(No Model.) 2 Sheets—Sheet 1.

N. McCARTY.

ELECTRIC ARC LAMP.

No. 267,553. Patented Nov. 14, 1882.

Fig 1

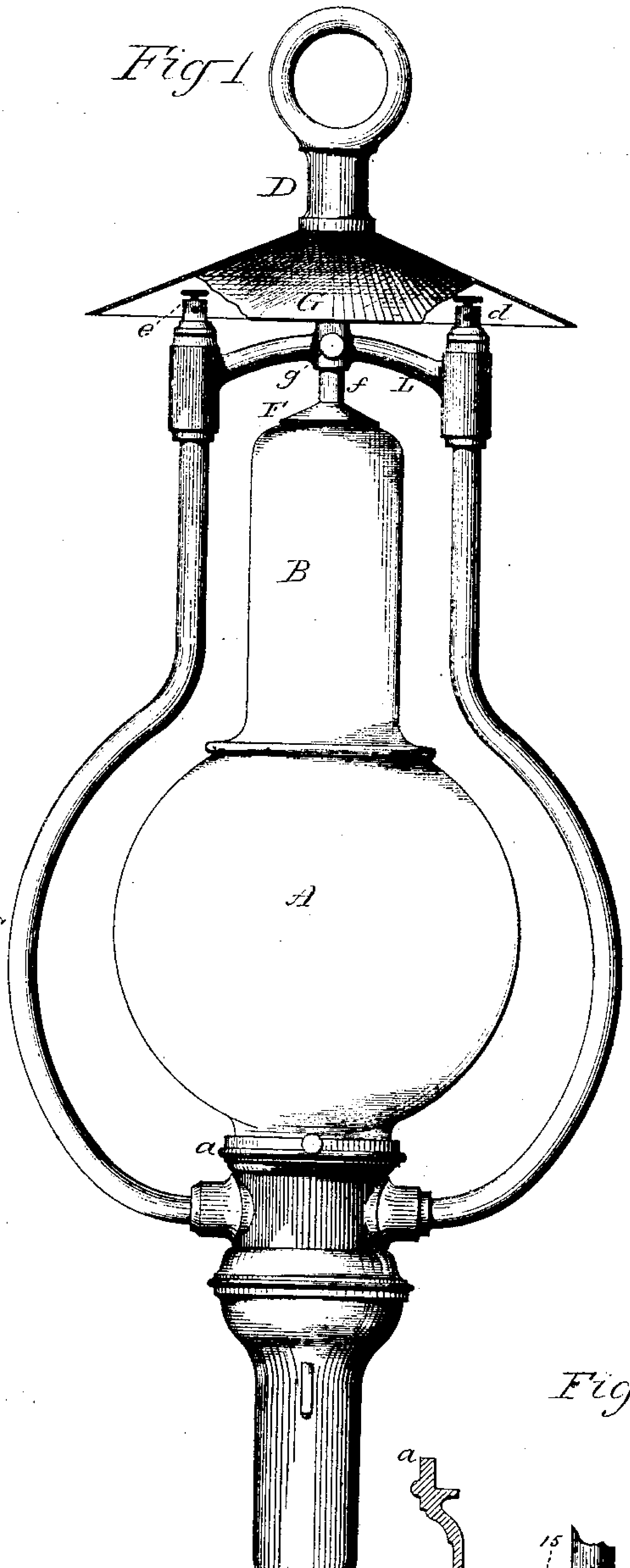


