No. 663,454. Patented Dec. 11, 1900.

F. W. MARTIN & F. STEWART

ELECTRIC ARC LAMP.

(Application filed May 12, 1900.)

(No Model.) 3 Sheets—Sheet 1.

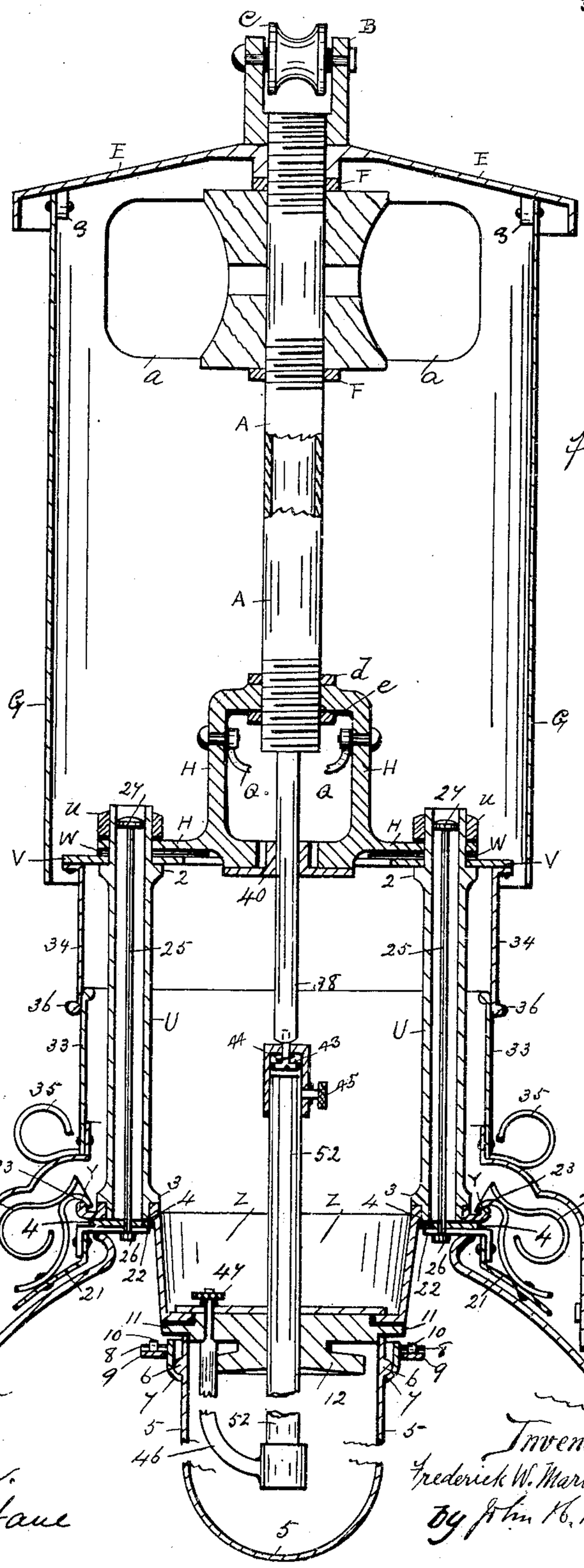


Fig. 1.

Witnesses.
M. S. Fraser.
M. H. LeHane

Inventors.
Frederick W. Martin & Frank Stewart,
By John H. Hendry, Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 663,454. Patented Dec. 11, 1900.

F. W. MARTIN & F. STEWART.

ELECTRIC ARC LAMP.

(Application filed May 12, 1900.)

(No Model.) 3 Sheets—Sheet 2.

Fig. 2.

