No. 673,474. Patented May 7, 1901.

S. S. PINGREE.

FLASH LIGHT APPARATUS.

(Application filed Dec. 10, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

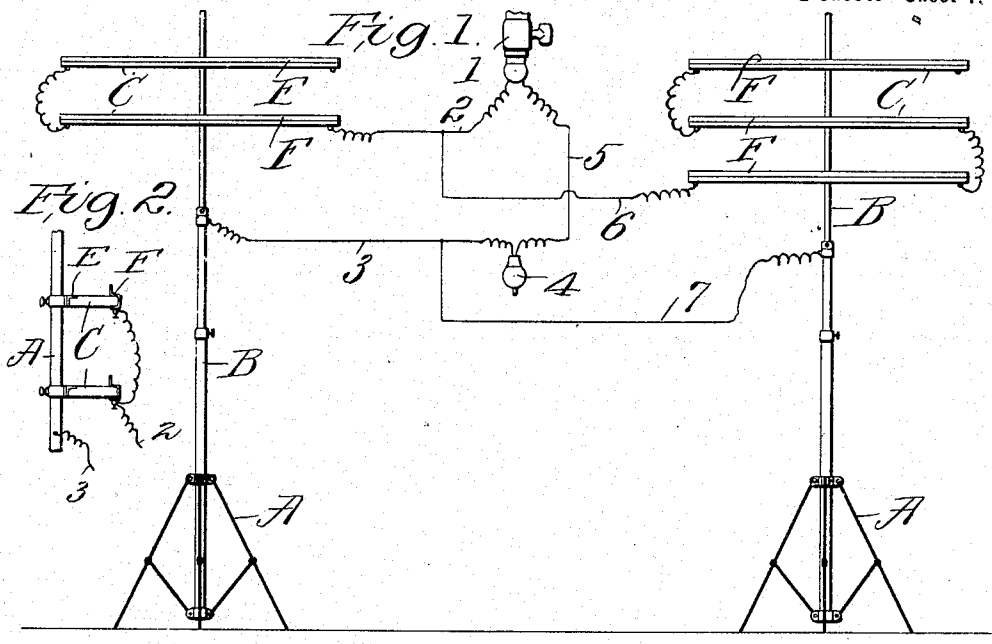


Fig. 2.

Fig. 3.

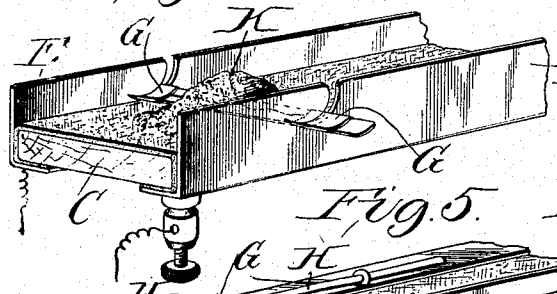


Fig. 4.

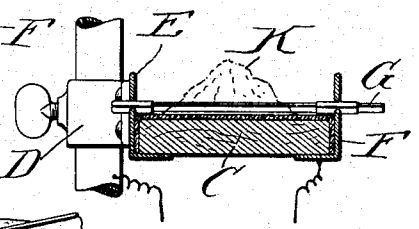


Fig. 5.

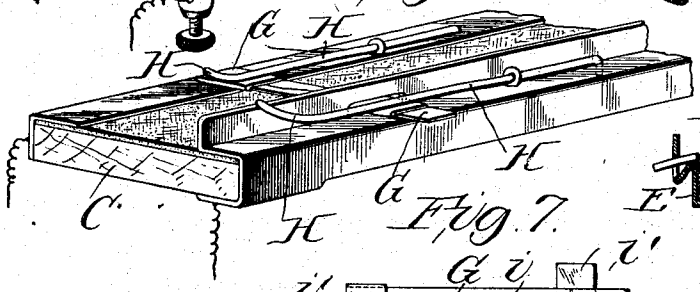


Fig. 6.

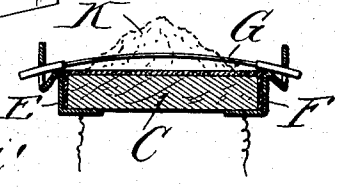
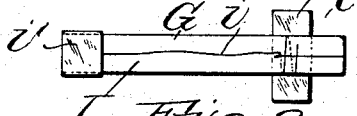
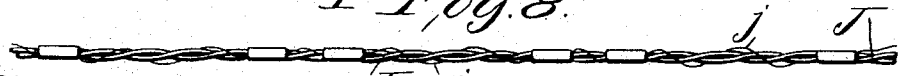


Fig. 7.



I Fig. 8.