Fig. 2

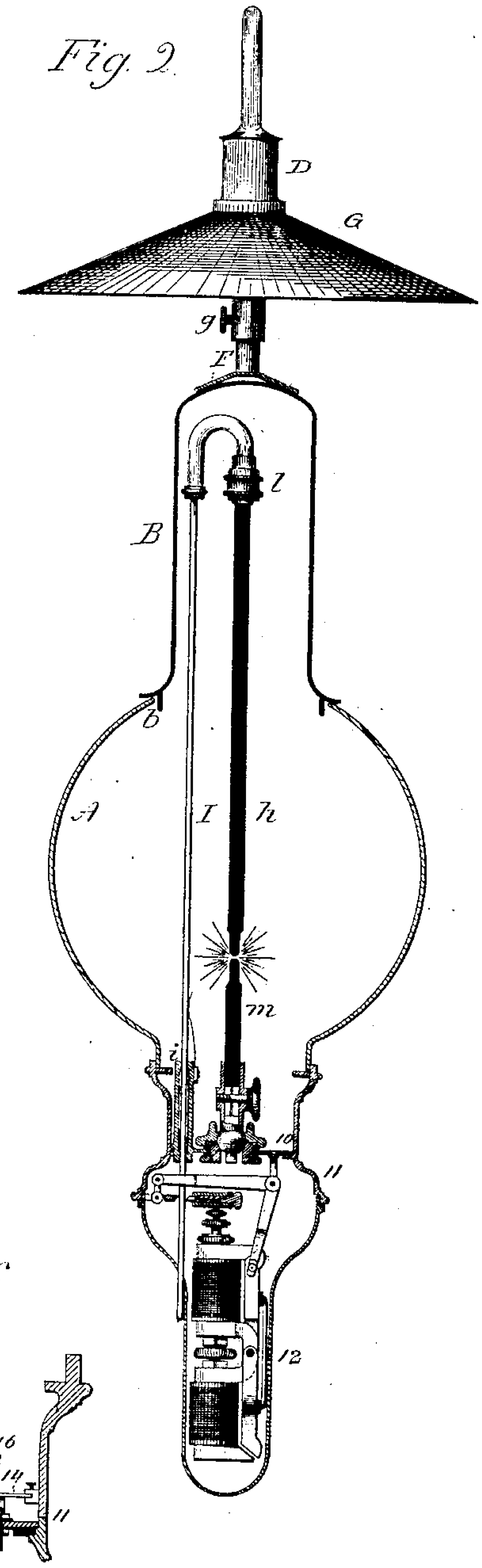


Fig. 6

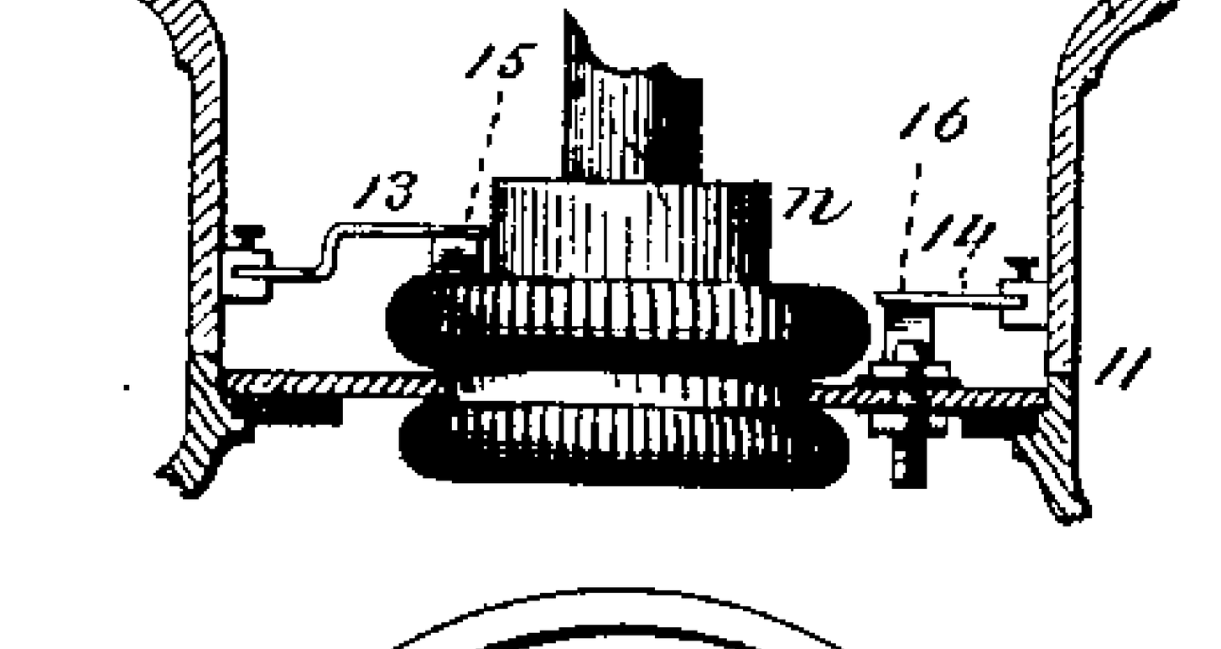
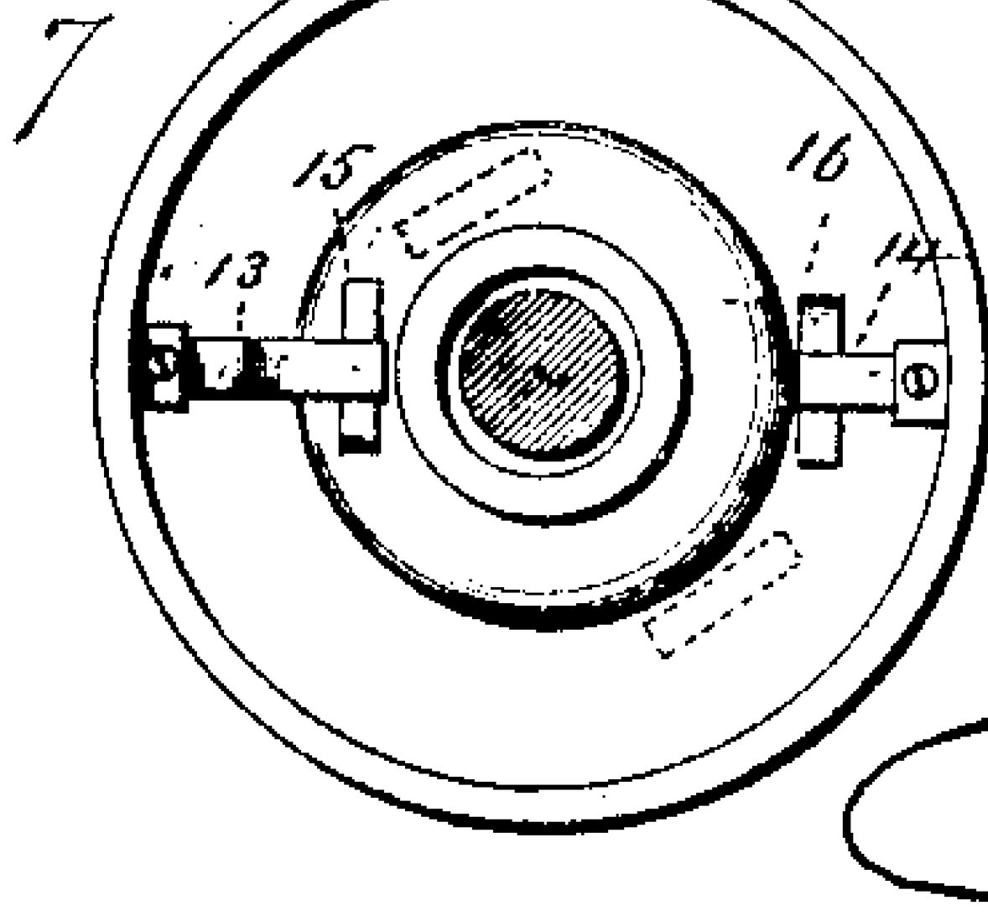


Fig. 7



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(No Model.) 2 Sheets—Sheet 2.

N. McCARTY.

ELECTRIC ARC LAMP.

No. 267,553. Patented Nov. 14, 1882.