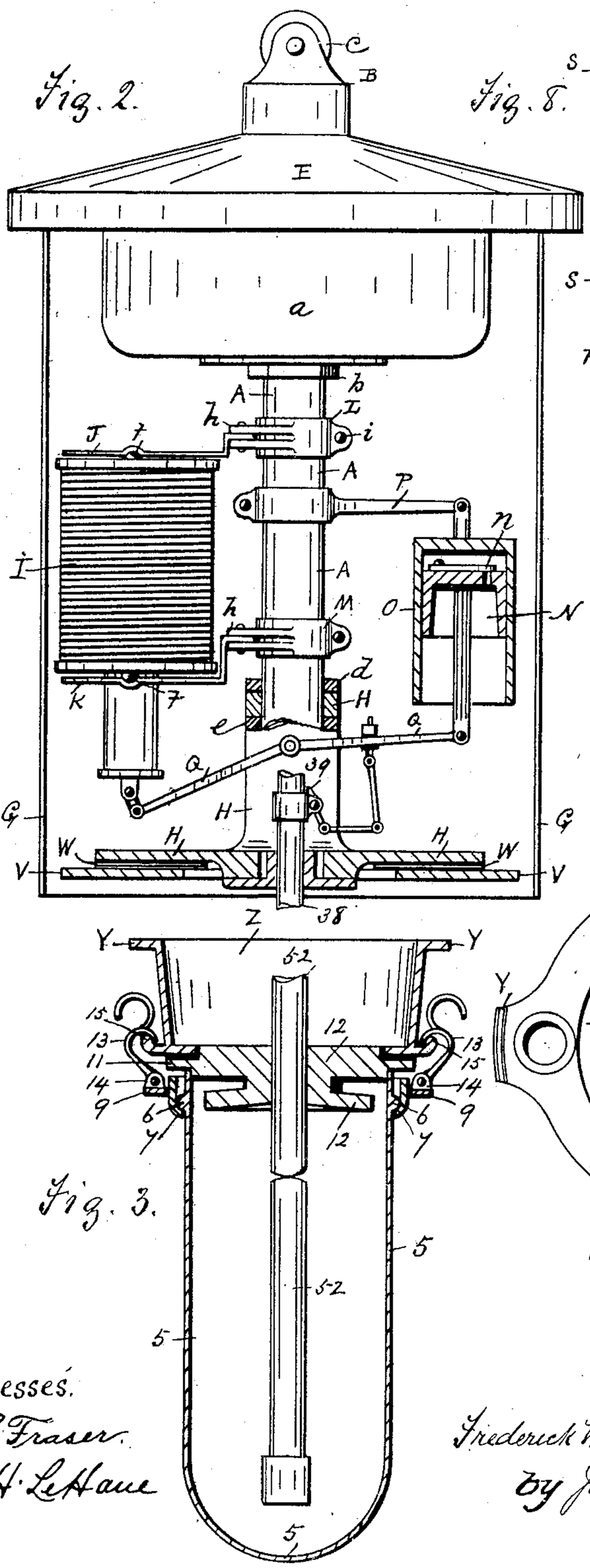
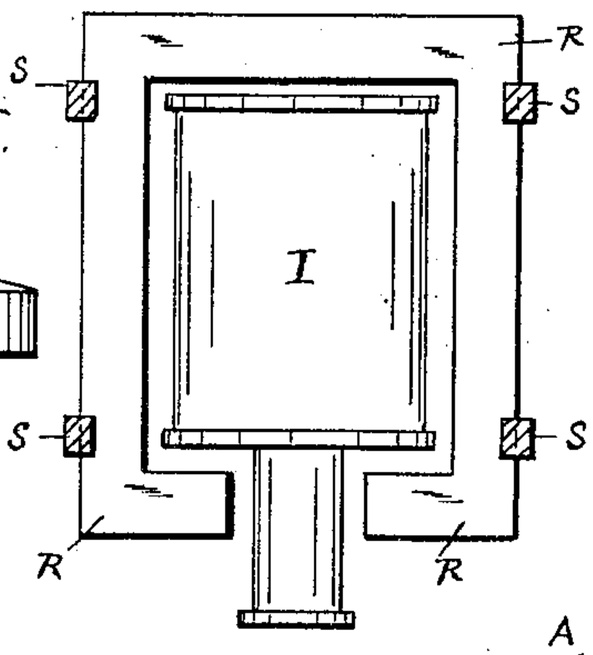


Fig. 8.