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NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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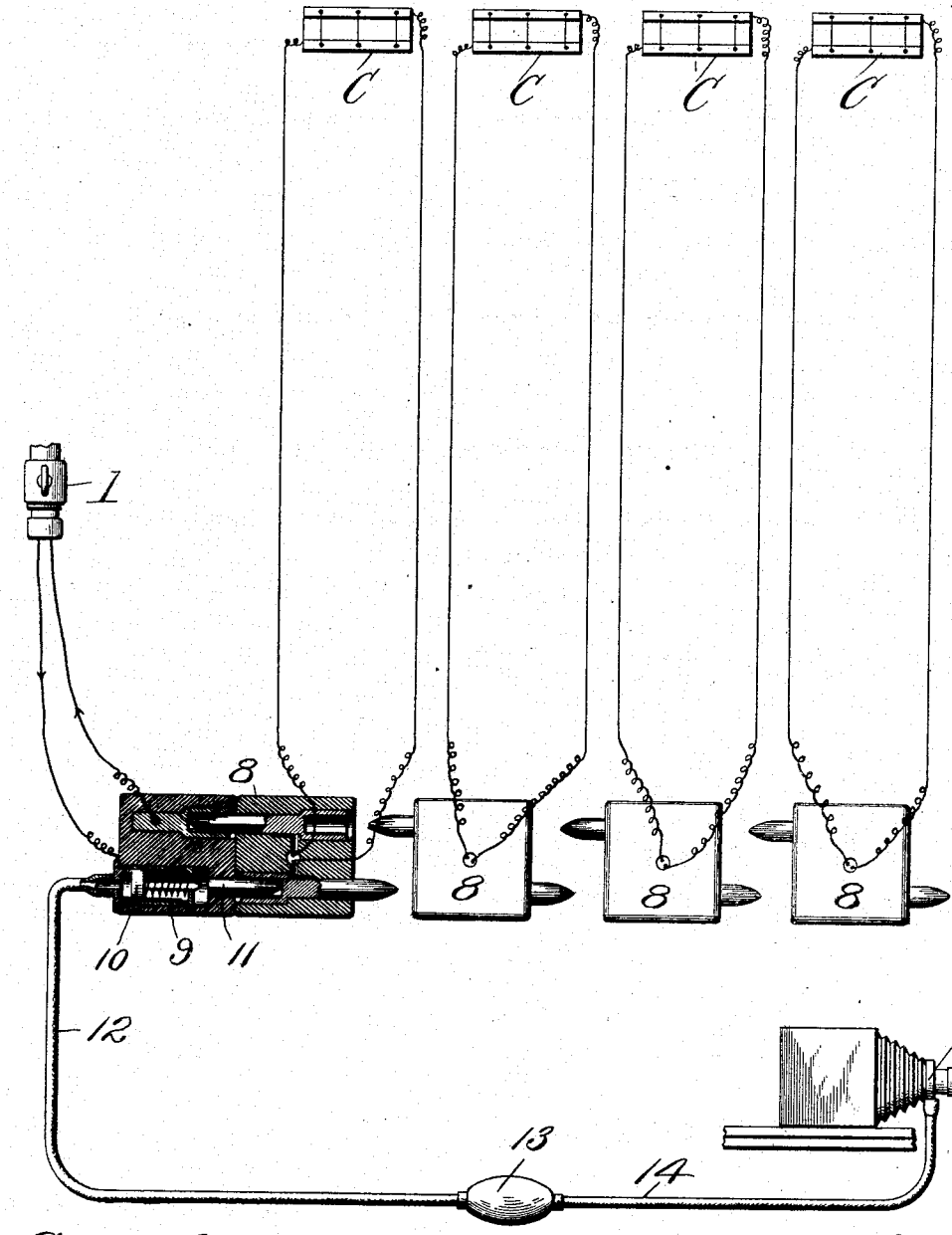
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(No Model.) 2 Sheets—Sheet 2.

Fig. 9.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

SAMUEL S. PINGREE, OF ST. LOUIS, MISSOURI.

FLASH-LIGHT APPARATUS.

SPECIFICATION forming part of Letters Patent No. 673,474, dated May 7, 1901.

