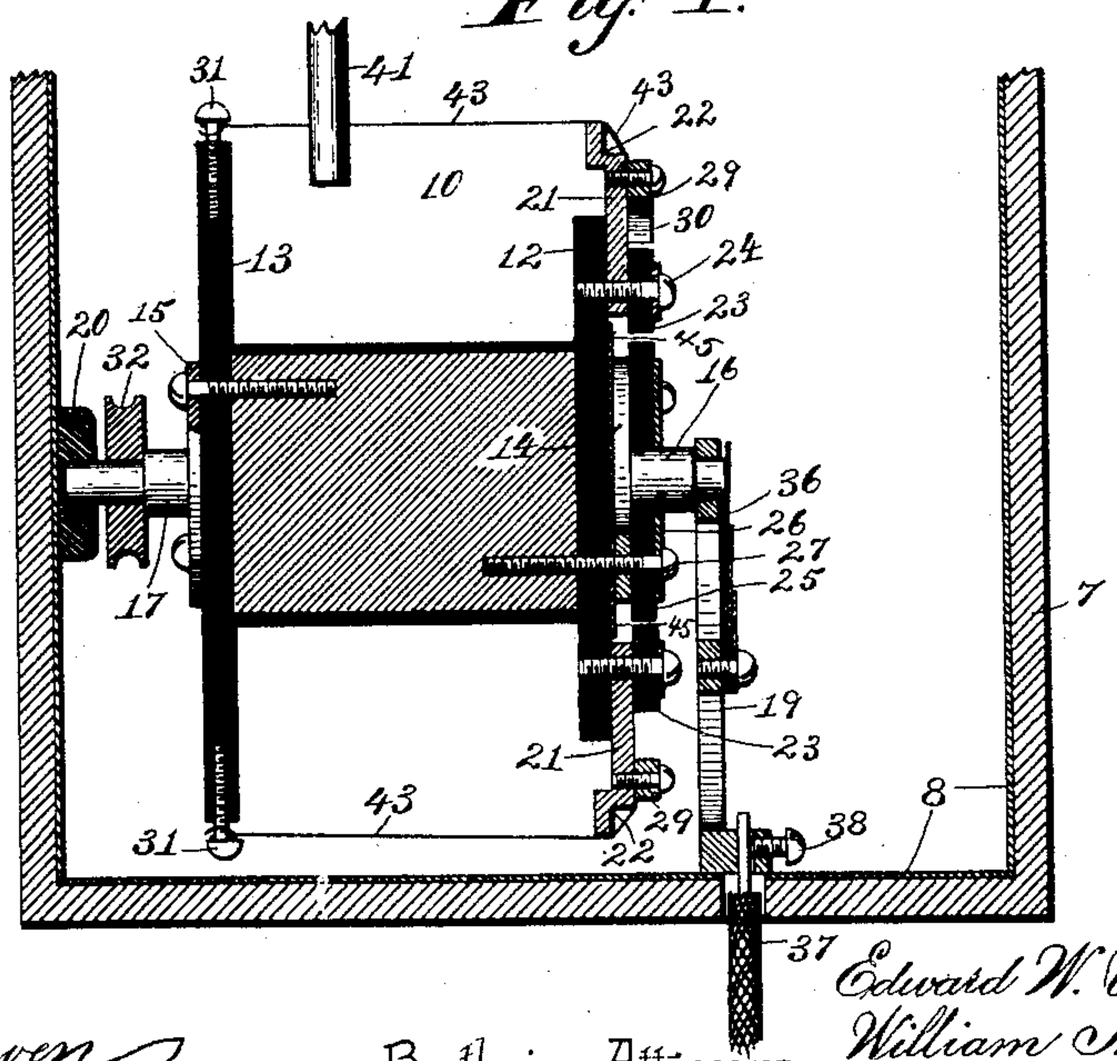


Fig. 4.



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UNITED STATES PATENT OFFICE.

EDWARD W. VAN BRUNT AND WILLIAM M. RAYNOR, OF SCRANTON, PENNSYLVANIA.

