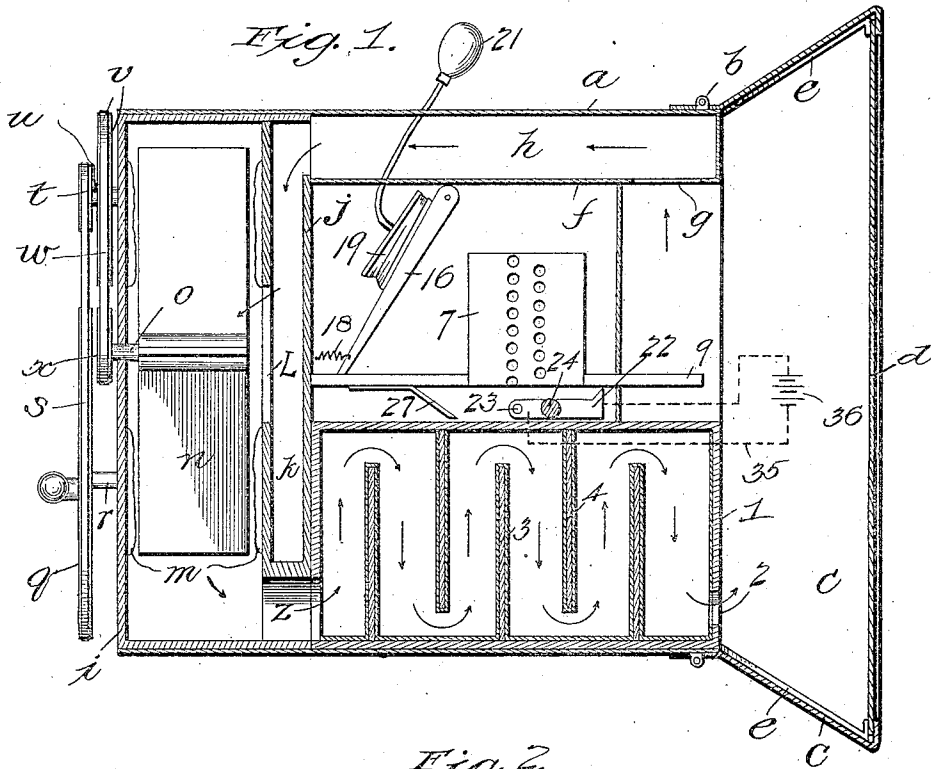


F. C. SCHOFIELD.  
FLASH LIGHT APPARATUS AND CARTRIDGE THEREFOR.  
APPLICATION FILED AUG. 12, 1907.

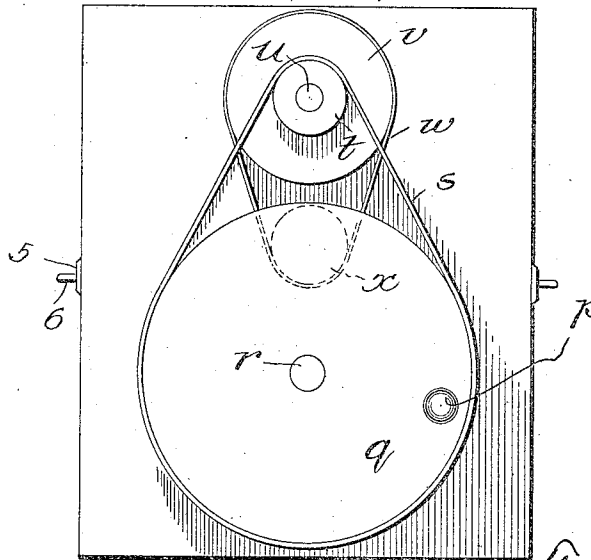
946,849.

Patented Jan. 18, 1910.