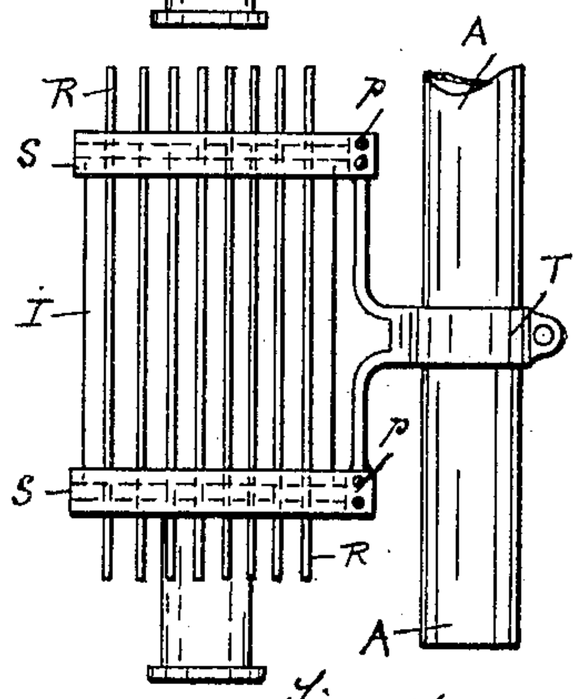


Fig. 7.

Fig. 3.

Fig. 4.

Witnesses.
M. S. Fraser.
M. H. LeHane

Inventors.
Frederick W. Martin and Frank Stewart
by John N. Hendry
Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 663,454. Patented Dec. 11, 1900.

F. W. MARTIN & F. STEWART.

ELECTRIC ARC LAMP.

(Application filed May 12, 1900.)

(No Model.) 3 Sheets—Sheet 3.

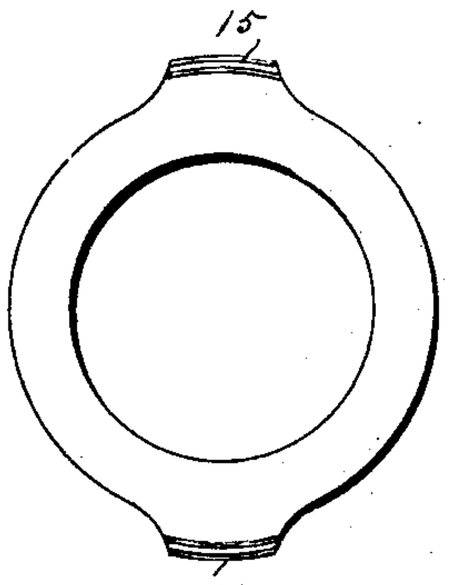


Fig. 5

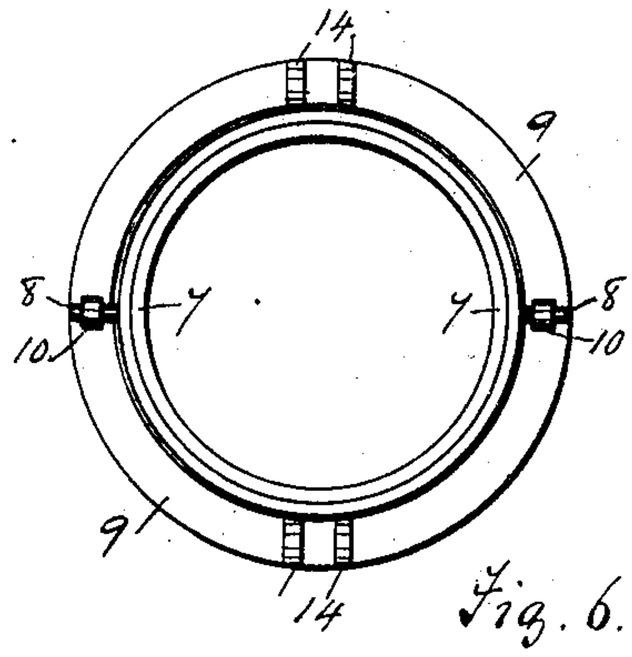


Fig. 6.