fig. 3

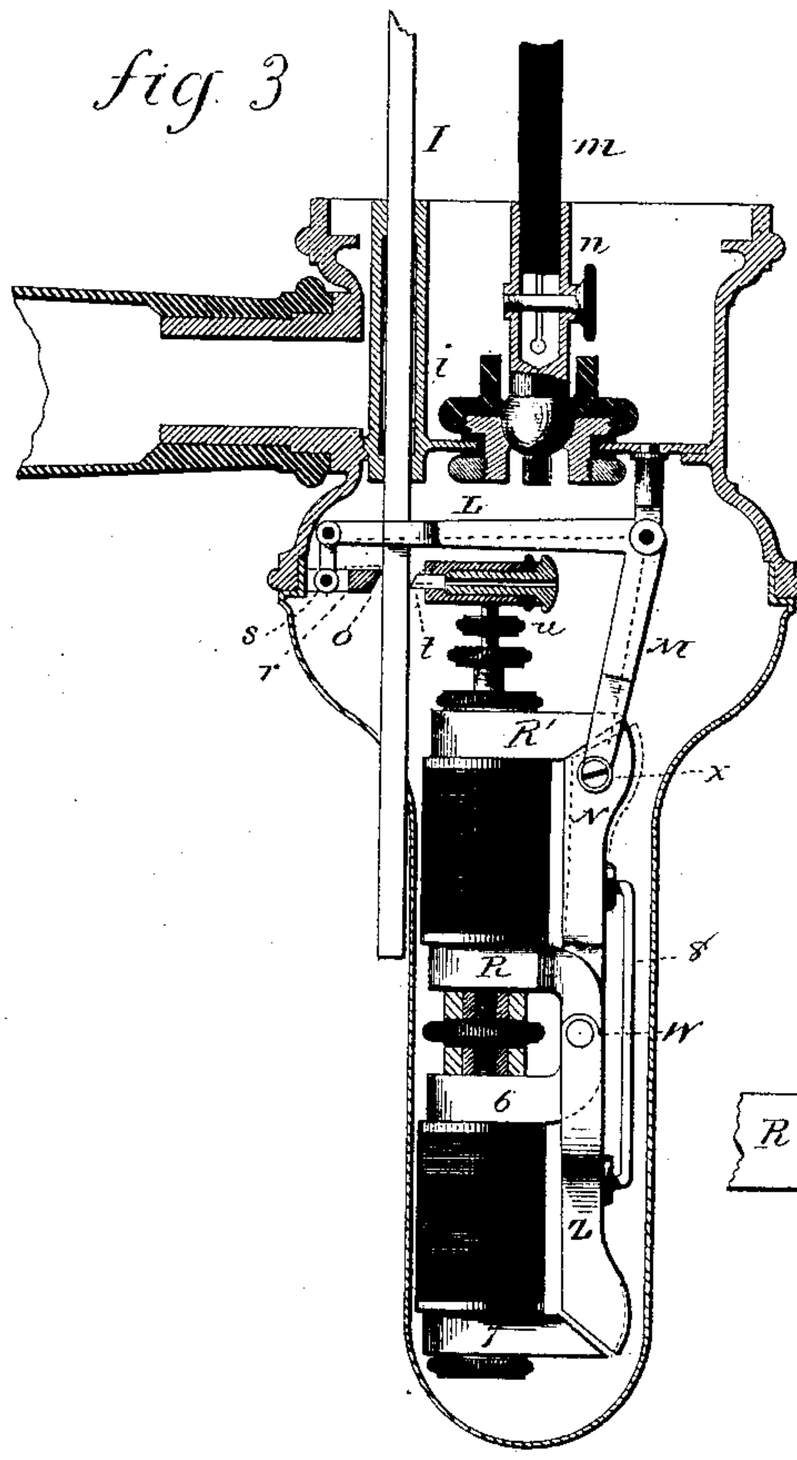


fig. 3a

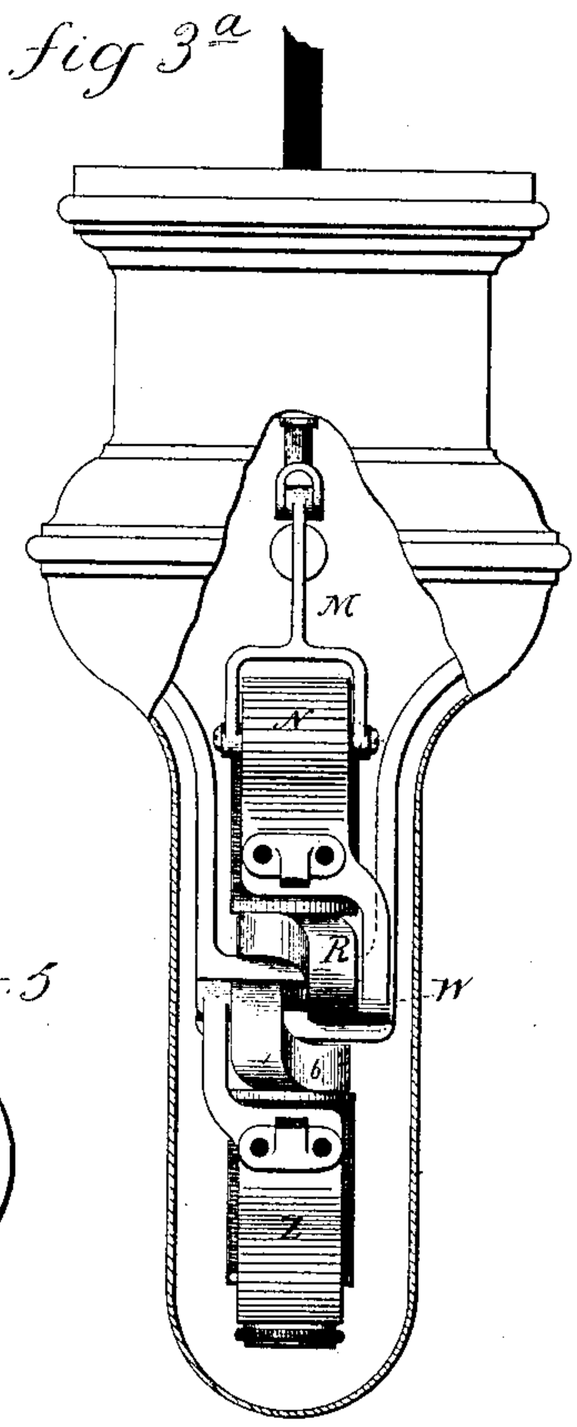


fig. 5

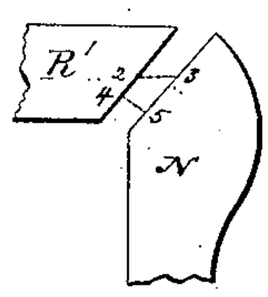
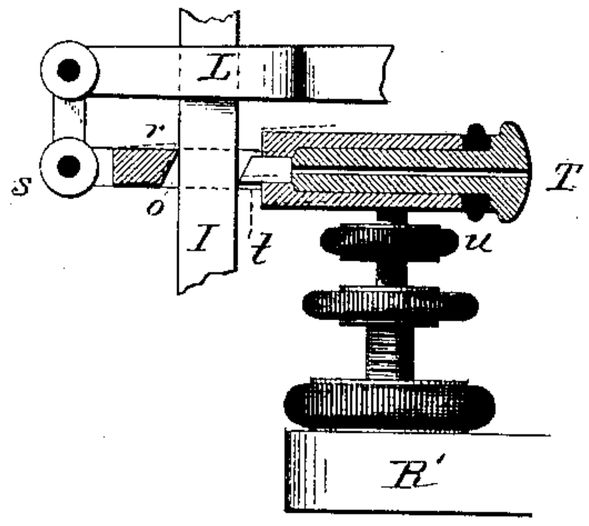


fig. 4



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UNITED STATES PATENT OFFICE.

NORMAN McCARTY, OF BROOKLYN, NEW YORK, ASSIGNOR TO THE ELECTRICAL SUPPLY COMPANY, OF ANSONIA, CONNECTICUT.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 267,553, dated November 14, 1882.

Application filed July 12, 1882. (No model.)

To all whom it may concern:

Be it known that I, NORMAN MCCARTY, of Brooklyn, in the county of Kings and State of New York, have invented new Improvements in Electric Lamps; and I do hereby declare the following, when taken in connection with accompanying two sheets of drawings, and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a side view of the hanging lamp; Fig. 2, vertical sectional view; Fig. 3, sectional side view enlarged; Fig. 3ª, sectional view taken at right angles to Fig. 3; Figs. 4, 5, 6, 7, detached views.

This invention relates to an improvement in lamps for electric light, the object being, first, to construct a protector or shade for the light, which shall completely inclose the carbons and prevent circulation of air around the points of the carbons; second, to arrange the entire mechanism of the lamp in a common holder below the shade, whereby the carbons and all the mechanism may be easily removed without disturbing or removing the globe or protector; and it consists, first, in a protector composed of a lower section of spherical shape, open at its bottom and top, and an upper section closed at its upper end and arranged to set upon and close the upper opening of the lower section, and so that the upper or adjustable carbon may extend through the lower section and up into the upper section and be readily removed therefrom without disturbing either section of the protector; also, in details of construction, as more fully hereinafter recited.

I will describe the first part of my invention as applied to a hanging lamp, as seen in Figs. 1 and 2.

