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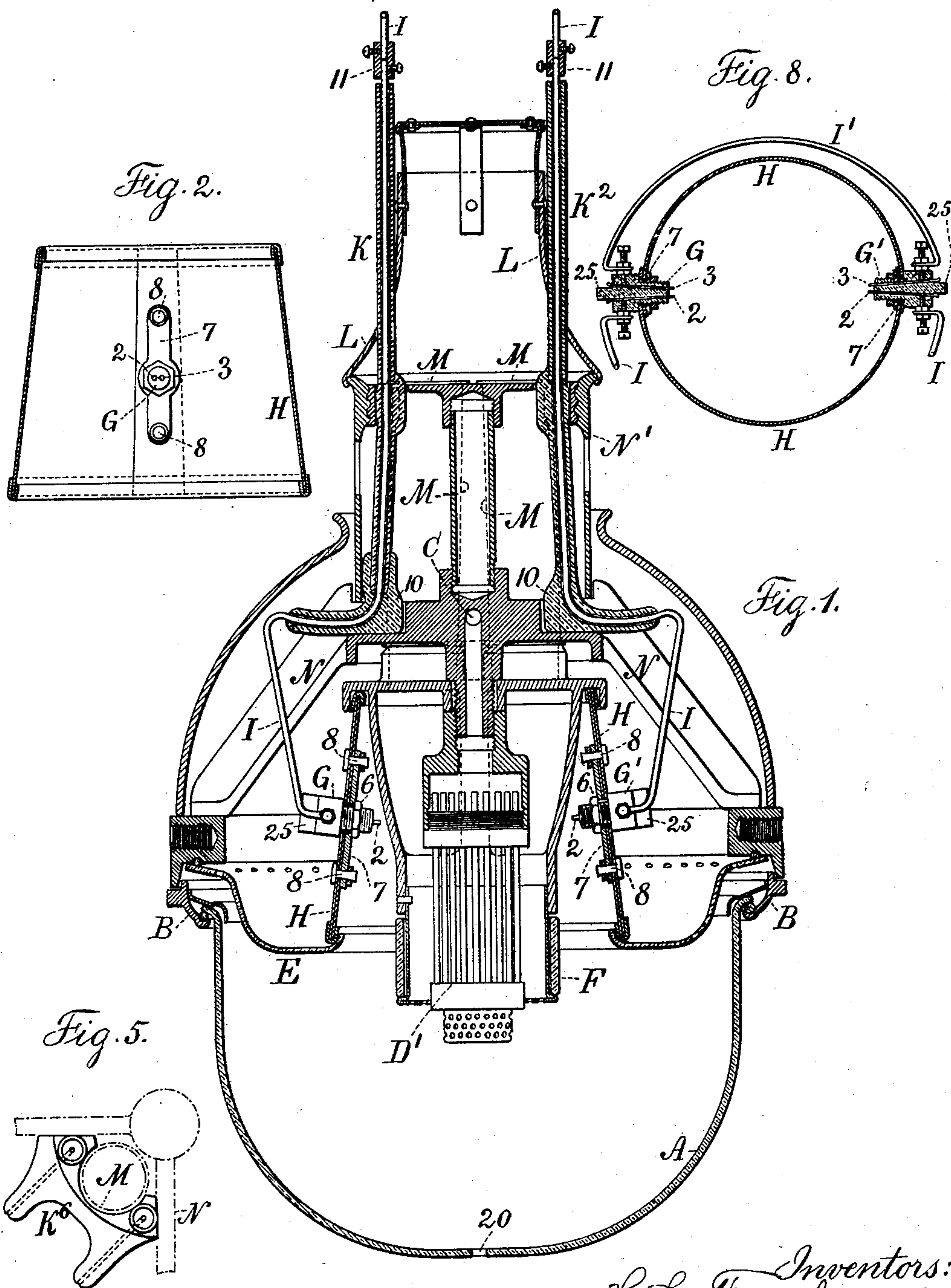
Patented June 20, 1899.

H. C. FARQUHARSON & D. F. ROOT.
GAS LIGHTING APPARATUS.

(Application filed June 14, 1897.)

(No Model.)

