

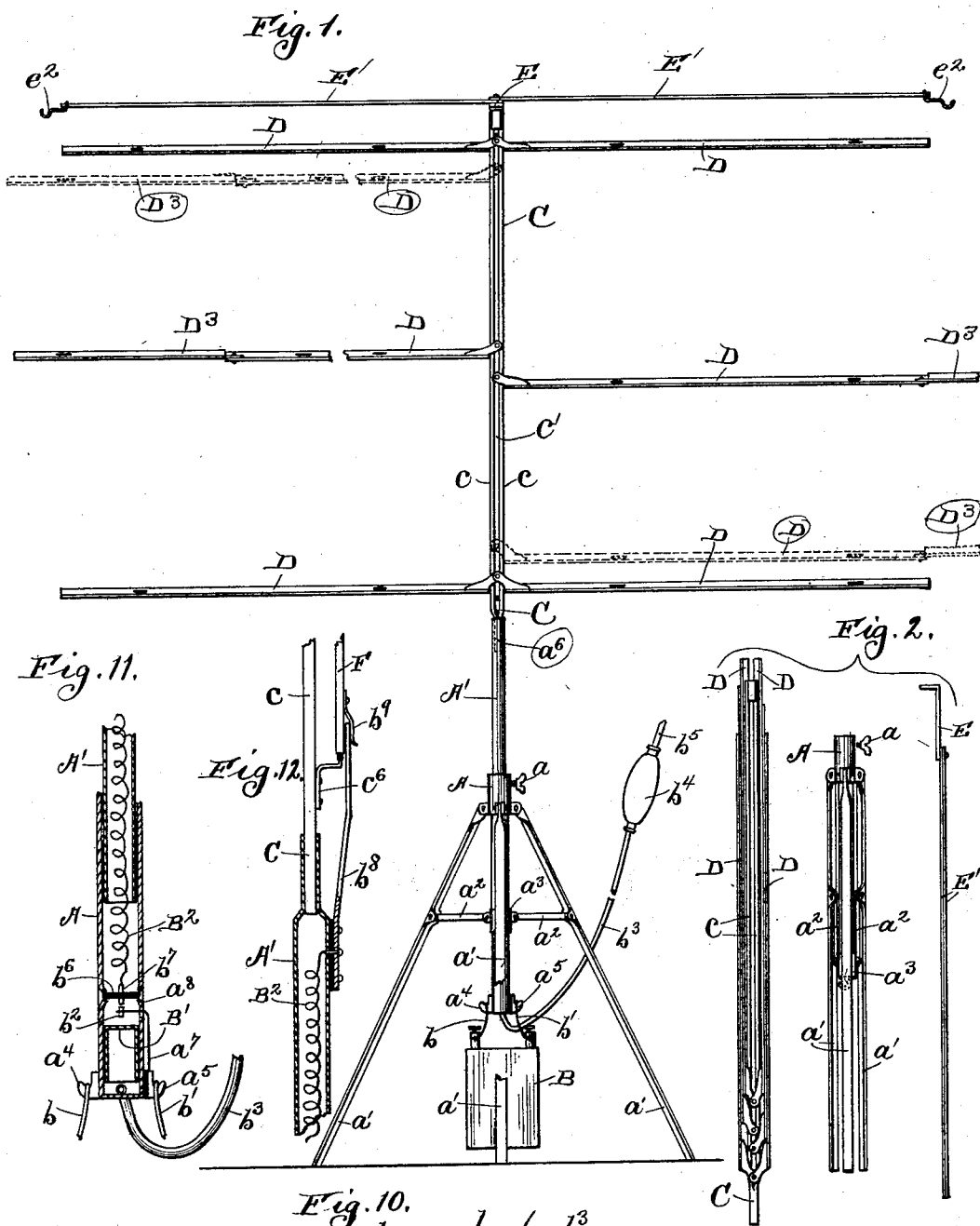
(No Model.)

2 Sheets—Sheet 1.

G. R. LAWRENCE.
ELECTRIC FLASH LIGHT APPARATUS.

No. 557,403.

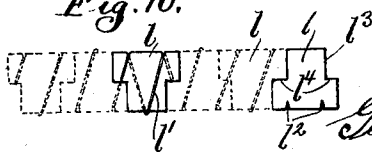
Patented Mar. 31, 1896.



Witnesses

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ELECTRIC FLASH-LIGHT APPARATUS.

SPECIFICATION forming part of Letters Patent No. 557,403, dated March 31, 1896.

Application filed May 17, 1895. Serial No. 549,604. (No model.)

To all whom it may concern:

Be it known that I, GEORGE R. LAWRENCE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Electric Flash-Light Apparatuses, of which the following is a specification.

This invention relates to improvements in an apparatus to be used by photographers for producing flash-lights; 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.

Still 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.

In order to enable others skilled in the art to which my invention pertains to make and use the same, I will now proceed to describe it, referring to the accompanying drawings, in which—

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. Fig. 2 is a view in elevation of the tripod, the supporting-frame and its adjust-

able 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. Fig. 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. Fig. 4 is a perspective view, also foreshortened, of the supporting-frame, showing the method of making an electric connection with a portion thereof. Fig. 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. Fig. 6 is a plan view, partly in section, taken on line 6 6 of Fig. 5. Fig. 7 is a cross-sectional view of one of the light-supporting arms, taken on line 7 7 of Fig. 5 and showing the manner of igniting the flash-light powder. Fig. 8 is a plan view of a part of one of the light-supporting arms, showing a modification in the method of causing the ignition of the powder. Fig. 9 is a cross-sectional view thereof, taken on line 9 9 of Fig. 8. Fig. 10 is a plan view of one of the fuses used in my apparatus. Fig. 11 is a vertical sectional view of the lower portion of the supporting-stand or tripod, showing the electric connections for the apparatus. Fig. 12 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; and Fig. 13 is a perspective view of a modification in the construction of one of the fuses.