LIGHTNING-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 461,991, dated October 27, 1891.

Application filed May 16, 1891. Serial No. 393,035. (No model.)

To all whom it may concern:

Be it known that we, EDWARD W. VAN BRUNT and WILLIAM M. RAYNOR, citizens of the United States, residing at Scranton, in the county of Lackawanna and State of Pennsylvania, have invented a new and useful Lightning-Arrester, of which the following is a specification.

Our invention relates to lightning-arresters, and is designed more especially for the protection of dynamos, motors, and other electrical machines.

The objects of the invention are, first, to provide an arrester in which a large number of fuses are placed in a given space and at a perfectly safe distance apart; second, to provide means whereby the fuses may be quickly and easily replaced during an electric storm without danger to the attendant; third, to provide fuse terminals or connectors which will not be injured by the fuses blowing out, and, fourth, to bring each fuse under the same degree of strain while in operative position. These objects and such others as fairly fall within the scope of the invention we attain by means of the mechanism illustrated in the accompanying drawings, the peculiar construction, combination, and arrangement of which will be fully described hereinafter, and the specific points of novelty particularly pointed out in the claims.

Referring to the drawings, Figure 1 is a perspective view of our lightning-arrester, showing the preferred position it will occupy in the circuit. Fig. 2 is a front elevation of the device with the casing open. Fig. 3 is a vertical sectional view through the casing on the line $x\,x$ of Fig. 2, showing the lightning-arrester proper in end elevation. Fig. 4 is a sectional view on the line $y\,y$ of Fig. 3. Fig. 5 is a perspective view of one of the fuse connections; and Fig. 6 is a sectional view of the other fuse connection, showing the manner of connecting the fuse thereto.

Similar numerals of reference designate corresponding parts in the several views.

Referring now more particularly to Fig. 1, 1 designates the lightning-arrester, upon the top of which is placed a switch 2 of any suitable construction. The line-wire 3, entering the office or station, passes to the instrument 4, which is to be protected. A branch wire 5 is connected with the line-wire 3 at a point, as 6, before it reaches the instrument 4, and the other end of the branch wire 5 is connected to one of the contacts of the switch 2, through which it is brought into electrical connection with the lightning-arrester proper.

The lightning-arrester proper is placed within a casing 7, which has a lining of asbestus 8 to protect it from fire when the fuses are blowing out, and a wire-screen door 9, arranged to cover the open side and prevent sparks from flying out and doing damage in the office or station and still permit ready inspection of the interior.

The lightning-arrester proper consists of a spool 10, the central portion of which is a drum or cylinder 11, formed of asbestus or other suitable material and covered with a coating of insulating material. The ends of the spool are disks 12 and 13 of insulating material rigidly secured to the central drum 11 and have metallic disks 14 and 15 secured centrally to their outer faces. Studs 16 and 17, formed integral with the disks 14 and 15, project outwardly from their centers, and are reduced in size at their outer ends to form journals, which support the spool. Within the casing and projecting upwardly from the bottom thereof is a standard 19, having a journal-bearing at its upper end, in which is supported the journal on the stud 16 on one end of the spool 10, and the journal on the stud 17 at the other end of the spool is supported in a bearing 20 of insulating material upon the inner side of the casing 7. Thus the spool 10 is journaled within the casing 7 and free to revolve in its bearings. The disk 12 upon the end of the drum 11, near the standard 19, is smaller in diameter than the disk 13, and metallic strips 21 are secured to the outer face thereof near the edge and project beyond the periphery, where they are bent or formed into steps 22, for a purpose to be hereinafter explained. Upon the faces of the strips 21, near their inner ends, are secured small carbon disks 23 by means of screws 24, which pass through the centers of the disks and are screwed into the strips.

