V. E. JOYCE.

APPARATUS FOR ELECTRICALLY IGNITING MINERS' SAFETY LAMPS.

APPLICATION FILED JULY 24, 1914.

1,154,992.

Patented Sept. 28, 1915.

5 SHEETS—SHEET 1.

FIG. 2.

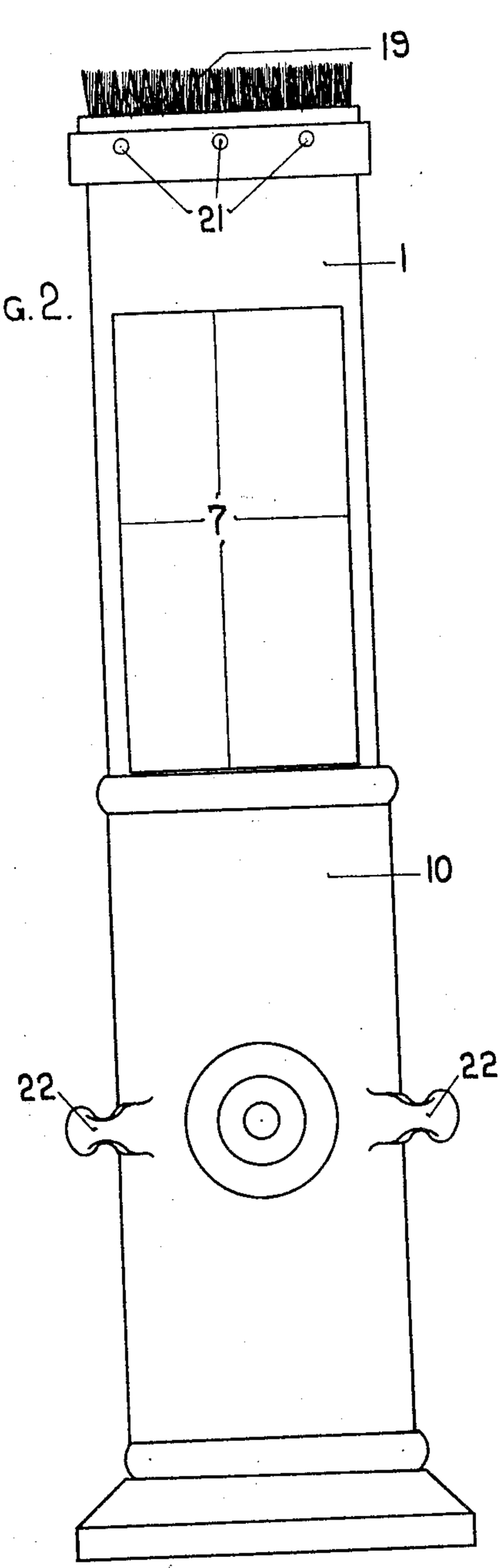
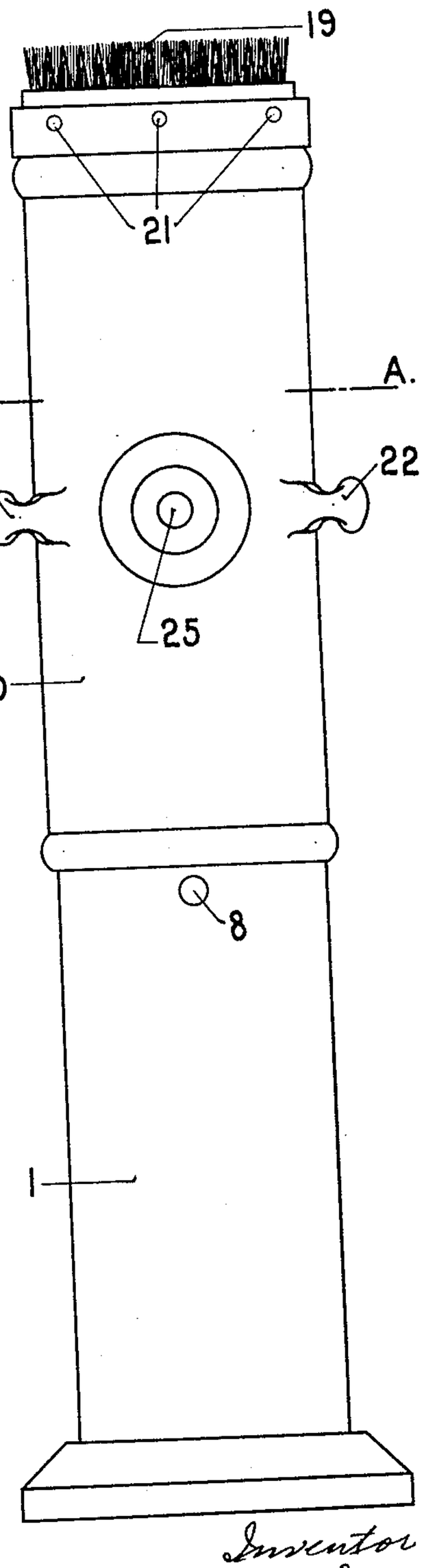



FIG. 1.

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5 SHEETS—SHEET 2.

FIG. 3.