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 *a²*, pivotally secured to said legs and to a sliding collar *a³* on the main post, thus forming a tripod or stand which may be folded together, as shown in Fig. 2 of the drawings.

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 b and b' 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^2 , 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 Figs. 1, 2, and 4 of the drawings, and are divided or separated to near their upper ends to form a vertical slot or guideway 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 c^3 and c^4 on the face and back of the supporting frame or standard. The lower portion of the rear part of the piece c^2 is bent outward from the standard and formed with an arm c^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 c , forming the standard.

To the rear surface of the standard C and near the juncture of the pieces c thereof is secured a bracket c^6 , having an upturned arm

c^7 , which supports the lower end of the piece F, which piece is provided with an insulator f' at its top and bottom and is connected to an electric conductor B^2 , through the piece b^8 , from the battery B, by means of a spring-clasp b^9 , 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 angular in cross-section, as shown in Figs. 1, 7, and 9, of the drawings, and when placed in position for use will present a vertical wall d , from which will extend forwardly a floor d' , in the angle of which floor and wall the magnesium or other powder d^2 (represented by dotted lines in Figs. 7 and 9) 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 or foil h' to unite the circuit.

The conductor G is exposed to the fuses at the slots d^4 in the pans, as is clearly shown in Fig. 5, and the rear surface of the walls d 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 g' , as shown in Figs. 5 and 6 of the drawings, and are provided with washers g^2 to prevent accidental dislocation from the piece F.

The inner portions of the arms or pans D are provided with projections D' , which stride one of the pieces c of the standard or supporting-frame, and are secured together by means of a rivet or pin D^2 , which passes through the slot c' in the standard, thus pivotally but movably securing the pans or arms D thereto.

By reference to Fig. 5 of the drawings it will be seen and understood that the pivot-points of the arms D are somewhat above the floor d' 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 Fig. 1 of the drawings.

The arms or pans D may be made extensible, if desired, by pivotally securing on their ends additional pieces D^3 , (shown in Fig. 1,) which may be of the same construction as above described. The outer ends of the brackets E are provided with adjustable arms E' , on the ends of which may be secured hooks or rests e^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 c^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 groove c^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 the pieces of the translucent material or reflectors may be readily shifted as desired.

In Figs. 8 and 9 of the drawings I have shown a modification of the construction of the flash-light pans or arms and in the manner of igniting the powder, which consists in providing the inner surface of the walls d of the pans with longitudinal ribs or projections d^6 and the conductor G with an exposed branch g^4 , which extends through the tube d^3 and parallel with the projection d^6 , between which and said branch the fuse h , having the wire or foil h' , is inserted.

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 Fig. 2 of the drawings. The current passing through the conductor or suspending device b will charge the supporting-standard and the conductor or device b' , and pieces a' , B^2 , and b^8 will charge the piece F and through it the conductors G within the tubes of the flash-light pans.

In Fig. 10 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 cardboard or other suitable material, around which is diagonally wound a wire l , so that the same will cut or embed itself into the edges of the cardboard 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 Fig. 10, thus affording an extended portion l^3 having shoulders l^4 . The extended piece l^3 of the fuse is adapted to be inserted into the slots d^4 of the arms or pans until the shoulders l^4 of the fuses rest against the walls d , thus affording uniform lengths of the fuse-wire exposed.

In Fig. 13 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 fireproof material. On this covering is placed a wire n , which when the fuse is placed in position, as shown in Fig. 9 of the drawings, will complete the circuit between the branch g^4 of the

conductor G and the projection d^6 on the pan or arm.

The fuse above described is preferably used when the pans or arms are constructed as shown in Figs. 8 and 9 and above described, but may also be employed with the construction illustrated in Figs. 5 and 7, but inasmuch as a spring is employed in the construction shown in the last-named figures a spring fuse is not absolutely necessary, yet it is obvious that said fuse may be generally used in the other construction of the pans or arms.

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 movably 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.

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 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
10 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
15 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
20 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
25 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
30 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
35 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
40 powder, substantially as described.

8. The combination of an electrically-connected supporting frame or standard with a hollow and slotted piece secured parallel
45 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 conductor, on each pan or arm, extending at
50 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
55 therewith, having an electric connection, a series of arms or pans movably and adjustably secured to the standard, each of said arms or
60 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
65 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
70 a vertical slot or guideway 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
75 ends to stride 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
80 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.
85

11. The light-supporting arms or pans D, having the tubes d^3 , the conductors G, in said tubes, and receptacles on the tubes for the reception of the fuses, the same contacting
90 with the conductors, substantially as described.

12. The light-supporting arms or pans D, having the tubes d^3 , the conductors G, in said tubes, the slots d^4 , and springs i , for the fuses,
95 substantially as described.

13. The combination with the supporting-standard C, of a hollow and slotted piece F, secured parallel therewith and each having
100 an electric connection, and the arms or pans D, pivotally and movably secured on said standard, and having the tubes d^3 , and receptacles for the fuses, the conductors G, located in said tubes and extending at their inner
105 ends into the piece F, substantially as described.

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
110 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,
115 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
120 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 camera to complete the
125 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
130 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 fuses, 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 pans or arms 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 , an 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^3 , 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, 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 camera and adapted to complete the circuit and to make the exposure, substantially as described.

19. A fuse consisting of a piece of material, having shoulders l^4 , and a projection l^3 , with a wire wound diagonally around said piece and embedded in its edges, substantially as described.

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