(19) Office de la propriété intellectuelle du Canada / Canadian Intellectual Property Office
Un organisme d'Industrie Canada / An Agency of Industry Canada

(11) Publication number: **CA 53476**
(13) Document type: **A**
(43) Publication date: **14.09.1896**
(51) Int. Cl:

(12)

(21) Application number: **53476D**
(22) Date of filing: **18.02.1896**
(30) Priority:

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(54) **ELECTRIC FLASH LIGHT APPARATUS**
(54) **APPAREIL A ECLAT DE LUMIERE ELECTRIQUE**

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TO ALL WHOM IT MAY CONCERN:

Be it known that I, GEORGE R. LAWRENCE, of the City of Chicago, County of Cook, and State of Illinois, U. S. A. Photographer, having invented certain new and useful improvements in an ELECTRIC FLASH LIGHT APPARATUS, and I do hereby declare that the following is a full, clear and exact description of the same.

This invention relates to improvements in an apparatus to be used by photographers for producing flash light,- and it consists in certain peculiarities of the construction, novel arrangement and operation of the various parts thereof, as will be hereinafter more fully set forth and specifically claimed.

The objects of my invention are FIRST, to provide a flash light apparatus, which shall be simple and inexpensive in construction, strong and durable, yet effective in operation; SECOND, such an apparatus the parts of which are so constructed and arranged that they may be readily folded into a compact form, so that the device can be conveniently carried; THIRD, to furnish a flash light apparatus whose parts may be so adjusted as to cause a uniform and equal diffusion of the light, thus avoiding the formation of pronounced shadows, and also the reflection caused by polished surfaces, which prevent the best results from being obtained, as is well known; and

FOURTH, to provide a flash light apparatus which shall produce a light of great temporary power or luminosity, for photographic purposes, the ignition of the powder used thereon being accomplished by means of an electric current, and simultaneously with the exposure. Another object of my invention is to dispense with as near as possible, the use of set-screws for adjusting the various parts of the apparatus. Still another object is to provide a means to ignite the powder on two or more of the apparatuses at the same time, when it is desired to photograph a vista, or when a greater light is required than one apparatus will afford.

Figure 1, is a view in front elevation of my invention, as it appears when extended and ready for use, illustrating by dotted lines the adjustability of the light supporting arms or pans.

Figure 2, is a view in elevation of the tripod, the supporting frame and its adjustable arms for the lights, and the movable bars for the support of screens and reflectors, showing them detached from one another, yet in their folded positions.

Figure 3, is an enlarged perspective view of one of the brackets, (showing it foreshortened for convenience of illustration), and a portion of the adjustable bars thereon for the support of the screen or reflector.

Figure 4, is a perspective view (also foreshortened) of the supporting frame, showing the method of having an electric connection with a portion thereof.

Figure 5, is a rear view in elevation, partly broken away, showing a portion of the supporting frame and a part of one of the light supporting arms or pans, and its electric conductor.

Figure 6, is a plan view, partly in section, taken on line 6, 6, of figure 5.

Figure 7, is a cross sectional view of one of the light supporting arms, taken on line 7, 7, of figure 5, and showing the manner of igniting the flash light powder.

Figure 8, is a plan view showing the method of making one of the fuses used in my apparatus.

Figure 9, is a perspective view of a flexible or spring fuse.

Figure 10, is a vertical sectional view of the lower portion of the supporting stand or tripod, showing the electric connections for the apparatus.

Figure 11, is a similar view of the upper part of said stand, and a portion of the supporting frame or standard, illustrating the upper part of the electric connection.

Figure 12, is a vertical sectional view, showing a modification of the construction of the lower portion of the supporting stand, and electric connections for the apparatus.

Figure 13, is a similar view, showing a modification in the construction of the upper electric connection.

Figure 14, is a vertical sectional view of a portion of the lower part of the supporting stand, showing the electric connections for the apparatus, an electro-magnet connection

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for operating one or more apparatuses simultaneously. And

Figure 15, is an enlarged perspective view of a part of the electric connection used with an electro-magnet showing it detached.

Similar letters refer to like parts throughout the different views of the drawings.