A represents the globe, within which the carbons are arranged to form the electric arc by the mechanisms hereinafter described, or otherwise. This globe is surmounted by a second section or chimney, B. Both the globe or body A and the section or chimney B are made preferably from glass; but the upper section may be made of metal, the globe made so as to fit upon the holder *a*, and be there secured in the usual manner for securing globes to globe-holders, or otherwise. This is preferably of spherical shape, as shown. The second section, B, is cylindrical, fitted at its base to set into or upon the opening in the top of the globe, as at *b*, Fig. 2, and closed at the top. The globe-holder or lower part of the lamp is supported by two tubular rods, C C, from above, connected to a hanger, D, by a cross-bar, or otherwise. The line-wires are connected to the posts *e d* at the top. From thence connection is made by wires through the rods C to the respective carbons. At the center the cap F bears upon the upper end of the chimney-section B, so as to hold it in place and in engagement with the lower section or globe A, as seen in Fig. 2. This cap is adjustable vertically by being attached to a vertical central sliding rod, *f*, through the central tubular hanger, and by means of a spring or set-screw, *g*, so that when occasion requires the glass sections A B may be removed by raising the cap F from the top of the chimney-section. By this construction of the globe or "protector," as it may be called, circulation of air is avoided, the mechanism for the support of the carbons is entirely inclosed, and the lamp as a whole presents a neat and tasteful appearance. The rods C may be made highly ornamental, so that the lamp is an ornament to any apartment when compared with the electric lamps in general use. A reflector, G, is provided at the top and in connection with the central support. This construction of protector is applicable to various mechanisms for holding and feeding the carbons, and is also peculiarly adapted to a bracket-lamp, as seen in Fig. 3, the bracket-arm extending from the base or rest for the globe, or is adapted for a pedestal, the globe-holder being constructed as a cap for the pedestal.

The second part of my invention, which relates to the support and automatic adjustment of the upper carbon, is illustrated in Figs. 3 and 4 on an enlarged scale and to those figures I will refer particularly in describing this part of my invention.

I is the rod which carries the upper carbon, *h*. It extends through guides *i* at the base up into the section B, and is there turned in inverted-U shape, its end carrying a clutch, *l*, to grasp the upper end of the carbon *h*, as seen in Fig. 2, so that any vertical movement im-

parted to the rod I correspondingly moves the carbon *h*. The lower carbon, *m*, is secured by a clutch, *n*, in vertical axial line with the upper or movable carbon, *h*. The lower part of the rod I passes down through a clutch, *o*, hung to one arm, L, of a bell-crank lever. This clutch is shown enlarged in Fig. 4, and consists of one fixed jaw, *r*, and one adjustable jaw, *t*, the bite of the two jaws on the rod I being the one, *r*, above and the other, *t*, below a line through the hinging point *s* of the clutch. Below the body of the clutch, within which the adjustable jaw *t* is arranged, is a bearing, upon which the body part of the clutch will strike. This bearing, as here represented, consists of an adjusting-screw, *u*, which may be raised or lowered so that the point where the body of clutch will strike will be higher or lower according to the position of the screw *u*. The other arm, M, of the bell-crank lever is connected to the armature N of the magnet P. The armature N is arranged in a position parallel to the axis of the magnet, and hinged by one end to one pole, R, as at *w*, the opposite end constructed to come into contact with the pole R′, which is arranged at the opposite end of the magnet P. The meeting surfaces between the armature N and the pole R′ are at an angle of about forty-five degrees to the axis of the magnet. The arm M is hinged to the armature near its contact end, as at *x*. The movement of the armature is vibratory, turning upon the pivot *w* as its center of motion, and as indicated in broken lines, Fig. 3. When the circuit is closed and the armature in contact with the pole R′, as seen in Fig. 3, the arm L is raised, and the clutch, with the rod which it holds, is also raised sufficiently far to take the movable carbon from the stationary carbon and form the electric arc, and in this position the parts remain until the carbons shall have been consumed to such an extent as to weaken the current and allow the carbon to feed. So soon as this condition is reached the weight of the rod I, operating upon the armature through the clutch and the bell-crank lever, which carries it, turns the armature upon its pivot away from its pole, the clutch descending with the rod until the body comes in contact with the set-screw *u*, or whatever the stop may be. Then the hinged end *s* of the clutch continues its descent with the arm L of the lever until the armature is fully thrown back. This last movement turns the jaws out of their grasp upon the rod, as seen in broken lines, Figs. 3 and 4, and brings the jaws of the clutch to a point below where the body of the clutch was stopped. In the meantime, the rod I, with the carbon which it carries, having been freed by this turning of the clutch, is dropped until the arc-resistance is lessened sufficient for the magnet to operate the clutch. Then the armature N will be again drawn to its pole R′, and in such movement will correspondingly turn the lever L M. The first part of the movement of the arm L is to raise the clutch from the position seen in broken lines, Fig. 4, to the clasping position seen in the same figure, then continuing its movement the lever raises the clutch with the rod I in its grasp, and this last part of the movement of the lever L raises the rod I to take the movable carbon away from the lower or stationary carbon to form the arc, as before, and so continuing the carbon will burn until the arc becomes too large, and then the arc will be regulated again by the dropping of the rod, as before described. In the clutch the jaw *t* is made adjustable by means of a set-screw, T, introduced longitudinally through the body, and so as to bear against the jaw, as seen in Fig. 4. By turning the screw inward the jaw *t* is moved toward the other jaw *r*, and so as to contract the space or grip of the two jaws, or, turned in the opposite direction, will correspondingly increase the distance between the jaws. The nearer together the two jaws are brought the quicker will be the grip upon the rod, and vice versa, so that the arc made by the closing of the armature upon its pole may be adjusted—that is, made greater or less according to the time at which the clutch clasps the rod. The time at which the clutch will release the rod, so as to permit it to fall after the arc is broken, may also be adjusted by means of the set-screw *u* or stop upon which the clutch strikes in order to turn it from its grasp—that is to say, the sooner the clutch strikes the stop the sooner it will release its grasp upon the rod.