3 SHEETS—SHEET 1.



*Fig. 2.*



Inventor

*F. C. Schofield,*

Witnesses

*G. L. Neosha on*  
*A. W. Neale, Jr.*

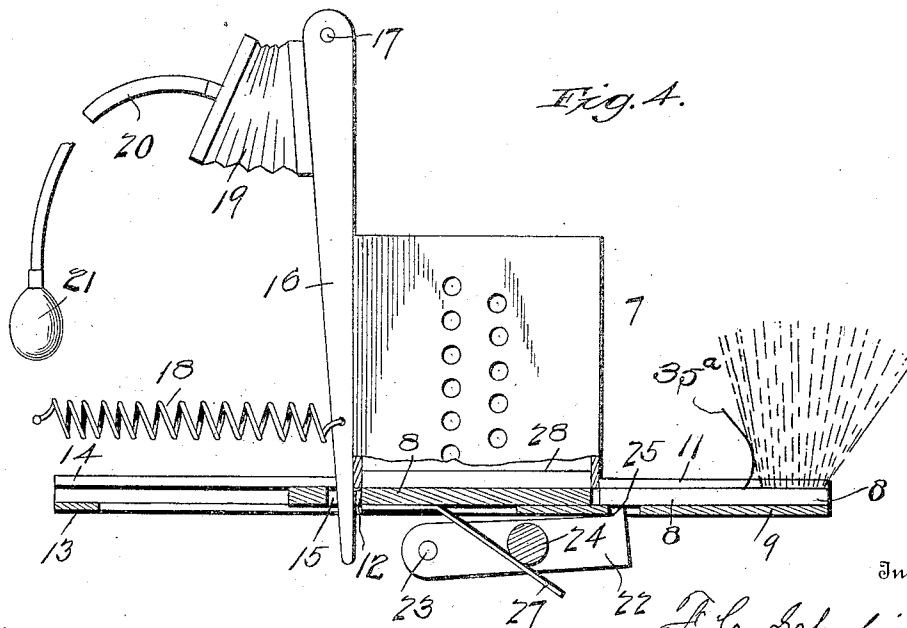
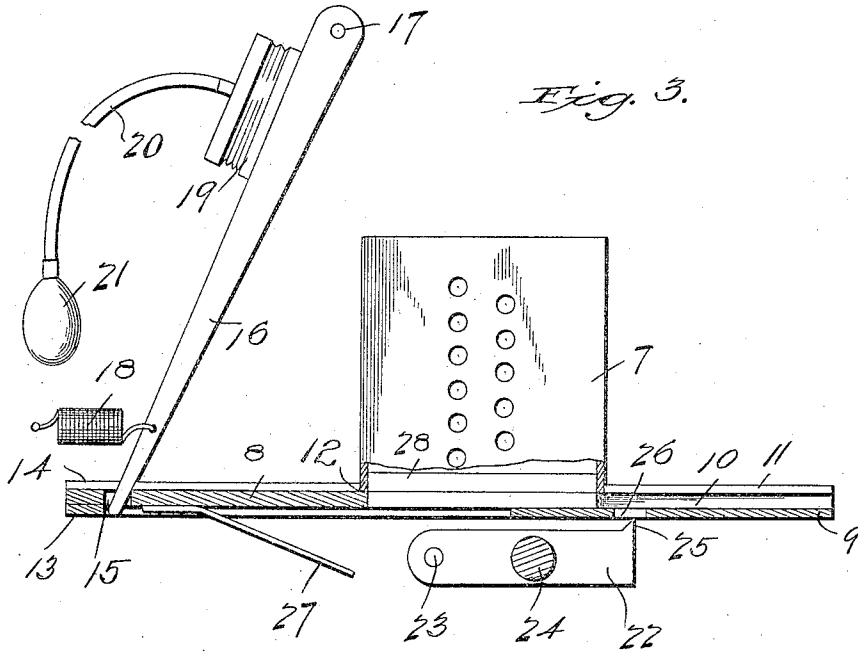
*By Wilkinson, Fisher & Witherspoon.*  
Attorneys

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3 SHEETS—SHEET 2.



Inventor

F. C. Schofield.

Witnesses

J. L. Moen  
A. W. Meale, Jr.

By Wilkinson, Fisher & Witherspoon  
Attorneys

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3 SHEETS—SHEET 3.

Fig. 5.