A, represents the main supporting post of the tripod or stand, and is preferably hollow to receive an auxiliary post or tube A', which telescopes therewith, and may be secured in position by means of a set-screw a, in the upper portion of the main post. Near the upper part of the main post A, are pivotally secured legs a', which are suitably braced by means of bars a^2, pivotally secured to said legs and to a sliding collar a^3, on the main post, thus forming a tripod or stand which may be folded together, as shown in figure 2 of the drawing. The lower end of the post A, is closed and is provided with hooks a^4, and a^5, or other attaching devices, upon which the battery B, may be suspended, thus utilizing the weight thereof as ballast, and also obtaining a direct electric connection through the suspending devices a, and a', with the supporting frame, as will be presently more fully explained.

Within the lower portion of the post A, is a cylinder b', which is open at its bottom and closed at its top, and is adapted to be raised against the contact point or piece b^2, by means of pneumatic pressure or air forced through the hose or pipe b^3, connected to the lower end of the post, by means of the bulb b^4, which bulb may

also simultaneously operate the shutter of the camera through the pipe or hose b^5, in the ordinary manner. Just above the top of the cylinder B', and within the post is located an insulator b^6, in which is fixed the terminal b^7, of the conductor B^3, the other end of which is passed through the post A', and secured to the piece b^8, attached to and insulated from the said post and adapted to engage with the hollow and slotted piece F, on the supporting standard. To the hook a^5, which is insulated from the post A, is secured a spring a^7, which extends through an opening a^8, in said post and is provided with the contact piece or point b^2, to be pressed against the point or terminal b^7, by means of the cylinder B', thus completing the circuit. The upper end of the auxiliary post or joint A', is formed with a socket a^6, for the reception of the lower end of the supporting frame or standard C, which is made of metal and preferably hollow. This frame or standard C, is preferably constructed of two pieces c, which are united and reduced at their lower portions, as shown in figures 1, 2, and 4, of the drawing, and are divided or separated to near their upper ends to form a vertical slot or mide-way c', for the reception and operation of the light supporting arms or pans D. To the upper ends of the pieces c, forming the standard C, and usually between said pieces, is secured a piece c^2, substantially "I"-shaped in cross-section, which piece together with the upper end of the pieces c, form grooves or sockets c^3, and c^4, for the reception of brackets E, which have their inner ends downturned and formed with prongs e.

to fit within the sockets e^3, and e^4, on the face and back of the supporting frame or standard. The lower portion of the rear part of the piece e^2, is bent outward from the standard and formed with an arm e^5, on which is secured a hollow piece F, which is provided on its side adjacent to the standard with a vertical slot f, through which passes and operates the conducting wires G, for the flash light supporting arms or pans D, the inner ends of which arms operate on the pieces e, forming the standard. To the rear surface of the standard C, and near the juncture of the pieces e^2, thereof, is secured a bracket e^6, having an upturned arm e^7, which supports the lower end of the piece F, which piece is provided with an insulator f^1, at its top and bottom and is connected to an electric conductor B^2, through the piece b^6, from the battery B, by means of a spring clasp b^3, or otherwise, which clasp is secured to the rear surface of said piece. The arms or pans D, for the reception of the powder are formed smaller in cross-section, as shown in figures 1 and 7, of the drawing, and when placed in position for use will present a vertical wall d, from which will extend forwardly a floor d^1, in the angle of which floor and wall the magnesium or other powder d^2, represented by dotted lines in figure 7 will rest. The upper edge of the wall d, of each of the pans or arms D, is bent outwardly to form a tube d^3, for the reception of the conducting wire G, which is insulated from said tube. The walls d, of the pans D, are provided at proper points with slots or openings d^4, for the reception and retention of suitable

fuses h, which fuses are provided with a platinum wire h', to unite the circuit. The conductor G, is exposed to the fuses at the slots g^4, in the pans, as is clearly shown in figure 6, and the rear surface of the walls g, of the pans are provided with springs i, to press the fuses against the exposed portions g, of the conductors G, thus causing ignition of the powder. The inner ends of the conductors G, are bent rearwardly so as to extend into the slot f, of the piece F, and then laterally, as at f', as shown in figures 5 and 6, of the drawing, and are provided with washers f^2, to prevent accidental dislocation from the piece F. The inner portion of the arms or pans D, are provided with projections d', which strike one of the pieces g, of the standard or supporting frame, and are secured together by means of a rivet or pin D^2, which passes through the slot g', in the standard, thus pivotally but movably securing the pans or arms D, thereto.