3 Sheets—Sheet 1.



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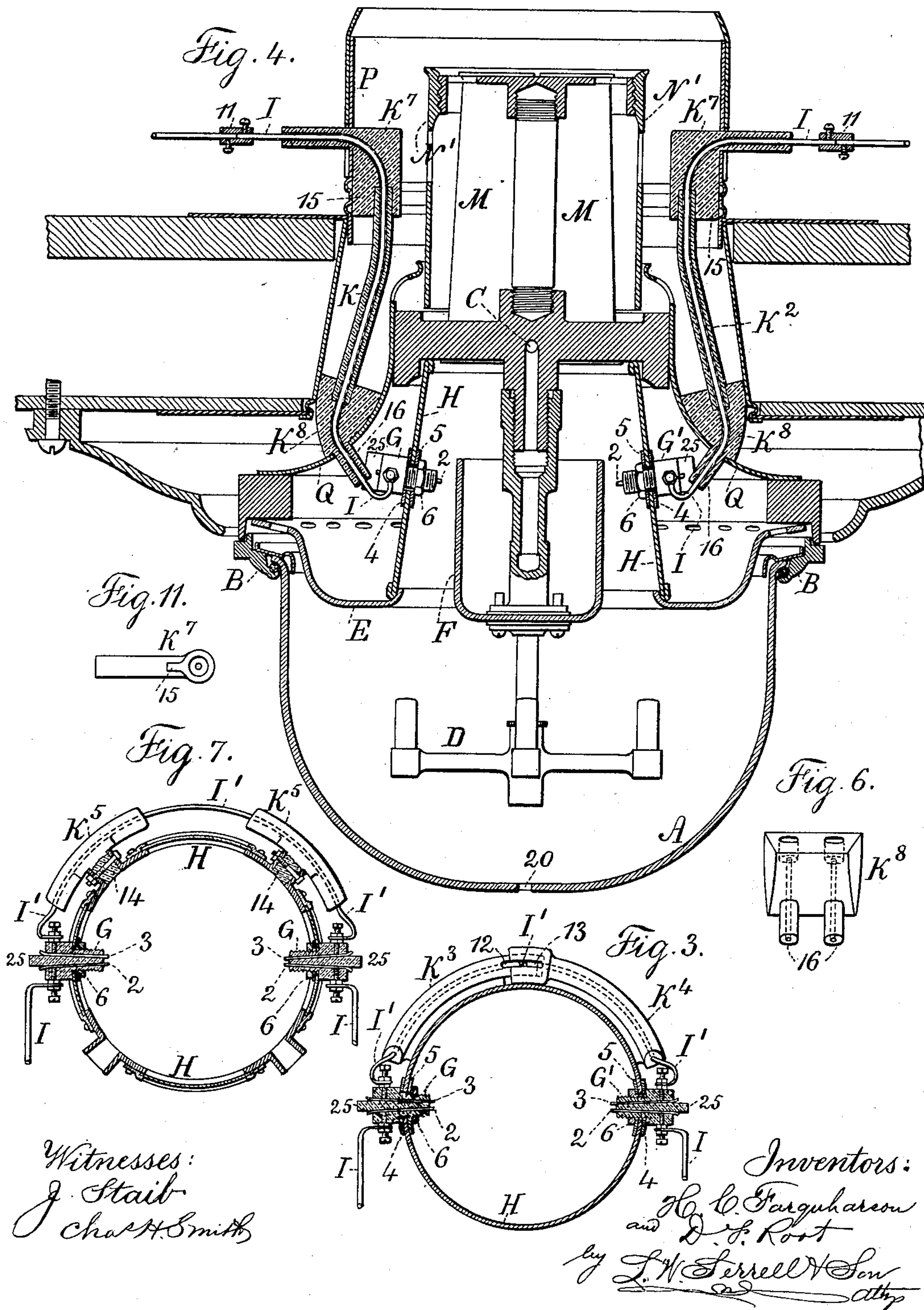
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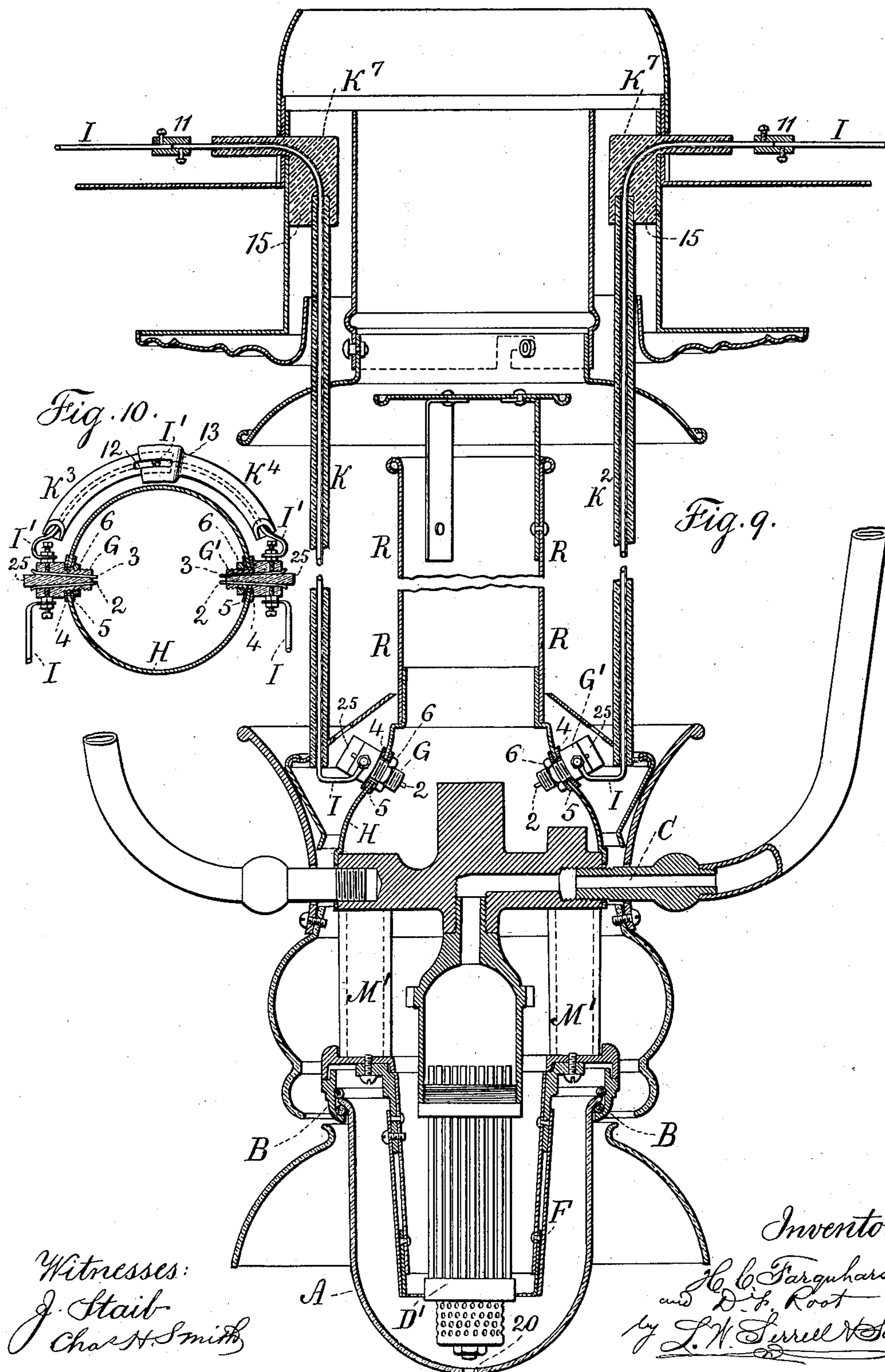
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3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