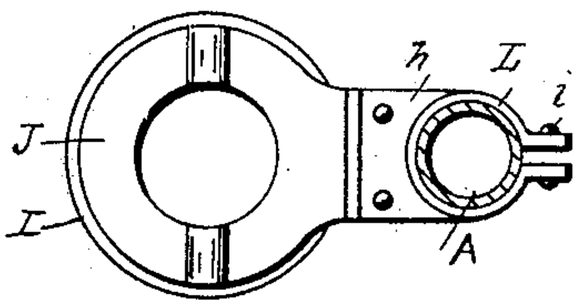


Fig. 9.

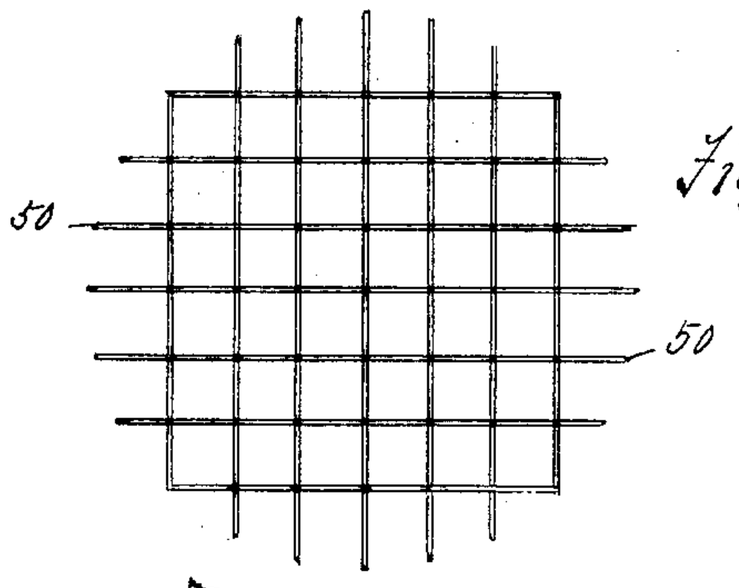
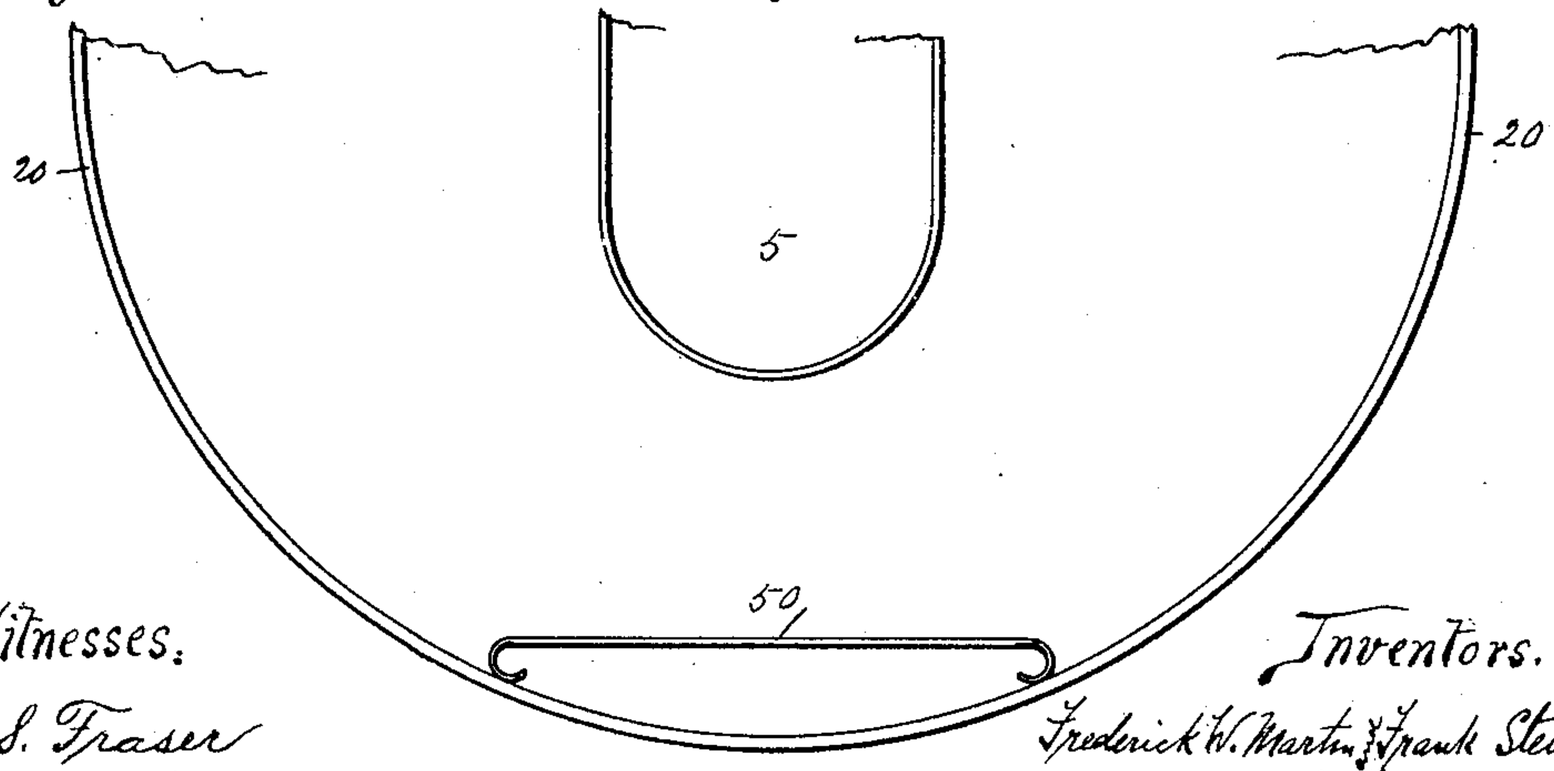