By reference to figure 5 of the drawing, it will be seen and understood that the pivot points of the arms D, are somewhat above the floor g^3, thereof when said arms are in a horizontal position, and that said construction affords a very strong brace for the arm, which may be secured at any desired point on the standard, as is illustrated by dotted lines in figure 1 of the drawing. The arms or pans D, may be made extensible if desired by pivotally securing on their ends additional pieces D^3, (shown in figure 11 which may be of the same construction as above described. The outer ends of the brackets E, are

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provided with adjustable arms E', on the ends of which may be secured hooks or rests g^2, for the bars for screens and the like. It will be understood that one of the brackets E, may be fitted in the socket g^3, or otherwise secured to the top of the standard, thus holding the adjustable rods or arms E', some distance in front of the flash light arms or pans, and that a like bracket provided with like arms may be secured in the socket or grooves g^4, to extend to the rear of the standard, when a suitable reflector may be attached to the arms E', on the rear bracket, and a translucent material attached to the arms E', on the front bracket. It is apparent that as the rods or arms E', are pivotally secured on their respective brackets, that the pieces of the translucent material or reflectors may be readily shifted as desired.

From the foregoing and by reference to the drawings, it will be seen and clearly understood that the standard may be provided with any number of arms or pans for the flash light powder, and that said arms may extend on either side of the standard and be raised or lowered to any suitable position to give the desired effect, yet when not in use may be folded to the standard, as shown in figure 2, of the drawing. The current passing through the conductor or suspending device b^2, will charge the supporting standard, and the conductor or device b', and pieces g^7, g^2, g^8 and b^3, will charge the piece F, and through its conductors G, within the tubes of the flash light pans.

In figure 3, I have shown a fuse and the manner of making the same, which I prefer to use with my apparatus,

and the said fuse consists of a strip of card board or other suitable material around which is diagonally wound a wire l', so that the same will cut or imbed itself into the edges of the card board or piece l, forming indentations or slots l^2. The piece or board l, is then cut into parts of the form illustrated by continuous lines in figure 8, thus affording an extended portion l^3, having shoulders l^4. The extended piece l^5, of the fuse is adapted to be inserted into the slots l^4, of the arms or pans until the shoulders l^4, of the fuses rest against the walls a, thus affording uniform lengths of the fuse wire exposed.

In figure 9, I have shown in perspective, a fuse which is composed of a flexible piece m, bent back upon itself, as shown, to form a spring, and is provided with an external covering m', of asbestos or other fire-proof material. On this covering is placed a wire n, which when the fuse is placed in position, will complete the circuit between the conductor G, and the spring l, on the pan or arm. On account of the spring of this fuse, it is obvious that the contact will be absolute, and for this reason I may use it instead of the one shown in figure 8.

Instead of using the hollow and slotted piece F, as shown and described, I may employ a wire in lieu thereof, and loop or otherwise securely connect the inner ends of the conductors G, therewith. I may also sometimes form the upper portion of the auxiliary post A', with a square socket for the reception of the lower end of the standard C, and also for the lower portion of the piece F,

which piece must be insulated from the standard C, and
the connection with the conductor B^2, may be made within
the auxiliary post.

As shown in figures 12 and 13, which represent
modifications embodying said feature, and in which I
employ a rod Q^2, instead of the wire B^2, which rod extends
through an insulated tube 0, within the post A', which tube
is secured at its lower part to an insulated washer Q^3,
fixed in the post A, by means of a contact screw Q^5, to
the lower part of which is secured a contact piece Q^6,
which is insulated from the post A, and formed at its
lower end with a hook R^5, for the suspending device R',
of the battery. On the opposite side of the post A, is
secured a contact-piece Q^4, insulated from the said post,
and formed at its lower end with a hook R^4, for the
suspending device R. Just above the piece Q^4, a spring
Q^5, is secured at its upper end to the post A, and thrown
into contact with the piece Q^4, by means of a rod Q^6,
pivoted in the post A, and which is raised by means
of the cylinder S', which is forced upward by air pressure
through the tube $\bar{A}$.