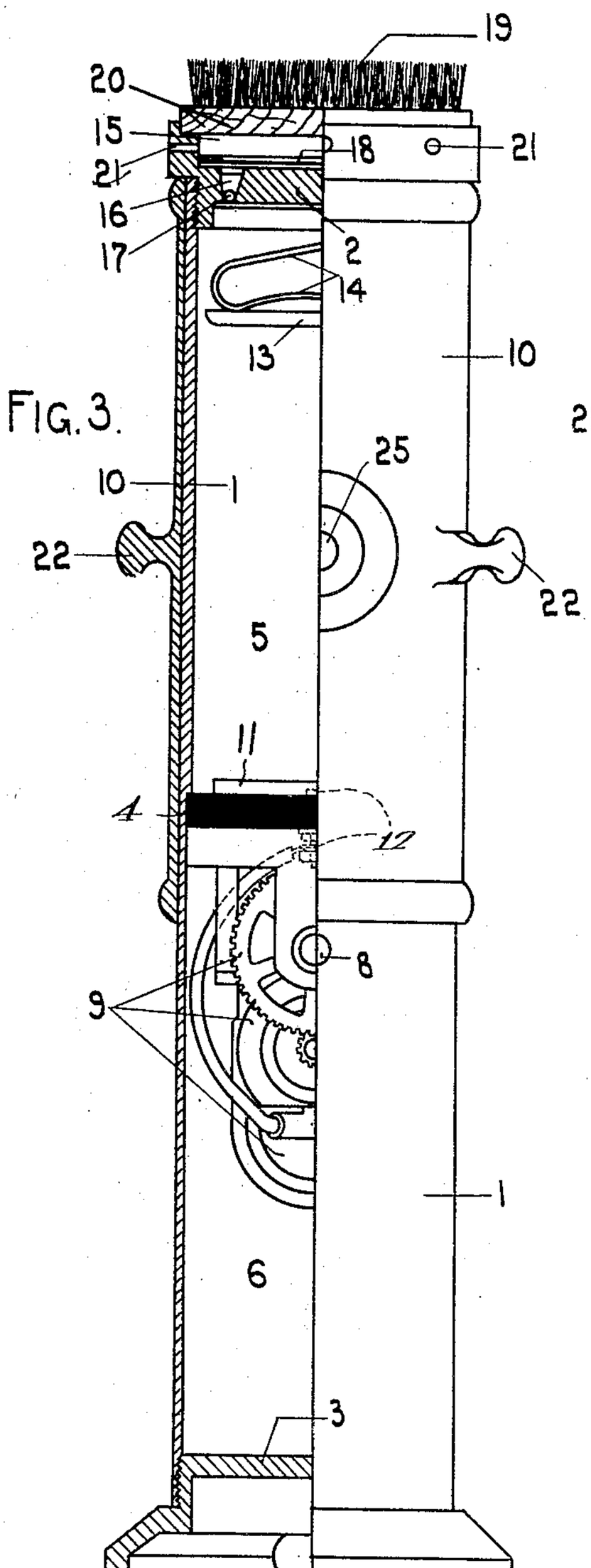



FIG. 4.

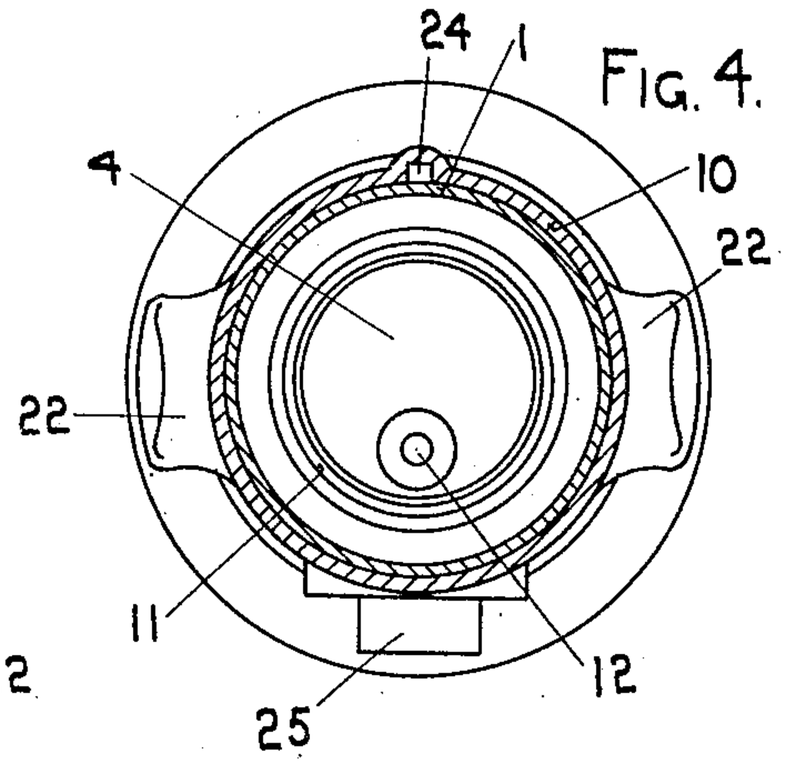



FIG. 5.

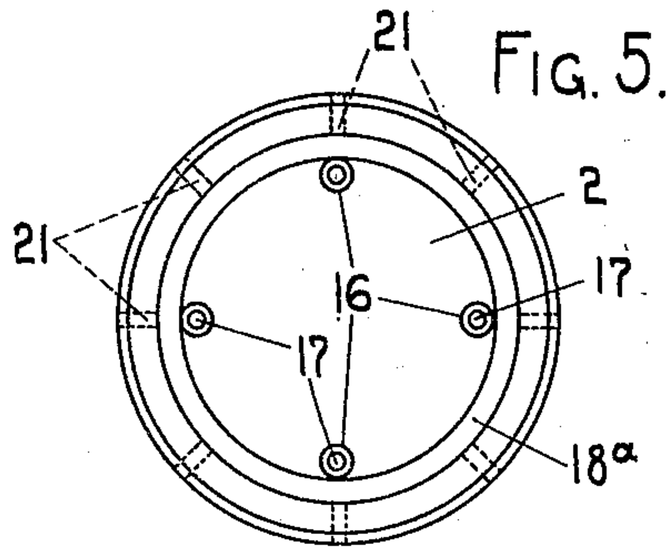
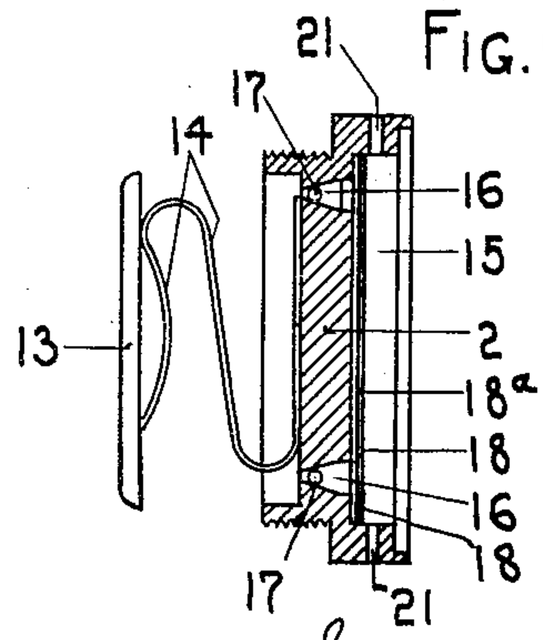



FIG. 6.