Fig. 11.

Fig. 10.



Witnesses.
M. S. Fraser
M. H. LeHane

Inventors.
Frederick W. Martin & Frank Stewart.
by John H. Hendry, Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

FREDERICK W. MARTIN AND FRANK STEWART, OF HAMILTON, CANADA, ASSIGNORS OF ONE-HALF TO BROWN, BOGGS & CO., OF SAME PLACE.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 663,454, dated December 11, 1900.

Application filed May 12, 1900. Serial No. 16,538. (No model.)

To all whom it may concern:

Be it known that we, FREDERICK W. MARTIN and FRANK STEWART, citizens of Canada, residing at Hamilton, in the county of Wentworth, in the Province of Ontario, Dominion of Canada, have invented new and useful Improvements in Arc-Lamps, of which the following is a specification.

Our invention relates to improvements in arc-lamps, and particularly to the constructive features thereof, in order to allow a ready and proper adjustment of the several parts comprising the lamp.

The objects of our invention are, first, to provide adjustable and non-rigid spring-supports for the magnet-coil to partly surround the magnet by laminated iron, thereby assisting the magnet in operation by strengthening and steadying the action of the core; second, to provide means whereby the magnet-coil may be readily removed from the lamp and replaced with fine or coarse wire, as preferred, to change the lamp from a multiple lamp with a coarse-wire coil or spool to a series lamp with the shunt-coil; third, to provide an adjustable support for the dash-pot and means to lessen the resistance to its action; fourth, to allow a proper adjustment and free movement of the upper and lower carbons; fifth, to provide means for holding the inner globe or chamber in position; sixth, to provide means for securing the outer glass globe to position and of lowering and suspending the same for cleaning, insertion of carbons, and other purposes, and, seventh, to afford facilities for the securing and the raising of the shade in order to effect the securing of the outer globe to position and the said lower suspension and to guard against the breakage of the same. We attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is an elevation, partly in section, of the arc-lamp, the magnet, and the dash-pot, with their holders being removed. Fig. 2 is a side elevation of the upper part of Fig. 1, showing the magnet and dash-pot, with their adjustable holders. Fig. 3 is a detail sectional side elevation of the lower framework with the inner globe in position. Fig. 4 is a plan of the framework of Fig. 3. Fig. 5 is a plan of the lower flange of said framework. Fig. 6 is a plan of the outer and inner rings around the inner globe to hold the same to the lower flange, designated Fig. 5 in the drawings. Fig. 7 is a side elevation of the laminated iron partially surrounding the magnet and adjustably secured to the main central supporting-tube, shown broken. Fig. 8 is a front elevation of the laminated iron of Fig. 7, showing its relation to the said central magnet. Fig. 9 is a plan of the upper adjustable spring-fastening of the magnet to the said central supporting-tube. Fig. 10 shows a very light wire mesh or mica resting on the bottom of the outer globe, shown broken; and Fig. 11 is a plan of the wire mesh shown in Fig. 10.