In figure 14, I have shown another modification
in the connections of the lower part of the apparatus,
which I use to flash the powder when two or more one
apparatus is employed, or when it is desired to operate
another located at some distance. In this modification
practically the same construction is used, as shown in
figures 12 and 13, except the rod Q^6, is omitted, and an

electro-magnet F, having connections E, with the distant apparatus is secured on the post A, from which it is insulated. Below the magnet F, is pivoted on the post A, and insulated therefrom, a spring-actuated lever E', which engages with a spring E², secured at its lower part to a piece E⁵, attached to the piece E⁴, on the post or standard. On the inner surface of the piece E⁵, and insulated therefrom is secured a metal piece E⁶, formed at its upper end with a yoke E⁸, to engage the spring E², when released from the lever E', when said lever is raised by the magnet, which operation charges the post A, through the strip E⁶, located between the piece E⁴, and post A, or standard.

While I have shown and described a pneumatic connection between the lower portion of the frame and casers, yet I do not desire to be limited to such a device, as I may employ other and equivalent means to complete the circuit and make the exposure simultaneously.

Having thus fully described my invention, what I claim as new, and desire to secure by letters-patent, is:

1. An electrically connected supporting frame or standard in combination with an electrically connected piece secured parallel with said standard, a series of arms or pans movably and adjustably secured to the standard, each carrying an electric conductor, and a number of fuses adapted to complete the circuit on the pans or arms and to ignite the powder, substantially as described.

2. The combination of an electrically connected supporting frame or standard with an electrically connected piece secured parallel with said standard, a series of arms or pans movably and adjustably secured to the standard, each carrying an electric conductor, engaging at their inner ends with said piece, and a number of fuses adapted to complete the circuit on the pans or arms and to ignite the powder, substantially as described.

3. The combination of a supporting frame or standard with a battery electrically connected thereto, a piece secured parallel with said standard, and having an electric connection with the battery, a series of arms or pans movably and adjustably secured to the standard, each carrying an electric conductor engaging at their inner ends with said piece, and a number of fuses adapted to complete the circuit on the pans or arms and to ignite the powder, substantially as described.

4. The combination of a supporting frame or standard with a battery suspended thereon and having one of its

connections therewith through one of its suspending devices, a piece secured parallel with said standard and having an electric connection with the battery, a series of arms or pans movably and adjustably secured to the standard, each carrying an electric conductor, engaging at their inner ends with said piece, and a number of fuses adapted to complete the circuit on the pans or arms and to ignite the powder, substantially as described.

5. The combination of a supporting frame or standard having an electric connection, with an adjustable and folding stand, a piece secured parallel with said standard and having an electric connection, a series of arms or pans movably and adjustably secured to the stand and each carrying an electric conductor engaging at their inner ends with said piece, and a number of fuses adapted to complete the circuit on the pans or arms and to ignite the powder, substantially as described.

6. The combination of a supporting frame or standard mounted on an adjustable stand, with a battery suspended thereto and having a connection therewith, a piece secured parallel with said standard and having an electric connection, a series of arms or pans movably and adjustably secured to the stand and each carrying an electric conductor engaging at their inner ends with said piece, and a number of fuses adapted to complete the circuit on the pans or arms and to ignite the powder, substantially as described.

7. The combination of an electrically connected supporting frame or standard with a hollow and slotted

piece secured parallel therewith having an electric connection, a series of arms or pans movably and adjustably secured to the standard and having receptacles for the fuses an electric conductor, on each pan or arm, extending at its inner end through the slot and into the hollow of said piece and adapted to contact therewith, and a number of fuses adapted to complete the circuit on the pans or arms and to ignite the powder, substantially as described.