A carbon disk 25, having a central perforation, through which the stud 16 passes, is placed upon the metallic disk 14 and protected by a thin metallic disk 26, which latter is placed upon the outer face of the carbon disk, and the several disks are held together and to the spool by screws 27, which pass through the disks and into the spool. The carbon disk 25 is slightly larger in diameter than the metallic disk 14, upon which it is placed, and the small carbon disks 23 upon the strips 21 are arranged around the disk 25 just beyond its periphery near to, but out of contact with, its edge. Lugs 28 project upwardly from the sides of the strips 21 just at the base of the bend which forms the steps, and cams 29, having short levers 30, are pivoted in position to bind against the said lugs when the levers are pressed inwardly. The disk 13 has a number of screws 31 corresponding to the number of strips 21 around its periphery, and each of the screws 31 has an aperture extending therethrough just below the head and in line with the slot, for a purpose to be explained hereinafter.

A grooved pulley 32 is secured upon the stud 17 between the bearing 20 and the disk 13, and has secured to the periphery thereof one end of a chain 33, which passes over a pulley 34 in the upper rear side of the casing and has secured to the other end a weight 35. From this construction it will be seen that if the spool 10 be revolved it will wind the chain upon the grooved pulley 32, thus raising the weight 35, and when the spool is released the tendency of the weight will be to unwind the chain, and thus revolve the said spool and the devices carried thereby. A conducting-brush 36 is secured to the standard 19 to press against and make contact with the end of the journal on the spool 10, thus insuring good electrical connection between the stud 16 and the standard. The ground-wire 37 passes upward through the bottom of the casing and into an aperture in the standard 19, where it is secured by a binding-screw 38. Upon the top of the casing is secured a plate 39, with which the lever of the switch 2 is adapted to make contact, and from the plate 39 a sleeve 40 projects downwardly through the top of the casing. A carbon pencil 41 is fitted into the sleeve 40 and adapted to slide vertically therein, a thumb-screw 42 being arranged in the sleeve to hold the carbon at any desired height.

The operation of the invention is as follows: The safety-fuses 43 are placed in their proper positions as follows: One end of the fuse is inserted in the aperture in one of the screws 31, and the end is then bent round in the slot of the screw-head, as shown in Fig. 6, thus forming a connection which is amply secure for all practical purposes and very easily connected or disconnected. The other end of the fuse is passed over the step 22 on the strip 21 and between the lug 28 and the cam 29, and then bent round the lug 28. The lever 30 is then pressed inwardly, causing the cam 29 to bind the end of the fuse between the said cam and the lug 28, thus making a simple and secure fastening for the fuse, which is thus stretched between the two disks. When the proper number of fuses have been placed in position, the spool 10 and disks carried thereby are revolved in the direction of the arrow in Fig. 3, thus winding the chain upon the pulley 32 and raising the weight 35 to the top of the casing. The carbon pencil 41 is then lowered until its lower end comes in the path of the fuses between the disks 12 and 13 and is clamped by the thumb-screw 42. The tendency of the weight will be to revolve the spool and keep one of the fuses pressed in contact with the carbon pencil. The carbon disks 23 upon the inner ends of the strips 21 are arranged at a proper distance from the disk 25 to prevent the ordinary current of the line from forming an arc, but sufficiently near to allow a current which would be dangerous to the instruments to form an arc from the disk 23 to the disk 25, and thus pass to the ground through the standard 19 and the ground-wire. The fuses are of such resistance that when the current is sufficiently strong to form an arc they will melt or blow out and thus break the circuit. As soon as a fuse has blown out the weight will cause the spool carrying the disks 12 and 13 to revolve and bring the next fuse into contact with the carbon. The direction of rotation of the disks will bring the fuse that has blown out to the front of the casing, where it can be easily and quickly replaced in the manner hereinbefore explained. By passing the fuses 43 over the steps 22 upon the strips 21 before placing them under the cams 29 the current will be taken from the fuse by the said step, and thus prevent fusing the clamping devices. If found desirable in practice, the steps 22 upon the strips 21 may be tipped with carbon, as shown at 44 in Fig. 5, to prevent fusing at this point, and a disk 45 of mica may be placed between the metallic disk 14 and the disk 12, extending far enough beyond the periphery of the carbon disk 25 to protect the disk 12 from injury by the heat from the arc when formed from the disks 23 to the disk 25. When the carbon disks become fused or damaged at the point where the arc is formed, the screws in the large disk 20 may be removed and the disk turned about the stud 16 to change the points of contact, the holes for the screws being arranged so that by turning the disk till the holes therein register with the next holes in the disk 14 will present different points to the small disks 23, and the latter disks may be turned about their central screws when the said screws are loosened to present another portion of their periphery to the large disk 25.