HENRY C. FARQUHARSON AND DENISE FRANK ROOT, OF NEW YORK, N. Y.,
ASSIGNORS TO THE FARQUHARSON ELECTRIC GAS LIGHTING COMPANY,
OF SAME PLACE.

GAS-LIGHTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 627,226, dated June 20, 1899.

Application filed June 14, 1897. Serial No. 640,666. (No model.)

To all whom it may concern:

Be it known that we, HENRY C. FARQUHARSON and DENISE FRANK ROOT, citizens of the United States, residing at New York, in the county and State of New York, have invented an Improvement in Gas-Lighting Apparatus, of which the following is a specification.

Difficulty has been experienced in leading the electric conductors to the gas-lamps in railway-cars in such a manner that the insulation is not liable to injury in consequence of the heat to which the parts are exposed. Especially is this the case in lamps that are suspended from the ceiling and provided with globes or shades below the gas-flame and with porcelain reflectors above such flame with an intermediate space for the passage of the products of combustion and chimneys or flues above such intermediate space, because the heat ascends and the electric conductors have necessarily to be brought down from above and within the general inclosure forming the lamp. In insulating the conductors in this class of lamps we have provided tubes of vitreous material that is a non-conductor; but we find that tubes made of glass or similar material are liable to break in consequence of sudden changes in temperature; but when these tubes are made of earthenware, such as porcelain, they are reliable both as insulators for the electric conductors and also as protecting the conductors from excessive heat, and they are not liable to injury under the ordinary circumstances of use.