Similar characters refer to similar parts throughout the several views.

In the drawings the vertical and central main supporting-tube is indicated by A, the upper end of which is screwed into the lamp-hanger B, provided with a porcelain pulley C, which is adapted to receive a wire or hook to be suspended therefrom. E is a canopy or a cover on said tube and is held in position by a nut F, as is also the choke-coil *a*, by the nut *b*. The outer casing G suspends from the lugs *g* of the cover E. The flanged central bearing H is secured to the lower end of the tube A by the nuts *d* and *e* on the tube A. The magnet-coil I is secured to the tube A by means of upper and lower steel spring-plates J and K, having diametrical grooves or indentations to fit over and conform to the semicircular raised parts *f* on the upper and lower flanges of the magnet-spool. The bent ends of the magnet-springs J and K fit between the lugs *h* of the clamps L and M, which are capable of fastening to the tube A by means of screws or bolts *i* and also of adjustment on said tube. These spring magnet-holders prevent certain vibrations, also quiet the hum that would or may occur with more rigid supports. This magnet is capable of being removed from between these springs J and K by opening them apart. This is possible on account of their light spring construction. The magnet may be raised or lowered, as the case may be, to operate in

harmony with the plunger N of the dash-pot O, which is hung from the arm P, which is adjustably clamped to the tube A and fastened by screw *j*. The plunger N is provided with an air-valve *n* on its upper face. This air-valve reduces the resistance to the action of the magnet-core when pulling upward. The opposite result is attained from atmospheric pressure against the valve when the core of the magnet is pulling, thus causing a slow movement when forming the arc, this atmospheric assistance being very desirable in alternating arc lighting. The magnet and the dash-pot are connected by a common connecting-fork lever Q, which is centrally pivoted to the inner sides of the suspended bearing H and connected to the core of the magnet and to the stem of the plunger of the dash-pot, as is usual. The magnet is partly surrounded with laminated iron R, which is held in position by straps *q*, which are adjustably secured to the tube A by means of the clamp T, secured to said straps at *p* and *p*, and may be located between the magnet-clamp and the clamp-arm P of the dash-pot. This laminated iron R is free from the magnet and helps to carry the lines of force and to keep the coil of the magnet cool by making a path outside of the wire coil itself, particularly so for the shunt-coils, and also helps the magnetic circuit of the coil, also assists the magnet in operation by strengthening and steadying the action of the magnet-core.

U and U are side suspension-tubes hanging from the horizontal flange of the central vertical bearing H by means of the nuts *u* and *u*, which screw against suitable insulation on said flange, bringing the collars 2 against the lower metallic ring V with an intermediate insulating-ring W. The lower ends of these tubes U have collars 3 and screw into the side flanges Y of the lower metallic globe-support Z and are flush with the under side of said flange. A metallic ring-plate 4 is secured to the under side of the flange Y and rigid therewith.

The chamber or inner glass globe 5 has an upper collar 6, which fits into the annular recess of the ring 7. This ring is provided with two horizontal and diametrically-opposed pins 8, which rest upon the ring-plate 9, which encircles the ring 8. These pins 8 are secured to the ring 9 by suitable fastenings 10. This globe 5 is brought up snugly to position against the flange 11 of the gas-check 12 by means of spring-fastenings 13, which are pivoted to the lugs 14 of the ring 9. These fastenings 13 fit over the rounded projecting raised parts 15 of the lower outer projecting flange of the inner-globe support Z. The ring 9 is made of light steel, and a suitable packing may be applied between the glass collar of this globe and the recess of the ring 7 to allow the spring-fastening 13 to enter its fastening position, as shown in Fig. 3 of the drawings.