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5 SHEETS—SHEET 3.

FIG. 8.

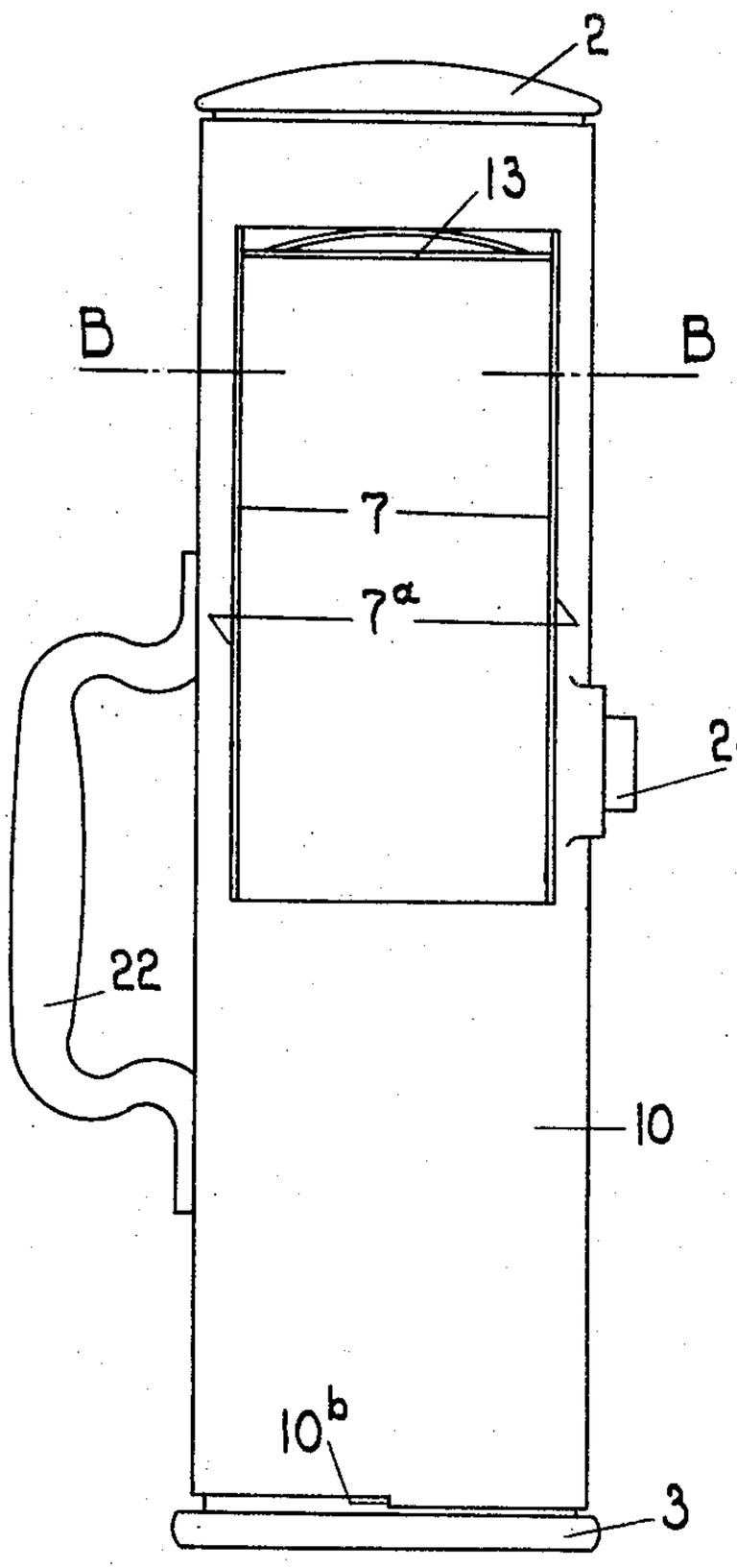
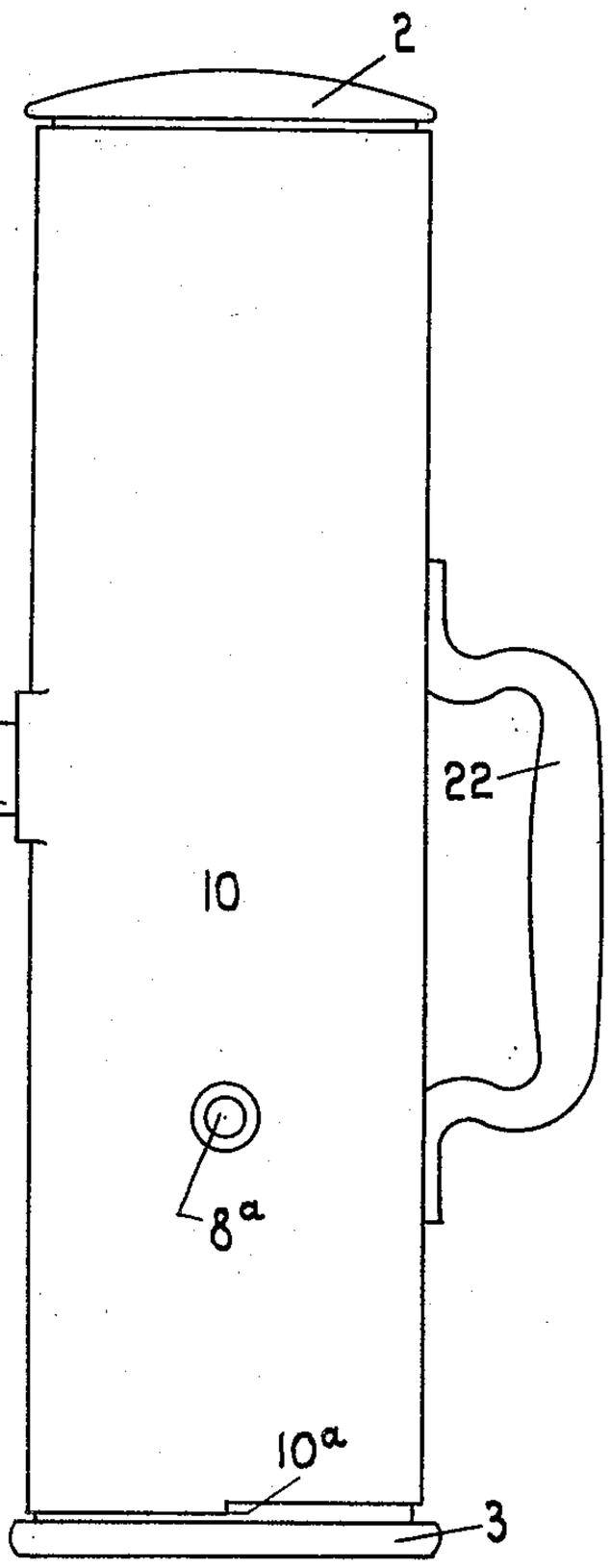