Our invention relates to the combination, with the lamp and flues or chimney and the electric conductors for bringing the current to the spark-points, of inclosing tubes for receiving the electric conductors, such tubes being of porcelain or similar vitreous material and adapted to being received into or through the respective parts of the lamp in such a manner as to effectually insulate the conductors and to allow for the easy disconnection of the respective parts for cleaning or repairs, all as hereinafter more fully set forth.

In the drawings, Figure 1 is a vertical section of an ordinary car-lamp with the present improvements in position. Fig. 2 is a sectional elevation illustrating the manner in which the spark-points are supported upon a

chimney of mica or other material. Fig. 3 is a plan view representing the insulating-tubes between spark-points at opposite sides of the chimney. Fig. 4 is a section showing the insulating connection as applied to a car-lamp known as a "deck lamp." Fig. 5 is a plan view in one form, and Fig. 6 an elevation in another form, of a double tubular insulator. Fig. 7 is a plan view representing an insulator for receiving the conductor as it passes around a chimney, and Fig. 8 is a similar view with a different chimney. Fig. 9 is a vertical section of a car-lamp differing from Figs. 1 and 4, but showing the present invention. Fig. 10 is a plan view of the connection around the chimney shown in Fig. 9, and Fig. 11 is a plan view of one of the tubes.

The present improvements may be availed of in various hanging lamps—such, for instance, as the lamp known as the "Pintsch-Argand" lamp, Figs. 1 and 9, the ordinary Pintsch car-lamp, or the deck-lamp for cars, Fig. 4—but we do not limit our present improvement to any particular style of lamp.

The hanging glass or globe is represented at A, the same being connected to a ring B, and the gas-pipe is shown at C with tip-burners D or Argand burner D', and the ring-shaped porcelain reflector is shown at E and the central porcelain reflector at F. The tip-burners D are shown in Fig. 4 and the Argand burner D' in Figs. 1 and 9. G is the holder for the spark points or wires 2 and 3, and this is similar to the device represented in Patent No. 553,304; but where the chimney through which such holder passes is either metal or enameled metal, Figs. 3 and 10, it is advantageous to place a plate of mica 4 between the head of the holder G and the exterior of the chimney H and a similar mica plate 5 between the chimney and the nut 6 that secures the holder in position in order that the electric spark may not pass between the conductor and such chimney.

Where the chimney is of mica, as shown in Figs. 1, 2, and 8, it is preferable to perforate such mica for the passage of the holder at a place where the two ends or edges of the mica lap, so as to have such hole pass through two thicknesses, and to strengthen the mica at this point a plate 7 is introduced with a hole

through it for the passage of the threaded portion of the holder G, and this plate 7 extends upon the line of the lap of the mica and is secured at or near its ends by rivets 8 passing through the mica and through the plate 7, thus not only clamping the two thicknesses of mica together, but enlarging the support for the holder in its connection with the mica chimney.

- 10 The plate 7 does not extend to either of the end bands of the mica chimney, as in Patent No. 553,304; but it receives its support wholly from the mica, as illustrated in Fig. 2. Hence the risk of the electric current being short-circuited through this metal plate is lessened and the parts are rendered strong and reliable.

In the form of lamp shown in Fig. 1 the conductor I is to be brought in any convenient manner to the lamp, and preferably the same is surrounded with a coating of insulating material, which insulating coating is to be stripped off in the portion of the wire passing through the parts of the lamp, so that there will be nothing to catch fire, to burn, or to be injured in the hot portions of the lamp, and the conductor I passes through a tube K, of porcelain or similar earthenware, the upper end of which tube passes out through the metal extension - chimney L, and the tube passes down between two of the sheet-metal flues M of the lamp to the cast-metal frame or spider N, where it is bent outward and advantageously upward, so that the naked wire can be threaded through this tube of insulating material, such as porcelain, and emerge at the lower edge of such tube, and this tube K may be of one or more pieces, and where more than one piece is made use of in each tube it is advantageous to provide a socket upon one end of one tube to receive into it the end of the next tube.

In lamps of this character there is usually a metal case N' surrounding the sheet-metal flues M and above the spider N, and the porcelain tube K is between two of the flue-tubes M and within the metal case N', and it passes out below the lower end of such metal case N' and the case holds the porcelain tube in position; but it is advantageous to provide a heel 10 at the bottom of the tube K for the same to rest upon the base that holds the flue-tubes, so that there will be no tendency for the insulating-tube to become displaced or to be wedged and broken by any movement that may be given to the parts of the lamp when the same is in use.