Among the advantages of the invention may be mentioned the following: First, no fusing can take place at the fuse-terminals, as the current is taken from the fuse by the

steps 22 before it reaches the connecting-points. Thus the connections remain uninjured and the ends of the fuse may be removed and a new fuse substituted with great facility. Second, by placing the fuses around the periphery of a spool they can be placed sufficiently far apart to prevent one fuse from being damaged when the next one blows out, and a larger number of fuses may be placed in a given space than by any other arrangement. The central drum 11 may be made large enough in circumference to protect the lower fuses from the sparks which may fall. Third, by using a weight to revolve the spool each fuse will be subjected to the same amount of strain when pressed against the carbon pencil. These and other advantages will be apparent to those skilled in the art to which the invention appertains.

It will be understood that we do not wish to limit ourselves to the precise details of construction as herein set forth, as slight modifications may be made therein without departing from the spirit of the invention.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a lightning-arrester, the combination of a frame, metallic strips 21, secured to one end of the frame, lugs 28 upon the said strips, cams 29, pivoted upon the strips 21 in position to bind against the lugs 28, steps 22 upon the outer ends of the said strips, conducting-disks upon the inner ends of the strips arranged near to but out of contact with a conductor connected with the ground, fuses clamped between the cams 29 and lugs 28 and held taut by suitable connectors at the opposite end of the frame, a conducting-pencil connected with the line-wire and arranged in the path of the fuses, and means for holding the fuses in close contact with the conducting-pencil, substantially as described.

2. In a lightning-arrester, the combination of a spool, disks 12 and 13, forming the ends of the spool, studs 16 and 17 on the ends of the spool, by means of which it is supported in a suitable casing, a conducting-disk upon one end of the spool electrically connected with the stud, a metallic support for the said stud in electrical connection with the ground, connectors upon the same end of the spool as the conducting-disk, small conducting-disks upon the inner ends of the connectors arranged close to but out of contact with the large conducting-disk, clamps upon the connectors, steps upon the connectors extending beyond the clamps, safety-fuses having one end clamped in the clamps upon the connectors and extending over the steps 22 to the other end of the spool, to which they are suitably connected, a conducting-pencil connected with the line-wire and extending in the path of the fuses, a pulley upon the stud at the other end of the spool, a chain secured to and wound upon the said pulley, and a weight upon the end of the chain to turn the spool and keep one of the fuses in contact with the conducting-pencil, substantially as described.

3. In a lightning-arrester, the combination of a spool, journals extending from the ends of the spool, a casing inclosing the said spool and having a bearing for one journal in the inner side thereof, a metallic standard projecting upward from the bottom of the casing and connected with the ground-wire, a journal-bearing in the upper end of the standard, in which one of the journals of the spool is supported, a brush upon the standard to insure electrical contact between the said journal and the standard, a conducting-disk upon the spool in electrical connection with the said journal, connectors upon the spool having conducting-disks arranged close to but out of contact with the large conducting-disk, safety-fuses connected to the connectors and extending from end to end of the spool, a conducting-pencil connected with the line-wire and extending in the path of the safety-fuses, and means for rotating the said spool to hold one of the fuses in contact with the conducting-pencils, substantially as described.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in presence of two witnesses.

EDWARD W. VAN BRUNT.
WM. M. RAYNOR.

Witnesses:
WILLIAM S. BOYD, Jr.,
DAVID W. DAVIES.