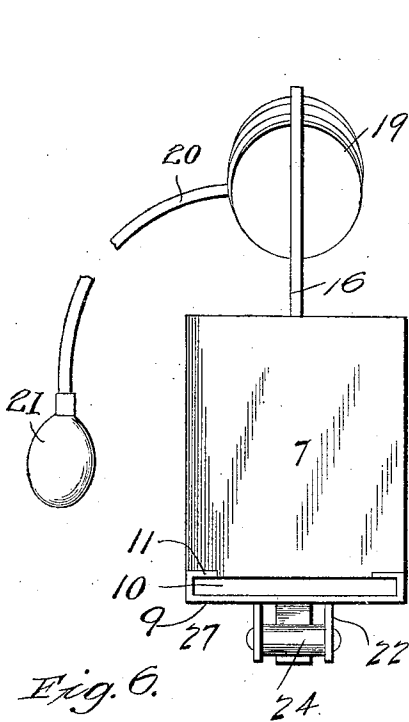
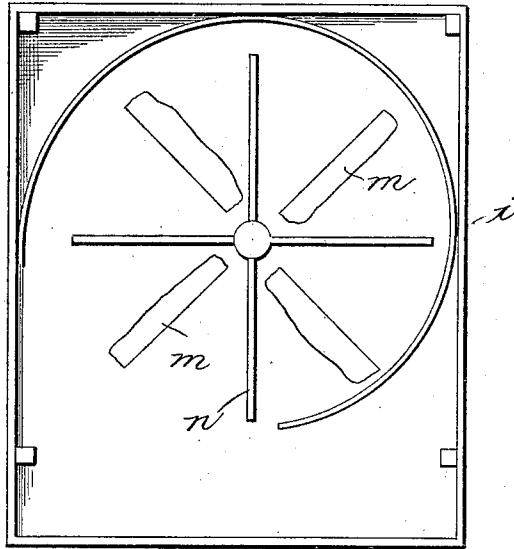


Fig. 6.

Fig. 10.

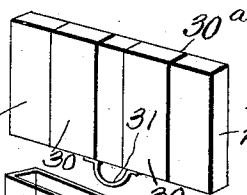


Fig. 7.

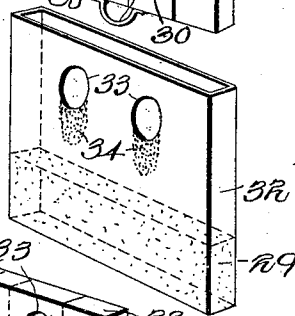


Fig. 8.

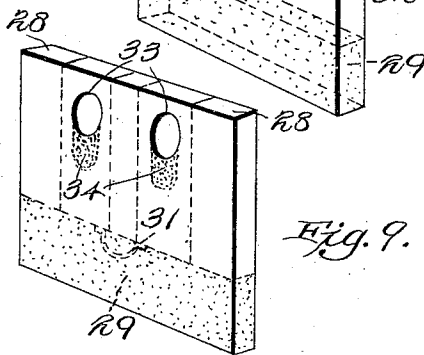


Fig. 9.

Witnesses

J. D. Mocheau  
A. W. Hale, Jr.

Inventor

F. C. Schofield,

By Wittenison, Fisher & Witherup.

Attorneys

# UNITED STATES PATENT OFFICE.

FREDERICK C. SCHOFIELD, OF RICHMOND, VIRGINIA.

FLASH-LIGHT APPARATUS AND CARTRIDGE THEREFOR.

946,849.

Specification of Letters Patent.

Patented Jan. 18, 1910.

Application filed August 12, 1907. Serial No. 388,200.

*To all whom it may concern:*

Be it known that I, FREDERICK C. SCHOFIELD, a citizen of the United States, residing at Richmond, in the county of Henrico and State of Virginia, have invented certain new and useful Improvements in Flash-Light Apparatus and Cartridges Therefor; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in flash-light apparatus and cartridges therefor, and the object of same is to provide a simple and effective flash-light apparatus and cartridge, in which the smoke of the explosion may be collected without having it discharged into the room.

With this object in view my invention consists in the construction and combination of parts as hereinafter described and claimed.

While I do not limit myself to the exact details shown and described, still for the purpose of disclosure reference is had to the accompanying drawings illustrating a practical embodiment of the invention, in which like characters designate the same parts in the several views, and in which—

Figure 1 is a longitudinal section of my improved apparatus, the mechanism for operating the blower being shown in edge elevation. Fig. 2 is a rear end view. Fig. 3 is a side elevation, partly in section, of the cartridge holder and expeller. Fig. 4 is a similar view showing the relation of the parts when the cartridge is shoved into position for explosion, and showing the cartridge as exploding. Fig. 5 is an interior view of the blower and casing therefor. Fig. 6 is a view in front elevation of the cartridge expeller and magazine holder. Fig. 7 is a perspective view of one part of the cartridge looking toward the underneath face thereof, and shown in the position to be inserted in its envelop. Fig. 8 is a similar view of another part of the cartridge, being a powder containing envelop. Fig. 9 is a similar view of the assembled cartridge, and Fig. 10 is an elevation on a larger scale of a connecting wire or firing member.