The conductor I as it passes out from the lower end of the tube K may be led directly to the clamping-screw of either spark-point 2 or 3, as shown. A connector-clamp 11 may be provided into which the ends of the wire are passed and wherein they are bound by one or more screws. This allows for separating the parts of the conductor in case the lamp has to be taken apart for repairs.

If only one spark-point holder G is made

use of, the return-wire from the second spark-point 3 may be led through an insulating-tube similar to the tube K; but usually it is advantageous to make use of two holders with their spark-points at opposite sides of the chimney H, and with this object in view a tube K², Fig. 1, similar to the tube K is made use of, passing in through the metal extension L and down between two of the metal tubes M and out at one side of the spider and to one of the spark-points in the second holder G', and a conductor I', Fig. 3, extends between the second spark-points in the respective holders, such conductor being within the porcelain tubes K³ K⁴, which are made as arcs of a circle, and the socket upon one tube receives the end of the next tube, and there are slots 12 13 in the contiguous ends of the tubes K³ and K⁴, so that two conductors I' can be made use of, extending from the respective spark-points through the tubes K³ and K⁴ and out through the lateral slots, and after the parts are properly positioned the wires can be twisted together and then cut off, so that the ends of the wires lie within the slots at the ends of the tubes K³ and K⁴, and by this device the wires are protected from injury by the heat of the lamp, and they are effectually insulated electrically from the parts of the lamp, so that there is no risk of the electric spark being developed except between the spark-points for igniting the gas.

In cases where the chimney of the lamp is made of a metal frame with flanges that project outward, as illustrated in Fig. 7, it is advantageous to make the insulating-tube K⁵ with a lateral block 14 to pass in between the flanges of the chimney-frame and be held by them. This insulating-tube K⁵ keeps the conductor at a sufficient distance from the metal parts of the lamp and chimney to prevent the risk of short-circuiting or of a spark jumping from the conductor.

In cases where but one holder is provided for the spark-points the outgoing and incoming conductors are advantageously near together and pass through porcelain tubes K to the double branch K⁶, (shown in Fig. 5,) in which there are two or twin lateral tubes from the descending tubes through which the conductors are passed to the respective screw-clamps upon the holder G for the spark-points.

In the lamp represented in Fig. 4 the conductors usually pass above the car to the metal chimney-top P, and the insulating-tube K⁷, Fig. 11, of porcelain or similar material, is made with one arm passing through a hole in such metal chimney-top P, and there is a rib 15 for keeping the vertical portion of the bent tube K⁷ sufficiently far from the metal of the chimney-top P to insure proper insulation, and the vertical tube K passes down in one or more lengths through the inside of the chimney to the double tubular block K⁸, (shown in Fig. 6,) the exterior of such tubular block being adapted to set against the upper side of the lamp-top Q and between the same and the ring that connects the lamp with

the ceiling, and this block K^s has two tubes 16, that pass through the metal lamp-top and closely adjacent to the holder G for the spark-points, which holder passes through the lamp-chimney and is secured as aforesaid, and the connection between the screws for the spark-points and the conductors within the tube 16 is sufficiently short usually to dispense with any covering or insulation for such conductors at this point.

It is to be understood that when two holders or sets of spark-points are made use of at opposite sides of the lamp top or chimney a connection is to be made between the spark-points, as before illustrated, so that the circuit connections can be taken away from the second spark-point in the manner before described.

Where the lamp is provided with a long chimney, in order that there may be some distance between the top of the car and the lamp itself, with an independent hood or top to the lamp passing through the top of the car, as seen in Fig. 9, the conductors may be upon the top of the car and pass through an insulating-tube, with a rib 15 and with the porcelain tubes in one or more lengths extending parallel, or nearly so, to the metal chimney R, and thence through the top part of the lamp over the sheet-metal flue-tubes M', at which place the holder G and spark-points will be located, so as to ignite the gas that ascends through such sheet-metal flues, and the flame will flash back to the burner or burners in the glass half-globe.

We find that in some conditions of the atmosphere the illuminating-gas, when turned on and previous to the heat resulting from the ignition of the gas, is liable to subside into the glass globe and there accumulate, and hence when the accumulated gases ignite the explosion or puff may sometimes injure the glass half-globe. To prevent this, we find that it is only necessary to make a small hole—say from one-eighth to one-quarter of an inch in diameter—in the bottom portion of the glass half-globe, as seen at 20. This admits sufficient air to cause the gas to rise and pass up the chimney or flues to the place where the spark-points ignite the same. This hole allows a constant circulation of air through the car-lamp, even when the gas is not burning. Hence the lamp is in such a condition that the gas will rise to the spark-points as soon as it is turned onto the burner.