In the usual construction of the armature of a magnet with relation to its pole the movement of the armature is at substantially right angles to the face of the pole, and the movement of the armature corresponds to the distance between the face of the pole and the face of the armature when the circuit is broken. By making the meeting-faces of the pole and armature on an angle as described, when the circuit is broken, the movement of the armature is measured on a line at right angles to the axis of the magnet—as from 2 to 3, Fig. 5; but the break in the magnetic circuit is measured at right angles to the respective faces—as from 4 to 5. This distance from 4 to 5 indicates the movement of the armature in the usual construction; but by making the surfaces inclined the movement is increased by so much as the distance 2 3 is greater than the length of the break 4 5. If therefore the break 4 5 be the utmost limit, the movement of the armature to act upon the clutch is increased beyond that extreme, as described, and in proportion to the angles of the faces of the armature and pole; consequently the movement of the clutch with the bell-crank lever is proportionately increased.

The clutch in this construction simply acts to raise the bar and carbon to form the arc and hold them in their proper relative position until the circuit is too weak to support the rod. Then the rod is free to drop independent of the clutch. With only one light upon a circuit the single magnet P is all that is required; but where two or more lights are

on the same circuit a shunt-circuit is made by a second magnet, V, arranged in axial line with the magnet P, and an armature, Z, hinged to the pole 6 at one end, and so as to vibrate to and from the pole 7 at the opposite end. The two armatures N and Z are joined by a non-metallic connection, 8, or otherwise, so as to operate in the usual manner in making a shunt-circuit. It will be observed that the armatures are hinged at opposite ends of their respective magnets, the pivot of the two being in the same axial line, as seen in Fig. 3ª. By their connection 8 the movement of one is imparted to the other, and so that the closing of the magnetic circuit in one breaks the magnetic circuit in the other. The arrangement of the wires for so doing, indicated in broken lines Fig. 3, are too well known to require further description. By this construction the mechanism is all contained in the lower portion of the lamp, and is inclosed by a casing, as seen in Figs. 1 and 2. The casing is made detachable from the globe-holder *a*, or that part to which the arms C are attached, in like manner for detaching the lamp of a common lantern—that is by a bayonet, or may be a screw, joint, as seen at 10, Fig. 2—or so that one part may be removed from or engaged with the other, and held in position when so engaged. All the mechanism and the lower-carbon holder are attached to the part 11 of the casing, and so as to be removed or replaced with that part. The lower part, 12, of the casing is made removable from the part 11 by screws or otherwise, so as to expose the mechanism, should occasion require. By this construction, whenever it is desired to replenish the carbon, adjust the mechanism, make any repairs, alterations, or examinations of the operative parts of the lamp, it is only necessary to take hold of the lower part, turn it partially around to its unlocked position, then remove it substantially in the same manner as a common lantern-lamp is taken from the base of the lantern, and to replace it in like manner the removal of the globe or protector is unnecessary. To break the circuit when the mechanism is to be removed and to close it when replaced the wires through the respective rods C terminate within the base of the globe-holder in the shape of springs 13 and 14. (See Figs. 6 and 7.) These are preferably flat strips of brass or equivalent metal. On the lower-carbon holder is a similar flat spring, 15, which, when the mechanism is secured in place, comes in contact with the spring 13, so as to make connection of one line with the lower carbon. 16 is a similar spring, arranged in connection with the magnet, and so that when in place it comes in contact with the spring 14 or end of the other wire, and connects through the magnet with the other carbon to make the circuit in the usual manner. When the part 11, which carries the mechanism, is turned, as for the purpose of removal, it takes the springs 15 and 16, respectively, from the two springs 13 and 14, as seen in broken lines, Fig. 7, and consequently breaks the circuit, which cannot be again closed until they be returned into the locking position. Hence, before the mechanism of the lamp can be removed for any purpose, the circuit must be broken. Other devices than the springs mentioned may be employed to open and close the circuit in the removal and replacing of the mechanism.