8. The combination of an electrically connected supporting frame or standard with a hollow and slotted piece secured parallel therewith having an electric connection, a series of arms or pans movably and adjustably secured to the standard and having openings in their walls to receive the fuses, an electric connector, on each pan or arm, extending at its inner end through the slot and into the hollow of said piece and adapted to contact therewith, and a number of fuses adapted to complete the circuit on the pans or arms and to ignite the powder, substantially as described.

9. The combination of an electrically connected supporting frame or standard with a hollow and slotted piece secured parallel therewith, having an electric connection, a series of arms or pans movably and adjustably secured to the standard, each of said arms or pans being provided with a tube to receive a conductor, and receptacles for the fuses, an electric conductor, in each of said tubes, extending at its inner end through the slot and into the hollow of said piece and adapted to contact therewith, and a number of fuses adapted to complete the circuit on the

pans or arms and to ignite the powder, substantially as described.

10. The combination of an electrically connected supporting frame or standard having a vertical slot or guide-way with a hollow and slotted piece secured parallel therewith having an electric connection, a series of arms or pans having forked projections at their inner ends to straddle the standard and rivets to movably and adjustably secure them thereto, so that when lowered to a horizontal position they will be firmly braced, an electric conductor, on each of said arms or pans, extending at its inner end through the slot and into the hollow of said piece and adapted to contact therewith, and a number of fuses adapted to complete the circuit on the pans or arms and to ignite the powder, substantially as described.

11. The light supporting arms or pans D, having the tubes $\underline{d}^5$, the conductors G, in said tubes, and receptacles on the tubes for the reception of the fuses, the same contacting with the conductors, substantially as described.

12. The light supporting arms or pans D, having the tubes $\underline{d}^5$, the conductors G, in said tubes, the slots $\underline{d}^4$, and springs $\underline{i}$, for the fuses, substantially as described.

13. The combination with the supporting standard C, of a hollow and slotted piece F, secured parallel therewith and each having an electric connection, and the arms or pans D, pivotally and movably secured on said standard, and having the tubes $\underline{d}^5$, and receptacles for the fuses, the conductors G, located in said tubes and extending at their inner ends into the piece F, substantially as described.

Witnesses.

14. The combination with an electric conducting supporting frame provided at its lower portion with attaching devices for the battery, of said battery suspended thereon by means of conductors, a piece secured parallel with the frame and near the same and electrically connected with the battery, a pneumatic device in the lower portion of the frame to complete the circuit when desired, substantially as described.

15. The combination with an electric conducting supporting frame provided at its lower portion with attaching devices for the battery, of said battery suspended thereon by means of conductors, a piece secured parallel with the frame and near the same and electrically connected with the battery, a pneumatic connection between the lower portion of the frame and owners to complete the circuit and make the exposure simultaneously, substantially as described.

16. The combination with an electric conducting supporting frame provided at its lower portion with attaching devices for the battery, of said battery suspended thereon by means of conductors, a piece secured parallel with the frame and near the same and electrically connected with the battery, a pneumatic device in the lower portion of the frame to complete the circuit when desired, a series of pans or arms movably and adjustably secured on the frame and having receptacles for the films, an electric conductor on each pan or arm, adapted to engage a conductor at its inner end, and a number

of fuses to complete the circuit on the pole or arm and to ignite the powder, substantially as described.

17. The combination of the main supporting post A, provided at its lower portion with the hooks a^4, and a^5, and internal cylinder B', with the battery B, having the devices b, and b', to engage the said hooks and to form an electric connection, the pneumatic bulb b^4, having the pipe b^5, connected to the post and adapted to raise the cylinder B', and complete the circuit, substantially as described.

18. The combination of the main supporting post A^4, provided at its lower portion with the hooks a^4, and a^5, and internal cylinder B', with the battery B, having the devices b, and b', to engage the said hooks and to form an electric connection, the bulb b^4, having a pneumatic connection with the lower part of the post A, and arms and adapted to complete the circuit and to raise the explosive, substantially as described.

19. A fuse consisting of a piece of material, having shoulders l^4, and a projection l^5, with a wire wound diagonally around said piece and inserted in its edges, substantially as described.