The outer glass globe 20 is secured to the ring 21 by, say, three equally-divisioned set-screws passing through said ring and into the circular groove of the neck of the globe, as is usual. This we do not claim. The ring 21 is secured to the two diametrically-lined brackets 22, which are held in position, as shown in Fig. 1 of the drawings, by means of the two spring-fastenings 23, the lower parts of which are secured to the ring 21, and the upper parts fasten over the rounded raised part of the aforesaid flange Y. It will be perceived that when these fastenings 23 are pressed outward by pressing the handles 24 of the spring inward the fastenings are released from the flanges Y. Consequently the globe 20, with its ring 21, the brackets 22, and the fastenings 23, may be lowered a certain distance. This distance is regulated by the length of the rods 25, the lower nuts 26 of which fit against the under side of the brackets 22 when in position, as shown, and the upper heads 27 rest upon the rigid ring 4 when the globe is lowered for various purposes connected with arc-lamps. Previous to this lowering of the outer globe 20, the shade 30 is secured to an angle-ring 31, to which is secured the lower circular casing 32, by screws 28, with spiral springs 29, to prevent the screws from working loose. An intermediate parallel casing 33 is secured to the flange of the casing 32 and telescopes into the upper casing 34, having an upper flange to fasten to the aforesaid ring V. Spring lifts and fastenings 35 are secured to the upper part of the casing 32 and are capable of fastening onto the projecting rim 36 of the parallel casing 34 when the shade 30 is lifted up. This adjustment of the shade to a higher position is important in order to allow for the manipulation of the side fastenings of the outer globe to suspend the same in a lowered position; also, to afford facilities for the manipulation of the fastenings referred to of the inner globe for carboning the lamp. These adjustments of the casings with the shade, together with the outer and inner globes, are necessary in the construction of this lamp in order that the interior of the lamp may be conveniently attended to—for instance, the introduction of the carbons 52 and other necessary attentions attending this style of lamp. It will be observed that these several adjustments alluded to may be accomplished without screwing and unscrewing nuts and bolts in the different parts. The method adopted in this invention is advantageous. The carbon-rod 38 is governed by any approved clutch 39, connected to the magnet and the dash-pot by the pivoted connecting-lever Q. The rod 38 passes through a bushing 40 of the central part of the suspended bearing H. The upper part of this rod is capable of operating in the central vertical tube A, and the carbon-holder 42 is connected to the rounded end of this rod 38 by an adjustable screw 43, with spiral spring 44, to allow certain tension and flexibility between the end of the rod and the carbon-holder. The carbon is held in

this holder by the screw 45. The lower carbon-holder 46 is held in position by means of its upper shank passing through the gas-check 12, and fastened by screw 47. Breakage of the inner globe happens frequently in arc-lamps through natural causes, and in consequence the outer globe is very often broken. To prevent this outer globe being broken by the falling glass of the inner globe, a light protecting-screen 50 is provided, to rest on the bottom of the interior of the outer globe to counteract the fall of the glass.

We are aware that arc-lamps are not new, nor many of the composite parts thereof herein illustrated and set forth—for instance, choke-coils, magnets, dash-pots connected to said magnets by pivoted levers, carbon-holders and carbon-regulating clutches, and also inner and outer glass globes and casings with shades. These we do not claim, broadly; but

What we do claim as our invention, and desire to secure by Letters Patent, is—

1. In an arc-lamp a main central tube, a lamp-hanger with central pulley, said tube screwed into said hanger for suspension therefrom, a canopy on said tube and against said hanger, a nut on the tube against the lower central part of the canopy to secure the same, a choke-coil on said tube, and against said nut, a nut on the tube to engage with the lower part of the choke-coil to secure the same, a bearing adjustably secured to the lower end of the tube, a lower horizontal flange on said bearing, side tubes suspended from said bearing, and a central bushing in said bearing for a carbon-rod to pass through and into said central tube, as described.