*a* represents the main casing, preferably of sheet metal, and open at both ends.

Around one end of the casing, which is preferably rectangular in shape, are located pins or buttons *b*, over which button-holes pass, which button-holes are made in a housing *c* of opaque material, such as heavy cloth or paper.

*d* represents a window of transparent or translucent material, secured at the outer end of this housing, and *e* represents supporting brackets, sewed or otherwise secured to the housing.

Longitudinally of the main casing *a* is a partition *f*, provided with a hole or a series of holes *g* for the passage of air, said partition forming with the top of the casing *a* an air passage *h*. Arranged to telescope into the rear part of the casing *a* is the blower casing *i*, and between the blower casing and the partition *f* is a vertical casing *j*, arranged to form an air passage *k*, which communicates with the passage *h*, and the rear part being perforated, as shown at *L*, to provide an air passage into the blower casing. The rear part of the casing *j* and the front part of the inside of the blower casing are provided with strips of silk *m* or similar material.

The blower is provided with vanes *n* mounted on a shaft *o*, and the vanes or blades are preferably made of hard rubber and arranged to strike against the strips of silk *m*, thereby electrifying the blades *n*. The blower casing *i*, as shown in Fig. 1, is open at the front and closed at the rear. It is made of wood, cardboard or any suitable non-conductor of electricity, and soaked in paraffin wax, or similar waterproof material, to render it moisture proof. The blower is driven by any suitable means. In the drawings this is shown as comprising a handle *p* mounted on a wheel *q*, which wheel is mounted on a short stub shaft *r*, carried by the blower casing, and which wheel is provided with a cord *s*, which runs over a pulley *t*, mounted on a stub shaft *u* on the blower casing *i*. On the shaft *u* is also mounted a pulley *v* provided with a cord *w*, which runs over the pulley *x* mounted on the shaft *o*. By the connections just described, the operator can readily and rapidly revolve the fan by means of the handle *p*.

The lower closed part of the casing *j* is provided with a number of holes *z* which

register with similar holes in the rear of the collecting chamber 1. This collecting chamber 1 is arranged to be slid into the casing *a* from the front, and consists of a rectangular chamber having at one end holes which register with the holes *z* and at the other end holes 2, which communicate with the space inside of the housing *c*. This chamber is provided with a number of vertical partitions 3, attached to the bottom thereof and leaving an open space over their tops, and a number of alternating vertical partitions 4 attached to the top but not reaching to the bottom of the casing, thereby providing a tortuous passage. The bottom of the casing 1 and the partitions 3 and 4 are covered with felt, velvet or similar material, having a number of fine points which act to collect the particles of magnesium oxid which are carried along by the air current. In assembling these parts, the casing 1 is first slipped inside of the casing *a*, the housing *c* is attached to the pins or buttons *b*, the casing *j* is slipped into place against the partition *f*, and then the blower casing is slipped into the rear of the apparatus, being fastened thereon by means of hooks 5 in the sides of the main casing engaging the eyelets 6 on the blower casing.

7 represents a magazine cartridge holder, in which a number of flat cartridges are loosely placed, one on top of the other.

8 is the expeller block, which pushes the lowest cartridge into the open top expeller guide 9, which is provided with sides 10 and guiding strips 11. The expeller block 8 is adapted to pass through a hole 12 in the rear of the cartridge case 7, and this block is carried in an open top casing 13, provided with sides and guiding strips 14 at the top thereof. This block is also provided with an opening 15, in which the lower end of the lever 16 projects, said lever being pivoted at 17 near the top of the casing. The lever 16 is normally held in the position shown in Fig. 3 by the spring 18 attached to said lever and to the partition *j*.

19 designates a suitably supported bellows, which bellows is connected to the lever 16 and is provided with a rubber inflating tube 20 and an operating bulb 21 therefor, the rubber tube passing out through the casing *a*, as indicated.

22, Figs. 1, 3, 4 and 6, represent vertically operative contact members, and these members may be pivotally supported by pins, as indicated at 23. The contact members are laterally connected by means of an insulated connection 24, and each of these members terminates in an upwardly projecting sharp metal point 25 adapted to pass upwardly through an opening or openings 26 in the bottom of the expeller guide 9, when a cartridge is forced into said guide. 27 designates

a spring arm carried on the bottom of the expeller block and adapted to engage beneath the insulated rod 24.