Witnesses: George Kilbourne

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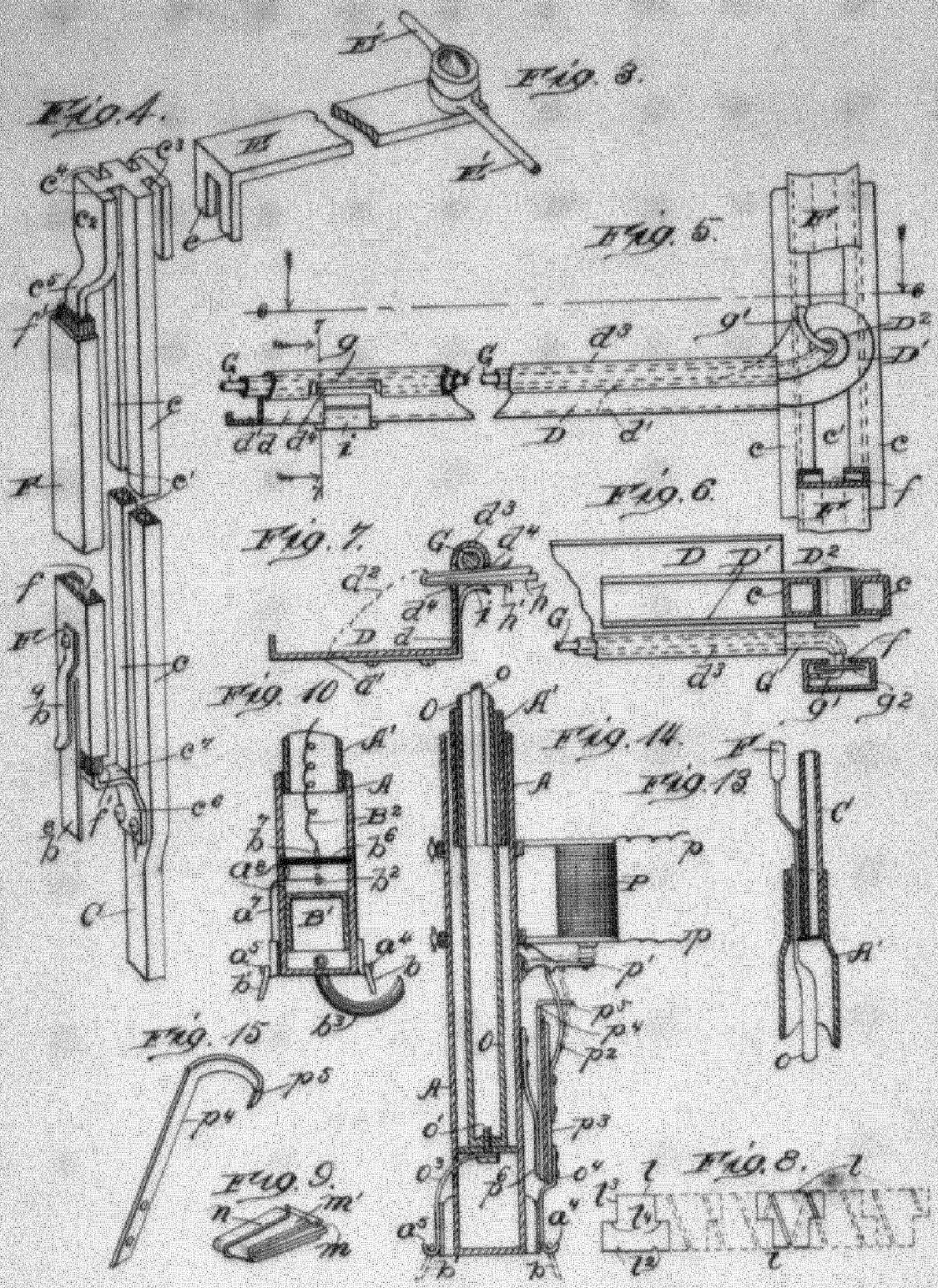
Thomas F. Dolan

Chicago, Ills. U.S.A.

February 5th 1886.

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ELECTRIC FLASH LIGHT APPARATUS.



Certified to be the Drawings referred to in the specification hereunto annexed.