It is usually advantageous to make the tubes of porcelain or earthenware in comparatively short lengths, so that they may not be liable to injury in handling, and the lengths are made with a socket at one end to receive the tapering end of the next tube, so that the tubes can be set together as the conducting-wire is threaded through such tube, and it is still further advantageous to make the bends in the end portions of the tubes as gradual as convenient, so that the naked wire of the conductor can be pushed through such tubes and

will follow the contour of the curved portions by simply pressing the wire of the conductor endwise.

We find that in some instances the electric spark may pass between the wires at the back ends of the holder instead of between the points 2 and 3. To prevent this, we make a projecting partition 25 at the back end of the holder G, and such holder and partition being of insulating material a spark at this place is prevented between the wires of the spark-points.

We are aware that lamps have been made with half-globes of glass below the light and with register-plates or air-tubes in the middle part of the glass for the passage of air to the flame.

In our present improvement the glass is without any metallic devices that have tended to obstruct the light, and the air for combustion comes from above the glass, and we simply introduce in the glass a small hole that acts to prevent cold air from above settling and remaining in the glass half-globe and causing the gas when turned on to descend into the globe instead of ascending to the electric spark-points.

In the present lamp the electric conductors are necessarily brought from above, because the lamp hangs from the ceiling and they have to be retained adjacent to the metallic supports for the lamp and they are exposed to a high temperature, and we have found that asbestos and other insulating materials that have heretofore been employed as an envelop for the conductors lose their efficiency and that glass tubes are liable to crack and break.

The porcelain tubes made use of by us are efficient as electric insulators and they are not liable to injury by the heat or by sudden changes in temperature, and in addition to this the tubular conduits are made in sections, the end of one porcelain tube passing into and being received by the enlarged end of the next tube, so that the connection is very reliable.

In all instances the non-conducting refractory tubes are of earthenware, and preferably that quality of earthenware known as "porcelain," and these tubes are supported by the metallic portions of the lamp and extend sufficiently above and below such metallic supports to prevent sparks passing from the conductors to the metal of the lamp. In Fig. 1 the earthenware tube rests at the bottom on the metal portion of the lamp, and it extends laterally a sufficient distance to prevent a spark passing to the lamp, and it also is represented as passing above the top of the lamp for the same purpose. In Figs. 4 and 9 the earthenware tubes pass off laterally through the metal chimney-top and at the bottom through the metal lamp-top, and they extend beyond the metal for the purposes before mentioned.

We claim as our invention—

1. In a suspended lamp, the combination with the metal wire forming a conductor and

the spark-points for igniting the gas, of a tube of insulating material such as porcelain having a bend in it and a rib for holding the tube at the proper distance from the sheet-metal lamp-chimney or other article through which said insulating-tube passes, substantially as set forth.

2. The combination with the lamp-chimney or similar support and two holders for spark-points passing through such chimney or support at opposite sides, of conducting-wires connected with the respective spark-points, tubes of porcelain or similar insulating material through which the wires pass, there being slots in the tubes near their adjacent ends through which the wires can be drawn and twisted together for obtaining the electric connection, substantially as set forth.

3. The combination with the lamp-chimney or similar support and two holders for spark-points passing through such chimney or support at opposite sides, of conducting-wires connected with the respective spark-points, tubes of porcelain or similar insulating material through which the wires pass, there being a socket at the end of one tube receiving the end of the next tube and slots in the socket and tube through which the wires pass and are drawn up and twisted together to effect

the electric connection, substantially as set forth.

4. In a gas-burning lamp, the combination with the electric wires and spark-points, of double tubular insulating connections for the electric wires adapted to fit between the respective parts of the lamp-chimney, the tubular projections upon such double connection terminating at a distance from the metallic portions of the lamp-chimney to prevent the passage of a spark, substantially as specified.

5. In a suspended lamp, the combination with the spark-points and their holder, of wires forming the electric conductors to such spark-points, and tubes of porcelain or similar insulating material occupying substantially vertical positions and having curved or bent tubular portions at the lower ends of such insulating-tubes and a foot piece or bearing at the lower part of each insulating-tube, substantially as set forth.

Signed by us this 9th day of June, 1897.

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DENISE FRANK ROOT.

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