In some cases it is desirable to adjust the lower carbon, leaving the upper stationary. In that case substantially the same mechanism is employed, and arranged in the lower part of the lamp in substantially the same manner, it only being necessary to reverse the action of the clutch and provide a counterbalancing mechanism for the lower carbon-holder to correspond to the action of gravity in the case of the upper carbon being adjustable.

In other cases it is desirable that both the upper and lower carbons should be adjustable. In such case the two holders will be connected together by gearing or otherwise, in the usual manner for such connections, the clutch operating in the manner hereinbefore described to adjust the one carbon-holder, and which communicates its adjustment to the other.

I do not wish to make claim in this application to the peculiar construction of armature described, as that will constitute the subject of a separate application for patent; and I wish it to be understood that this armature is included in the present invention only to the extent as it is an element in the combination for feeding the carbon.

I claim—

1. The herein-described protector for electric lamps, consisting of the lower or globe section, A, and the upper close section, B, constructed to close the upper opening in and form a continuation of the lower section, combined with the upper and lower carbon holders, the said upper section inclosing the upper-carbon holder, substantially as described.

2. In an electric lamp, the two carbon-holders, one or both adjustable, and the mechanism for adjusting said holder or holders, all arranged in a portion of the lamp below the globe-holder, said portion, with the said carbon-holders and mechanism, made detachable from the globe-holder, combined with mechanism, substantially such as described, whereby the circuit is completely broken in the act of disengaging the said mechanism from the globe-holder, and the circuit closed in replacing the said mechanism, substantially as described.

3. In an electric lamp, the two carbon-holders, one or both adjustable, and the mechanism in connection with the principal magnet for adjusting said holder or holders, all arranged in a portion of the lamp below the globe-holder, said portion, with the said carbon-holders and mechanism, made detachable from the globe-holder, combined with a shunt-magnet the armature of which is in magnetic connection with the armature of the principal magnet, so that the power of one tends to overcome the power of the other, and also arranged in

the portion of the lamp below the globe-holder, substantially as described.

4. In an electric lamp, the combination of the bell-crank lever L M, the one arm, M, hung to the armature, and the two jaws *r t* hung to the other arm of the lever, said jaws arranged to grasp the carbon upon opposite sides, substantially as described.

5. In an electric lamp, the combination of the bell-crank lever L M, the one arm, M, hung to the armature, and the two jaws *r t* hung to the other arm of the lever, said jaws arranged to grasp the carbon upon opposite sides, and said jaw *t* made adjustable relatively to the jaw *r*, substantially as described.

6. The combination of the armature N, arranged substantially parallel with the axis of the magnet P, hinged to one pole, R, at one end and its meeting surface with the pole R′ at the other end on an angle to the axis of the magnet, and the bell-crank lever L M, carrying the clutch *o*, with the rod I, carrying the adjustable carbon of an electric lamp, substantially as described.

NORMAN McCARTY.

Witnesses:
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