2. In an arc-lamp, a main suspended central tube, a magnet coil-spring ring-plates, diametrical grooves in said plates, raised parts on the magnet-spool for said grooves to hold and to allow removal of the magnet, adjustable clamps on said main tube to receive the ends of said ring-plates to adjustably attach the magnet to said tube, as described.

3. In an arc-lamp, a coil-magnet, indented spring-plates connected to raised parts on the ends of said magnet, to hold and to allow its removal, a suspended central tube, vertical adjusting-clamps on said tube to receive and fasten the ends of said spring-plates, an arm adjustably attached to the central tube to suspend a dash-pot, an air-valve on the upper end of the plunger of the dash-pot, to facilitate the operation of the magnet connected to said plunger, as described.

4. In an arc-lamp, a magnet-coil adjustably attached to a central main tube as described, laminated iron partly surrounding said magnet, without contact therewith, straps to hold the laminated iron, said straps attached to said main tube, a clamp on said main tube connected to said straps to hold the laminated iron around the magnet, for the purpose herein set forth.

5. In an arc-lamp, a suspended central main supporting-tube, a vertical bearing with horizontal flange at the lower end of said tube, upper and lower nuts screwed onto said tube and against said bearing to fasten the same, side tubes, a lower ring and an intermediate ring secured to said bearing, flange-collars on the tubes and upper nuts to fasten said rings and flange together, and to suspend said side tubes, a lower globe-support with horizontal flange, lower collars on said side tubes fitting against the upper side of the flange and the ends of the tubes screwed into said flange and flush with the lower side thereof, as described.

6. In an arc-lamp, side tubes, a central suspended bearing with horizontal flange to rigidly suspend said tubes, an outer globe-support with horizontal flange secured to the ends of the tubes, an inner glass globe, an upper collar on the inner globe, a ring with annular recess to grip said collar, diametrically-opposed pins projecting out from said ring, an outer ring-plate secured to the under side of said pins, lugs on said ring-plate at right angles to said pins, spring-fastenings pivoted to said lugs, a projecting flange with rounded raised part for said fastenings to engage to bring the top of the globe to a gas-check in the central and lower part of the support, as described.

7. In an arc-lamp, a central bearing with horizontal flange suspended by a main central tube, side tubes suspended from said flange, a glass-globe support with horizontal flange secured to the ends of said tubes, a ring-plate secured to the under side of said flange, an outer glass globe, an outer attached ring around the upper part of the globe, diametrically-opposed brackets secured to said ring, spring-steel fastenings secured to the ring, the upper part of said springs capable of fastening over the rounded raised parts of said horizontal flange, as described.

8. In an arc-lamp, an outer glass globe, diametrically-opposed brackets secured to a ring around said globe, vertical side tubes, a globe-support with horizontal flange secured to the ends of said tubes, rods with upper heads in said tubes, lower end nuts on the tubes to engage with said brackets, a ring-plate secured to the under side of said flange the heads of the rods to rest on said ring-plate to suspend the globe in a lowered position, as described.

9. In an arc-lamp, a shade resting on and secured to an annular flanged ring, an inwardly-curved casing secured to said ring by hand-screws, spiral tension-springs on said screws to retain the same, a parallel extension to said casing capable of telescoping into a parallel casing with projecting rim suspended from the ring-plate on the side tubes, a curved spring-plate secured to the inwardly-curved casing to lift the shade, and to fasten to the rim of the suspended parallel casing, as described.

10. An arc-lamp comprising a suspended central tube, a central bearing adjustably secured to the end of the tube, a horizontal flange on said bearing, side tubes suspended from

said flange, an inner globe-support with a horizontal flange secured to the ends of said side tubes, a lower and central gas-check bearing, forming a part of said flange, an outer globe supported by said flange, a protecting-screen in said globe, a carbon-rod to operate in the central tube and extending through a bushing in said bearing, and a carbon-holder adjustably connected to the end of said rod, as described.

Hamilton, Canada, April 30, 1900.

FREDERICK W. MARTIN.
FRANK STEWART.

Witnesses:
JOHN A. HENDRY,
MICHAEL H. LE HAUE.