FIG. 7.

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5 SHEETS—SHEET 4.

FIG. 9.

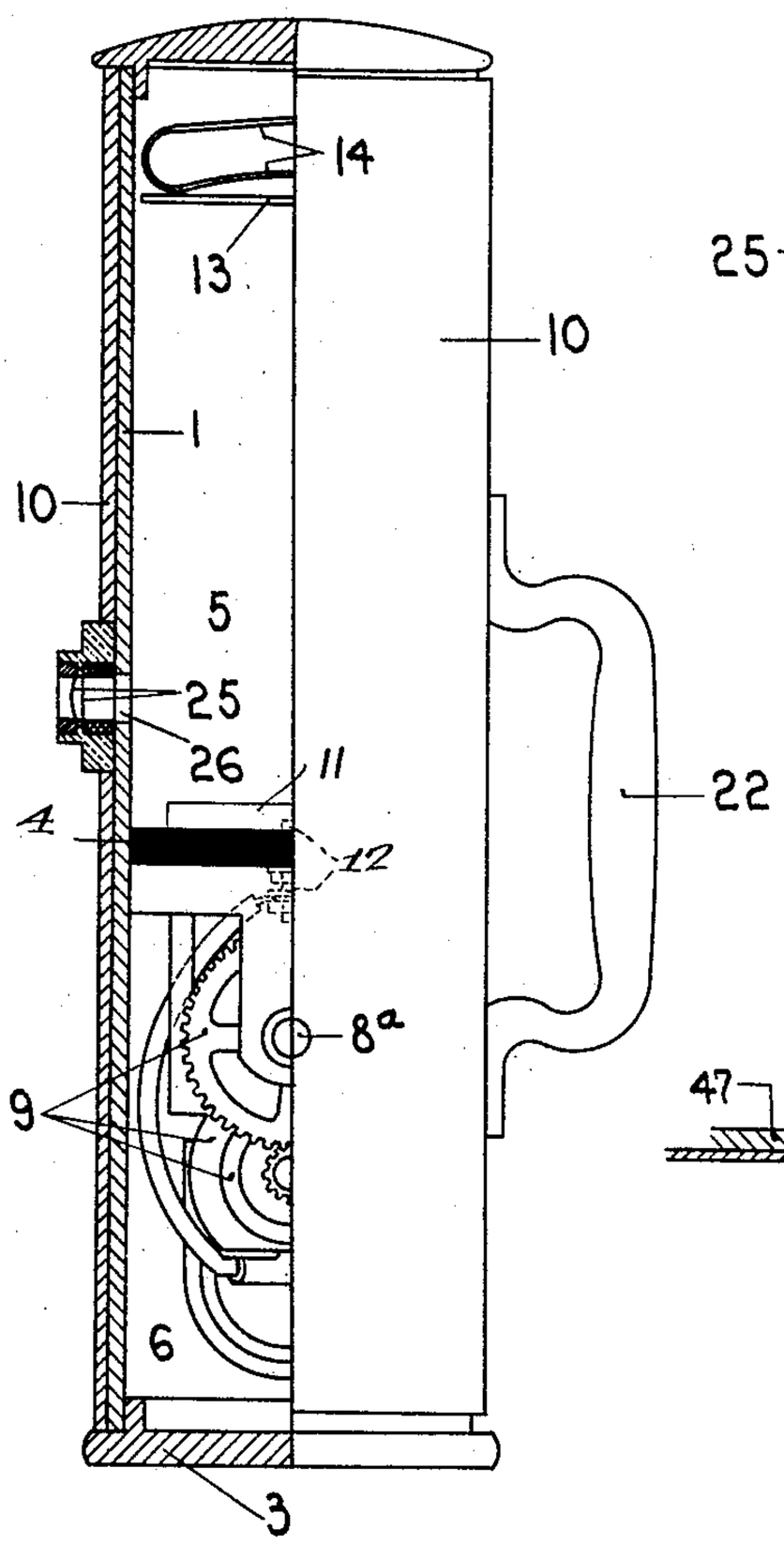



FIG. 10.