The specific construction of the cartridge is clearly shown in Figs. 7 to 10, and consists primarily of two parts, a containing envelop for the powder and a contained base forming the firing member. Said base, illustrated at 28, preferably consists of a block of wood on the underneath face of which are two contact strips 30 fastened in any suitable manner to said base, as, for instance, by bending over or clamping the ends, as indicated at 30<sup>a</sup>. These contact strips may be made of any good conducting material not easily attacked by moisture. For example, aluminum may be employed, the contact strips 30, as clearly shown in Fig. 7, are connected by a wire or firing member 31 of iron or similar material, offering a considerable resistance to the passing of an electric current. This wire 31 is coated with gun powder, match composition, or some other readily ignitable material, or the whole may be covered with shellac, or other moisture excluding composition. The other part of the cartridge consists of the containing envelop 32, preferably made of stout paper and adapted to snugly receive the base member 28. On its underneath face this envelop is provided with a pair of apertures 33 disposed adjacent the contact strips 30 of the base member, and just in front of the apertures 33 the paper envelop is provided with a coating 34 of emery, fine sand, or similar abrading material.

In assembling the cartridge, the envelop 32 (Fig. 8) is partly filled, as indicated at 29, by a suitable flash light powder, such as magnesium, after which the base member 28 is inserted in the envelop with the contact strips 30 disposed in alinement with the apertures 33 and the firing member 31 buried in the magnesium powder, as clearly indicated by dotted lines in the assembled cartridge, Fig. 9. It will be understood that each of the contact members 22 is connected through circuit wires 35 to an electric battery 36, or other source of electric generation, which is preferably located outside of the apparatus.

In operation, when it is desired to explode a cartridge, the operator presses the bulb 21, whereupon the expeller block 8 pushes forward the lowest cartridge into the guide 9. During this motion the spring arm 27 rides beneath the pin 24 and brings the points 25 up into the position shown in Fig. 4. As the cartridge is moved along, these points are brightened by the coating 34 and finally come into contact with the exposed portions of the contact strips 30 through the holes 33, thereby closing the circuit, heating the wire 31 and exploding the cartridge. The paper envelop is preferably scored or weakened

ened on its upper face in such manner that when the powder therein explodes the envelop ruptures at or along the weakened lines, which are weaker along the front than along the sides, so that the part ruptured curls back, as shown at 35<sup>a</sup>, Fig. 4 and helps spread the powder in an efficient arc or flame. As the envelop does not rupture until there is an adequate pressure in the cartridge to cause its rupture, it follows that since the powder up to the time of the production of a rupturing pressure is wholly confined, all the particles of powder are ignited, and I am thus enabled to produce the desired light by a minimum of powder, because none is blown away or lost from the effects of the explosion without being ignited, and besides this, I obtain a brighter or stronger light because the higher the pressure the hotter the gases. When the pressure on the bulb 21 is released, the spring 18 retracts the parts to their normal position shown in Fig. 3, leaving the exploded cartridge on the guide 9, which exploded cartridge is expelled, a new cartridge being shoved into position and drops into the housing *c*.

As a result of the explosion, the interior of the apparatus, and especially the front part thereof, is filled with a dense white smoke of magnesium oxid. The operator then revolves the fan and the current of air, carrying with it the smoke, goes through the passage *h*, the hole *L*, the holes *z*, becoming electrified during its passage between the vanes of the blower, and passing above and below the partitions 3 and 4 back into the front of the apparatus. During its passage through the collecting chamber 1, the velvet or similar material tends to collect the solid floating particles, more especially as these are electrified. If any solid particles fail to be collected they pass back through the apparatus, and, being electrified, attract the other particles. Those particles that are similarly charged, of course, do not attract each other, but some may be electrified by the rubber vanes, and others charged by induction, and therefore they will be of opposite signs and consequently will attract each other, and then, too, particles that have been electrified and which adhere to the velvet or other collecting material, are discharged of their electricity, and to them the electrified particles will adhere. The result is that after a few turns of the blower the smoke has been entirely collected and the apparatus is ready for use again.

Obviously, owing to the construction of the device, the whole apparatus may be easily taken apart and cleaned, when desired.