Chicago Ills. February 5th 1896.

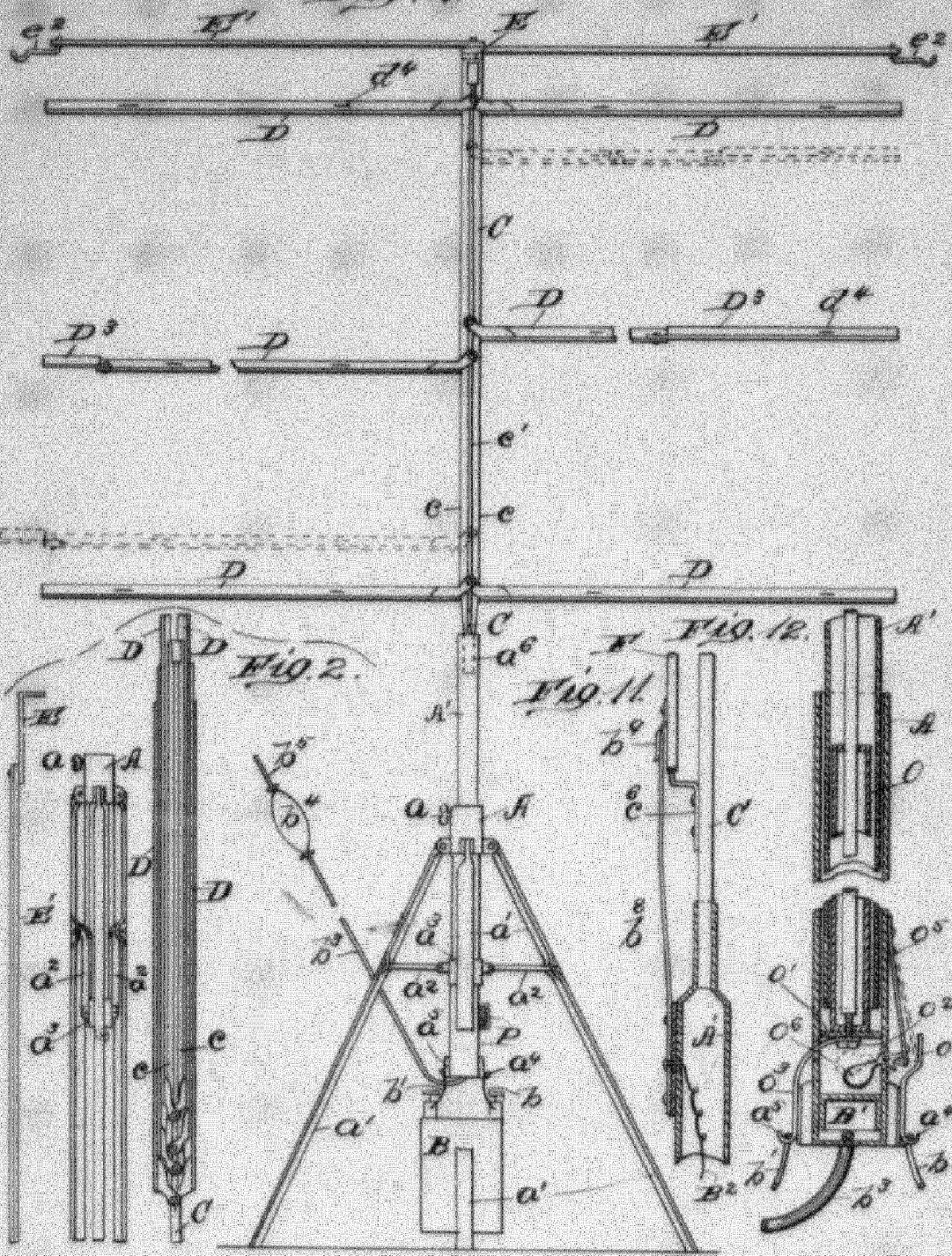
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53476

ELECTRIC FLASH LIGHT APPARATUS.

Fig. 1.



Certified to be the Drawings referred to in the specification hereunto annexed.

Chicago Ills. February, 6th 1866.

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