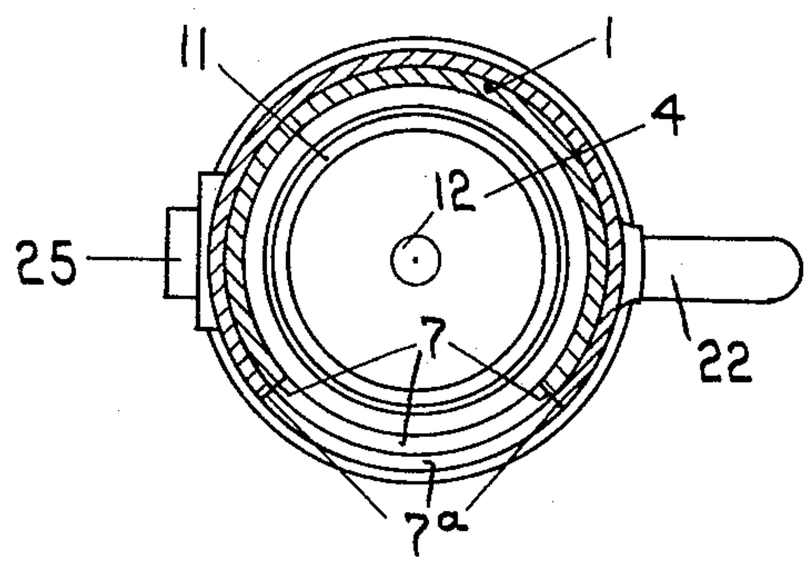
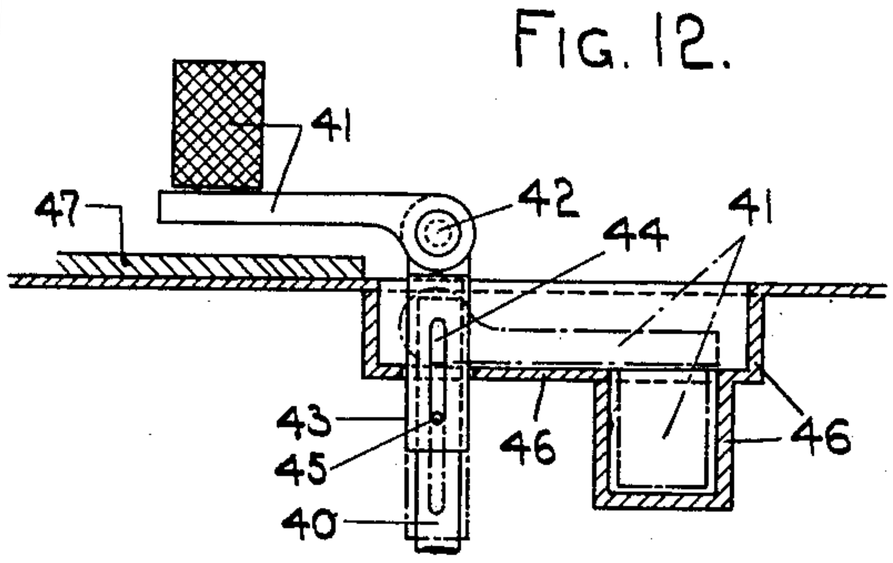



FIG. 12.

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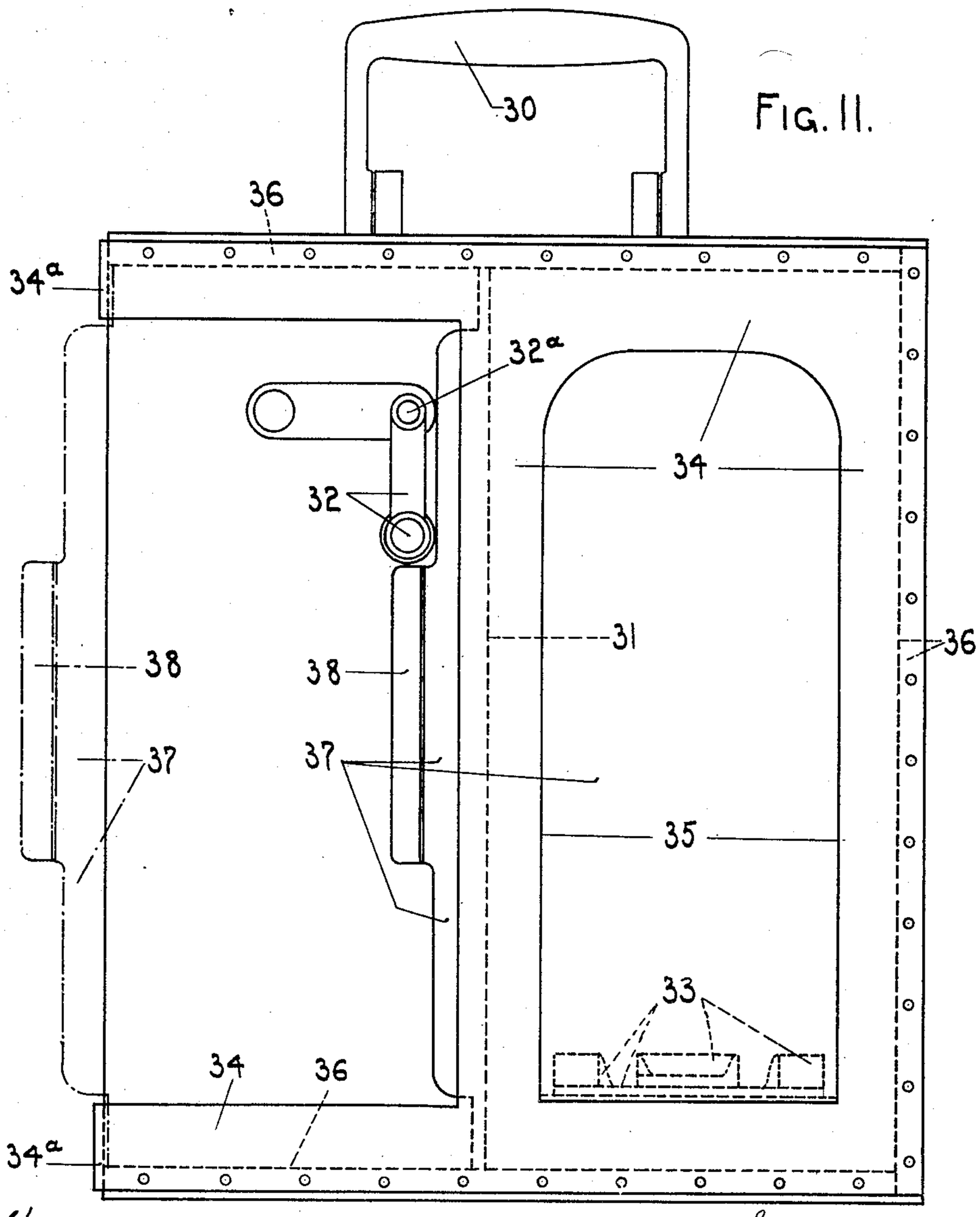
APPLICATION FILED JULY 24, 1914.