A very important feature of my invention is the magazine of charges or cartridges, which, with one loading of the apparatus, enables a number of exposures in succession

to be made, and an important factor in the practicability, in a commercial way, of this feature of my apparatus, is the reduction of the volume or the condensing of the smoke after the ignition or explosion of a charge, and its retention in the collecting chamber, which is accomplished by my apparatus.

While I have thus described my invention, I wish it to be distinctly understood I do not limit myself to the details shown, as many of these might be varied considerably without departing from the spirit of my invention, the chief idea of which is to collect the smoke within the apparatus itself, so that said apparatus may be used repeatedly without requiring to be cleaned or the smoke to be removed therefrom.

Having thus described my invention, I claim:

1. A flash-light apparatus embodying a chamber in which a charge of flash-light powder may be burned closed to prevent communication outside of the apparatus, and means for fitting such chamber for the burning of charges of powder in succession, comprising a holder located in the apparatus apart from the burning chamber closed to prevent communication outside of the apparatus, and means for passing the smoke from the chamber to the holder the apparatus being a wholly inclosed one whereby the products of combustion are wholly retained therein.

2. A flash-light apparatus embodying a chamber in which a charge of flash-light powder may be burned closed to prevent communication outside of the apparatus, and means for fitting such chamber for the burning of charges of powder in succession, comprising smoke condensing and holding means closed to prevent communication outside of the apparatus.

3. A flash-light apparatus comprising a compartment in which a charge of flash-light powder may be burned closed to prevent communication outside of the apparatus, means for condensing the volume of smoke and holding the same, including a chamber, and means for removing the smoke from said compartment and passing it into said chamber said chamber being closed to prevent communication outside of the apparatus.

4. A flash light apparatus comprising a compartment in which a charge of flash light powder may be burned, a chamber in communication with said compartment at two points, whereby there will be a circulation, and means for causing a circulation of smoke.

5. A flash-light apparatus comprising a compartment in which a charge of flash-light powder may be burned, and means for condensing the volume of smoke and holding the same, including a chamber, passages

being provided that establish communication between said chamber and said compartment at two points, whereby there will be a circulation of the smoke through said chamber.

6. A flash-light apparatus comprising a compartment for the burning of a charge of flash-light powder, a magazine, a charge being movable from the magazine to said compartment, and automatic igniting means normally inactive.

7. A flash-light apparatus comprising a compartment for the burning of a charge of flash-light powder, a magazine, a charge being movable from the magazine to said compartment, and automatic igniting means normally inactive acting to ignite the charge when it is moved from the magazine to the burning compartment.

8. A flash-light apparatus comprising a compartment for the burning of a charge of flash-light powder, a magazine, a charge being movable from the magazine to said compartment, and means for the condensing of the volume of smoke, and its retention, including a chamber into which the smoke is introduced the apparatus being wholly inclosed whereby the products of combustion are wholly retained therein.

9. A flash-light apparatus comprising an inclosed structure in which a charge of flash-light powder may be burned, and a generator of electricity having a moving member for causing a current of air to pass through said chamber and electrify the products of combustion as they move along with the air current.

10. A flash-light apparatus comprising an inclosed structure, means for igniting a cartridge therein, a generator of electricity having a moving member for producing a current of air within said structure and electrifying the smoke particles as they are carried along by the air current, substantially as described.

11. A flash-light apparatus comprising an inclosed structure, means mounted in said apparatus for igniting a cartridge therein, means for causing a current of air to circulate within said apparatus, carrying with it the smoke particles, means for electrifying the smoke particles as they are carried along by the air current and means for collecting said electrified particles in the lower part of the apparatus, substantially as described.

12. A flash-light apparatus comprising a completely inclosed structure in which a charge of flash-light powder may be burned, means for causing a circulation of the contents of said structure, resulting from the burning of the powder including a continuous passage, and means for arresting particles circulating through the structure.

13. A flash-light apparatus, comprising an inclosed structure, means for igniting a car-

tridge therein and means for causing an electrified gaseous current to circulate within said apparatus including a continuous passage, substantially as described.

14. In a flash-light apparatus the combination of an inclosed structure, means for igniting a cartridge therein, a blower for generating a gaseous current in said structure, and means for causing said current to repeatedly circulate in a tortuous path within said structure, substantially as described.

15. A flash-light apparatus comprising an inclosed structure, means for igniting a cartridge therein, a blower mounted in the structure for causing a gaseous current in said structure, means for electrifying said current and a collecting chamber in which the electrified current is caused to pass in a tortuous passage, substantially as described.