**1,154,992.**

Patented Sept. 28, 1915.

5 SHEETS—SHEET 5.

Fig. 11.

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# UNITED STATES PATENT OFFICE.

VICTOR ERNEST JOYCE, OF LONDON, ENGLAND.

## APPARATUS FOR ELECTRICALLY IGNITING MINERS' SAFETY-LAMPS.

1,154,992. Specification of Letters Patent. Patented Sept. 28, 1915.

Application filed July 24, 1914. Serial No. 852,948.

*To all whom it may concern:*

Be it known that I, VICTOR ERNEST JOYCE, a subject of the King of Great Britain and Ireland, residing at London, England, (whose post-office address is Goldhawk Works, Goldhawk Road, Shepherd's Bush, in the county of London, England,) have invented certain new and useful Improvements in and Relating to Apparatus for Electrically Igniting Miners' Safety-Lamps; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to apparatus for electrically igniting miners' safety lamps.

The invention relates particularly to that type of apparatus in which hand driven electricity generating apparatus is employed for providing the current necessary for igniting the lamp, the inclosing casing of the apparatus comprising a generator chamber, a lamp chamber, an opening in the lamp chamber through which the lamp to be lighted is inserted into the said chamber, and means for closing the opening of the lamp chamber, said means being so constructed and arranged that in one of its extreme positions it closes the said lamp chamber and enables the generator to be driven and at all other of its positions it prevents the generator being driven by preventing the generator handle being coupled to the generator.

The invention has for its object to provide an improved construction of apparatus of the kind above set forth, which will be simple, strong and efficient.

The invention consists in the combination and arrangement of parts and details of construction pointed out in the claims and hereinafter described with reference to the accompanying drawings, in which,—

Figure 1 is an elevation of one form of apparatus according to this invention, showing the parts in such relative positions that the aperture providing the entrance to the lamp chamber is closed, and Fig. 2 is an elevation of such apparatus with the entrance to the lamp chamber open. Fig. 3 is a part sectional, part full elevation of the apparatus shown in Figs. 1 and 2, the parts being in the position shown in Fig. 1. Fig. 4 is a sectional plan of the apparatus shown in Figs. 1, 2 and 3, the section being taken on the line A—A, Fig. 1. Fig. 5 is a plan view of the top cover of the apparatus shown in the preceding figures with the brush (hereinafter described) removed. Fig. 6 is a view, partly sectional, of the top cover of the apparatus shown in the preceding figures and the negative contact (hereinafter described) removed from the apparatus. Fig. 7 shows in elevation another form of apparatus according to this invention, the parts being in such relative positions that the aperture providing the entrance of the lamp chamber is closed, and Fig. 8 shows such apparatus with the parts in such relative positions that the lamp chamber is open. Fig. 9 is a part sectional, part full, elevation of the apparatus shown in Figs. 7 and 8, the parts being in the position shown in Fig. 7. Fig. 10 is a sectional plan of the apparatus shown in Figs. 7, 8 and 9, the section being taken on the line B—B, Fig. 8. Fig. 11 is a front elevation of another form of apparatus according to this invention and Fig. 12 is a view illustrating a handle for driving the generator, which can be folded over so that the means for closing the aperture in the lamp chamber may pass over and cover said handle when the said means is moved out of the position in which the lamp chamber is properly closed.

In the embodiment of the invention shown in Figs. 1 to 6 the apparatus comprises in combination an inner cylindrical casing 1, of the desired diameter, closed at its ends by plates or parts 2, 3, and divided by an air tight partition 4 into a lamp chamber 5 and generator chamber 6, the lamp chamber 5 having in its cylindrical wall an opening 7 through which the lamp to be lighted is inserted and the generator chamber 6 a hole 8 in its cylindrical wall through which the stem of the generator driving handle passes or is passed to engage or connect with the operating spindle of the generator 9, which handle may be removable or be so constructed as to fold in flush with said cylindrical wall of the generator chamber, an outer imperforate cylinder or sleeve 10 of lesser height or length than the inner cylindrical casing 1 being provided and adapted to slide longitudinallv thereon, the construction and arrangement being such that in one extreme position of the outer cylinder or sleeve 10 the said hole 7 in the lamp chamber 5 is ef-

fectively closed and the said hole 8 in the generator chamber 6 uncovered, or the generator handle itself uncovered, so that the generator may be operated, but that in any other position of the outer cylinder or sleeve 10 the said hole 8 in the generator chamber 6, or the generator handle, is closed or covered by the said outer cylinder or sleeve 10 and operation of the generator 9 is thus prevented.

The cylindrical casing is arranged vertically as shown, the upper portion thereof forming the lamp chamber, the lower portion the generator chamber. The generator may be a magneto apparatus.

The construction of apparatus shown in Figs. 7 to 10 comprises a vertical cylindrical casing 1 divided by a horizontal air tight partition 4 into a generator chamber 6 and a lamp chamber 5, the latter being, in the construction shown, the upper one and being provided with an aperture 7 in the cylinder wall through which the lamp may be inserted, the lower chamber containing the generator 9 and having in the cylindrical wall the hole through which the generator handle passes or is passed to engage the driving spindle of the generator. A second cylinder 10 is provided and adapted to take about the cylinder 1 and be revoluble thereon, the cylinders 1, 10 being a good fit the one to the other. The outer cylinder 10 is provided with two openings, $7^a$, $8^a$, one $7^a$ through which the lamp to be ignited may be passed, when the cylinders are in such positions relatively to each other (see Fig. 10) that the said opening $7^a$ in the outer cylinder 10 coincides with the lamp opening 7 in the inner cylinder 1, and the other $8^a$ through which the operating or driving handle of the generator may be inserted to drive the generator when and only when, the cylinders are in such positions relatively to each other that the outer one (10) is effectively closing or sealing the lamp opening 7 of the inner one, the outer cylinder 10 in all other relative positions of the cylinders closing or blocking the generator handle hole of the inner cylinder.

In the transverse partition 4 which separates the two chambers 5 and 6 of the casing 1 there may be provided a seat 11 for the lamp bottom and a spring contact stud 12 is provided adapted when the lamp is in position to make contact with the usual contact stud in and insulated from the lamp bottom, said contact stud 12 in the partition 4 being the positive contact of the apparatus. The seat 11 (if provided) is insulated from the partition 4 and from the contact stud 12, which latter is also insulated from the partition 4. The lead-in wire of the lamp is connected in any approved manner to the said contact stud in the lamp bottom and the return wire in the lamp to the lamp frame. The negative contact of the apparatus according to this invention consists of a plate or diaphrgam 13 in electric connection with the upper part of the lamp chamber, for instance by means of the spring 14, this spring pressed contact plate or diaphragm 13 making contact with the top of the lamp frame and also acting to press said contact stud in the lamp bottom firmly on to the contact stud 12 in the transverse position 4. The said negative contact 13 is "earthed" on the casing of the apparatus or on the frame-work of the generator.

The transverse partition 4 in the inner cylinder 1 may be and preferably is a disk of the desired thickness formed of insulating material and carried on and secured to the frame of the generator 9.

The top and bottom plates or parts 2, 3 of the inner cylinder 1 are preferably screwed into the said cylinder and locked by countersunk screws passing through the cylinder 1, but the said parts 2, 3 may be secured to the cylinder 1 by screws passing through countersunk holes in said cylinder 1, into annular flanges on the plates (or into the plates themselves) and the heads of such screws may be covered with suitable wax or other sealing material which may be imprinted with some name or device so that tampering with the screws may be detected.

The transverse partition 4 in the inner cylinder may if desired be secured in place by sealed screws and spring pins similarly to the top and bottom plates 2 and 3.

The generator 9 is preferably secured to and carried by the bottom or base plate 3 of the apparatus, so that by disconnecting said bottom or base plate from the inner cylinder 1 (and the transverse partition 4 from the inner cylinder if it be secured thereto) the generator 9, partition 4 and contact 12 carried thereby may be removed for repair or replacement by a new generator etc.

Anti-explosion passages, governed by suitable non-return valves, may be provided if desired, said passages and valves being such that should an excess of pressure obtain in the lamp chamber the valves will open and permit the pressure to escape through the said passage. For instance an annular groove, or as shown in Figs. 3, 5 and 6, a recess 15 may be provided in the upper side of the top plate 2 and the desired number of passages 16 drilled so as to connect said groove or recess with the interior of the lamp chamber 5; the upper ends of said passages may be of enlarged conical form and each constitute a valve chamber adapted to receive a valve ball 17, and a portion of wire gauze 18 may be provided to take into said recess 15 and prevent the valve balls 17 leaving their respec-

tive valve chambers, 18ª being a sheet metal ring holding said gauze in position. The gauze is not shown in Fig. 5.

In a suitable position on the apparatus there may be provided a brush over and in contact with which the bottom of the lamp may be passed, to remove coal dust or the like therefrom, before the lamp is placed in the apparatus, and such brush is preferably a wire brush 19 detachably secured to the upper end or top of the apparatus.

If the above described wire brush 19 be provided, and its base plate 20 cover the recess 15 in the top plate 2 of the lamp chamber, a series of radial passages 21 are drilled in said plate to connect said recess 15 with the atmosphere.

Suitable lugs or feet may be provided at the base of the apparatus by which it may be secured in position, and suitable lugs or handles 22 are formed or provided on the exterior of the outer cylinder or sleeve 10 by which it may be moved relatively to the inner cylinder.

The dimensions and position of the hole 7 in the lamp chamber 5 and the dimensions of the outer cylinder or sleeve, or of the imperforate part thereof, are such that with the latter in position closing the said hole 7 the metal of the cylinder or sleeve 10 overlaps the metal surrounding said hole 7 in the inner cylinder 1 to an extent sufficient to effectively prevent a spark or flame from the interior of the lamp chamber passing outside the apparatus, and the engaging faces of the inner and outer cylinders may be oiled or greased to render the "joint" more gas tight.

In the case of the apparatus shown in Figs. 1 to 4 the sleeve 10 is movable vertically to open and close the opening 7 in the lamp chamber, the sleeve 10 in its uppermost position closing said opening 7 and uncovering the generator handle hole 8, and when lowered covering said hole 8, the opening 7 being fully opened when the sleeve 10 is in its lowermost position.

In the case of the apparatus shown in Figs. 7 to 10, the cylinder 10 is rotatable on the inner cylinder 1 to the extent of about one half of a revolution and in one of the extreme positions of cylinder 10, the opening 7 in the lamp chamber of cylinder 1 is properly closed and the generator handle hole 8ª in cylinder 10 in registration with the generator handle hole in the inner cylinder. Means such as an upstanding lug on the plate 3 may be provided and adapted by the abutment of one or other of the shoulders 10ª, 10ᵇ, Figs. 7 and 8, against it to limit to rotary movement of cylinder 10 in either direction, the lower end of cylinder 10 being cut away as shown to provide such shoulders, the cut away portion also providing means for obtaining access to drive screws to lock the bottom 3 and inner casing 1 together, should such locking screws be employed. In any other relative positions of the cylinders the generator handle hole in the inner cylinder 1 is covered by the metal of the other cylinder 10 and the generator handle cannot be inserted to operate the generator.

If desired the brush 19 shown in Figs. 1, 2 and 3 and the anti-explosion passages 16, 21, shown in said figures, may be employed in connection with the top part 2 of the apparatus shown in Figs. 7 to 10.

In the construction of apparatus shown in Figs. 1 to 4 the outer cylinder or sleeve 10 may be a casting and the inner cylinder a steel tube; in the case of the construction shown in Figs. 7 to 10 both cylinders may be formed of steel. In both constructions the outer cylinder 10 carries a glazed sight opening 25 so that the lighting up of the lamp may be seen from without the apparatus, such glazed opening 25 being rendered gas tight in any suitable manner. In the construction shown in Figs. 1, 2, 3 and 4 said opening 25 comes opposite the opening 7 in the inner cylinder 1 when the lamp chamber is closed; in the construction shown in Figs. 7 to 10 an opening 26 is provided in the inner cylinder 1 with which the opening 26 registers when the lamp chamber is closed.