16. A flash-light apparatus comprising a chamber in which a charge of flash-light powder may be burned, a blower having vanes of rubber, surfaces against which said vanes strike to generate electricity, and a collecting chamber through which the current produced by the blower passes.

17. A flash-light apparatus, comprising an inclosed structure, means for igniting a cartridge therein, a blower having hard rubber vanes in said structure, means against which said vanes strike to electrify them, and a collecting chamber for the smoke particles, substantially as described.

18. In a flash-light apparatus the combination of an inclosed structure, means for igniting a cartridge therein, a blower therein having hard rubber vanes, strips of exciting material, against which said vanes strike, and a collecting chamber provided with means whereby the gas current is caused to travel in a tortuous path, substantially as described.

19. A flash-light apparatus, comprising an inclosed structure, means for igniting a cartridge therein, means for causing the circulation of a current of gas therein, and a collecting chamber provided with imperforate partitions forming a tortuous channel and having a lining provided with numerous projecting points, substantially as described.

20. A flash-light apparatus, comprising an inclosed structure, means for igniting a cartridge therein, a blower and a collecting chamber provided with alternately overlapping partitions covered with a material having a pile, such as plush, and forming a tortuous passage, substantially as described.

21. A flash-light apparatus, comprising a closed structure, means for igniting a cartridge therein, means for generating an electrified current of gas therein, and a collecting chamber provided with overlapping partitions, substantially as described.

22. A flash-light apparatus made up of an inclosing casing, a collecting chamber

adapted to be slipped into said casing, a housing provided with a window removably attached to said casing, a casing adapted to be slipped into said first named casing, and  
 5 providing an air passage, and a blower case adapted to be slipped into said first named casing, whereby an inclosed structure composed of readily removably parts is obtained, substantially as described.

10 23. In a flash-light apparatus, the combination of a magazine for a number of charges of powder having an outlet for the charges in succession, an electric igniting device including a circuit closer, and means  
 15 for simultaneously feeding a charge from the magazine and operating the circuit closer to fire the charge.

24. In a flash light apparatus, the combination of a magazine for a number of cartridges, provided each with a member of an igniting device, means for feeding the cartridges from the magazine, and another member of the igniting device in the path of the cartridges as they move from the  
 20 magazine to automatically ignite the same.

25. In a flash-light apparatus, the combination of a support for a number of cartridges, provided each with an electric igniter, means for feeding the cartridges from the support, and a circuit closer in the path of the cartridges as they move from the  
 25 magazine.

26. In a flash-light apparatus, the combination of an inclosed structure and means  
 30 for exploding a cartridge therein, said means including a cartridge holding case, an expeller block provided with a projecting arm, devices partly outside of said structure for operating said expeller block, a  
 35 cartridge provided with contact points and a firing member, and an electric contact device operated by the motion of the arm of the expeller block to close the circuit, thereby exploding the cartridge, substantially as  
 40 described.

27. In a flash-light apparatus the combination of a cartridge holder and an expeller block provided with an arm, a lever contacting with said expeller block, a bulb, tube and bellows for operating said lever, 50 electric contact pieces and means whereby said expeller block in its movement forces said electric contact pieces into operative position, substantially as described.

28. In a flash-light apparatus, the combination of a cartridge holder provided with a cartridge outlet, a cartridge guide in line with said outlet, an expeller block provided with a projecting arm in line with said outlet, means for operating said expeller block, 60 electric contact pieces, and a pin carried by said contact pieces, adapted to be struck by said arm as the expeller block moves to bring said pieces into operative position, substantially as described. 65

29. A cartridge for flash-light apparatus comprising a powder holder, and an electric igniter within the holder, and having contact pieces opposite openings in the holder wall, the wall overlying the contact pieces 70 contiguous to the openings.

30. A cartridge for flash-light apparatus comprising a block having contact strips attached to it, an electric igniter connected with said strips, and an envelop containing 75 said parts and the powder and overlying portions of the contact strips.

31. A cartridge for flash-light apparatus comprising a powder holder, and an electric igniter within the holder and having contact pieces opposite openings in the holder wall, the holder having polishing material on its outer surface. 80

In testimony whereof, I affix my signature in presence of two witnesses.

FREDERICK C. SCHOFIELD.

Witnesses:

J. A. LEACH,

KENNETH BAKER.