24, Fig. 4, is a key-way in the outer cylinder 10 adapted to coöperate with a key, secured to the outer side of cylinder 1, to prevent relative rotation of the cylinders.

Referring now to Fig. 11, in this construction of apparatus the inclosing casing consists of a sheet steel box rectangular in form and of the desired dimensions, and provided with a suitable handle (or handles) 30 by which it may be carried from place to place. This box is divided by an internal air tight vertical partition 31 into two chambers or compartments, one (the left hand) adapted to contain the electricity generating apparatus and the other (the right hand) adapted to receive the lamp to be lighted.

In the generator chamber of the apparatus, a suitable form of electric generator, for instance a magneto machine, is mounted, and its driving spindle is provided with means adapted to be engaged by a handle 32 and to be driven thereby, a hole being provided in the front of the inclosing casing through which the engaging portion of said handle can be passed. This hole is not shown in the drawing but is located behind the portion of the handle 32 marked 32ª in the drawing.

In the lamp chamber there are provided suitable contacts with which the contact parts of the lamp are adapted to make contact when the lamp is in position in the chamber. The positive contact may for in-

stance be the known spring stud contact and the negative contact the known ring contact 33 into which the lamp bottom takes.

In the front of the lamp chamber a hole of suitable size and shape is cut for the passage of the lamp into the interior of the chamber. The dimensions of the casing and of the lamp chamber portion thereof are such that when said hole has been cut in the front of the lamp chamber a flange of considerable width is left around said hole. Suitably fixed to and at a relatively small distance from the outer face of the front plate of the lamp chamber is an additional plate 34 provided with a hole 35 of the same dimensions and adapted to coincide with the hole in the front of the lamp chamber. The outer face of the front plate of the casing and the inner face of the guide plate 34 are planed or "faced" so as to be smooth and true. At the top and bottom edges and at that edge of plate 34 which is farthest from the generator chamber a suitable packing strip 36 may be inserted between the front plate of the lamp chamber and the said guide plate 34 so as to make an air tight joint at the edges and also leave a guide or channel surrounding the aperture of the lamp chamber of a depth of say 1″.

The plates may be riveted together and the rivets passed through such packing strips, but other suitable means of closing the joints at these edges may be employed. A sliding door 37, consisting of a plate having its faces planed or "faced" so as to be smooth and true, is provided for the lamp chamber and adapted to slide between the front plate of the chamber and the guide plate 34, said door being provided with a portion 38 which, when the door is closed, projects laterally beyond the guide plate 34 at the generator chamber and constitutes a handle for operating the door. The door plate 37 is of such a thickness that it slidingly fits the guideway formed between the front plate of the lamp chamber and the guide plate 34 and that when oiled it will, when in the closed position, prevent a flash or flame passing from the interior of the lamp chamber to the exterior thereof.

The sliding door 37, for closing the aperture in the lamp chamber is such that only when it is fully home in its closed position with its edge (at the generator chamber side or end) clear or open the hole into which the generator driving handle 32 takes, the said door at all other times closing or blocking said hole and thus preventing the generator handle being inserted to drive the generator. Means, such as the backward turning of the end portions 34ª of the plate 34 at the generator chamber end of the casing, is provided to prevent the sliding door 37 being moved in a direction to open the aperture of the lamp chamber farther than is necessary for that purpose and to prevent complete removal of the door from the apparatus by any unauthorized person.

It will thus be seen that it is impossible with an apparatus as described and shown in Fig. 11, to obtain an igniting current until the lamp chamber is properly closed or sealed as it is impossible to insert any means, by which the generator may be driven, into the hole in the generator chamber until such lamp chamber is so closed or sealed, the door 37 blocking the entrance to such hole.

If desired a brush such as 19 Figs. 1, 2 and 3, may be fitted to the apparatus according to Fig. 11.

In any of the constructions of the apparatus described and shown, instead of a removable handle being employed and the member which seals the lamp opening itself preventing said handle being inserted except when the lamp opening is properly closed, a handle of suitable form, such as a folding handle or a handle which may be pulled out to be rotated and then pushed in flush, may be employed and the member which seals the lamp opening be so arranged that when moved from the position in which it properly seals said opening it will cover said handle and thus effectively prevent operation thereof to generate a current. An illustration of such a handle is given in Fig. 12, in which 40 is the generator spindle, and 41 the handle, which handle is pivotally connected by a pin 42 to a tubular portion 43 adapted to take over the end of the generator spindle 40. The tubular portion is provided on opposite sides with slots 44 of the desired length and a pin 45 passed through the end of the generator spindle 40 takes into these slots so as to permit the handle to slide on the generator spindle but not to be removed therefrom. When it is desired to open the lamp chamber the handle 41 may be turned over and pressed into a depression or housing 46 provided in the casing as shown in dotted lines, such housing being of course within the generator chamber. When the handle is so turned and pressed in the means closing the lamp chamber may be operated to open such chamber, but when the handle is out in the full line position shown in the drawing the said means (of which 47 represents a portion) cannot be moved to open said lamp chamber. When the means (47) adapted to close the lamp chamber is in any position not closing such chamber it covers the handle 41 and prevents its operation.

I claim:—

1. In a safety-lamp igniter, the combination, with a cylindrical casing provided with a partition which separates its end portions into two chambers, for a lamp and for an electricity generator respectively, the lamp

chamber having a single lateral opening for the introduction and removal of the lamp, and the generator chamber having on one side a means for effecting the working of the generator; of a cylindrical sleeve slidable longitudinally on the casing and normally closing the said lateral opening and preventing the generator from being operated when slid so as to uncover the said lateral opening.

2. In a safety-lamp igniter, the combination, with a cylindrical casing provided with a partition which separates its end portions into two chambers, for a lamp and for an electricity generator respectively, the lamp chamber having a single lateral opening for the introduction and removal of the lamp, and the generator chamber having on one side a means for effecting the working of the generator; of a cylindrical sleeve slidable longitudinally on the casing and normally closing the said lateral opening and preventing the generator from being operated when slid so as to uncover the said lateral opening, and a plug or plate secured in the lamp chamber and provided with valved gas outlet holes having covers formed of wire gauze.

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

VICTOR ERNEST JOYCE.

Witnesses:
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