Application filed December 10, 1900. Serial No. 39,330. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL S. PINGREE, a citizen of the United States, residing at the city of St. Louis, in the State of Missouri, have invented a certain new and useful Improvement in Flash-Light Apparatus, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a diagrammatic view illustrating my improved electrical flash-light apparatus. Fig. 2 is a detail view showing one of the standards and the powder-shelves in side elevation. Fig. 3 is a detail view illustrating a portion of one of the powder-shelves and one manner of introducing the fuse thereon. Fig. 4 is a cross-sectional view through the shelf, showing the manner of mounting the same upon the standard. Fig. 5 is a detail view of a portion of another form of shelf. Fig. 6 is a cross-sectional view through a shelf, showing a modified form of arranging the fuse thereon. Fig. 7 is a detail view of one form of fuse used in connection with my invention. Fig. 8 is a detail view of another form of fuse used in connection with my invention, and Fig. 9 is a diagrammatic view illustrating the manner of igniting flash-light powders arranged at different points and simultaneously operating the shutter of a camera.

This invention relates to a new and useful improvement in apparatus for the instantaneous ignition of an unlimited quantity of explosive flash-light powder. It is especially designed for the use of photographers, one object being to provide a simple and inexpensive apparatus of the character described wherein fuses may be arranged at as many different points as desired, any number being employed, said fuses being blown or burst simultaneously by an ordinary electric-light system, such as is commonly used in buildings, so that the blowing of the fuse will disturb the powder, throwing a portion of it into the air, and at the same time igniting the powder.

Another object is to control the shutter of the camera, which will be operated simultaneously with the ignition of the flash-light powder.

With these objects in view the invention consists in the arrangement, construction, and combination of the several parts, all as will hereinafter be described, and afterward pointed out in the claims.

In the drawings I have illustrated my invention as used in connection with a simple form of apparatus, wherein A indicates a tripod carrying a standard B, and on the standard are arranged any number of powder-shelves C. These powder-shelves may have a body of wood or other non-conducting material faced with asbestos for receiving the powder to be ignited.

D indicates a clamp by which the shelf may be vertically adjusted on the standard B.

E and F indicate electrical conductors, (shown as strips of metal forming marginal flanges for the shelf,) said strips providing mounts for the fuses G. As shown in Fig. 3, these strips may be provided with curved slots for receiving the fuses, or said fuses may be introduced under springs H, as shown in Fig. 5, or as shown in Fig. 6 the fuses may be bent into position, so as to exert pressure by the resiliency thereof to make the proper electrical contact. In any event the object is to bridge the strips E and F by the fuses, so as to provide an electrical connection between said strips through the fuses.

As shown in Fig. 7, the fuse consists of a strip of paper or other insulation material I, forming a backing for the platinum or other wire fuse *i*, which wire fuse extends longitudinally the paper or other insulation strip and is fastened at the ends with copper or other electrical conducting material *i'*, which is bent and clamped near the ends of the fuse, so that when the fuse is placed in position the current in the strips E or F passing through the fuse makes electrical connection therewith through these contact devices *i'*.

As shown in Fig. 8, the fuse is made up of twisted or braided fabric or other suitable substance J, serving as a backing for the platinum or other fuse-wire *j*, metallic clips being arranged upon the continuous fuse at intervals, whereby said clips may be inserted so as to be in electrical contact with the strips

E and F and then the continuous fuse severed, so as to leave a portion bridging the strips.

As illustrated in Figs. 3, 4, and 6, the fuse is placed in position and the flash-light powder K piled thereon, there being as many fuses arranged on the shelf as desired, and likewise as many piles of powder, or the powder may be laid in a train and fuses buried at different points along the train.

Where there are two or more shelves on a standard, all of the strips F are electrically connected, the strips E being electrically connected by the standard B or with each other by wire.

Referring now to Fig. 1, 1 indicates an ordinary plug introduced into a lamp-socket, and 2 the feed-wire connected to one of the strips F, which, as before stated, is in electrical connection with the other strips F of the other shelves on the standard. The fuse bridging the strips F and E and the strips E being in electrical connection, a return-wire 3 is carried either from the standard B or from the strips E to a push-button or other contact making and breaking device 4, a return-wire 5 leading from said push-button or other contact making and breaking device back to the plug 1. When the fuse or fuses are in position and the powder piled thereon, it is only necessary to push the button of the contact making and breaking device 4, when a current will be instantly established through all of the fuses, which will burst them, and the explosion of the fuses will throw some of the flash-light powder into the air, at the same time igniting it. It makes no difference how many piles of powder there are nor how many fuses are employed, all the fuses will burst simultaneously, as before described, no matter at what distance from each other these fuses may be. Assuming now that another series of shelves are employed at some other place, wire 6, leading from wire 2 to the strips F of the other shelves, will conduct the current through the fuse arranged between the strips F of such other shelves through the strips E thereof, standards B, by direct wire from E to plug 1, and through wire 7 back to the plug 1. Thus it will be seen that no matter how many shelves are employed, irrespective of the number of fuses and piles of powder to be ignited and independently of the position of or distance between such shelves, all the flash-light powder will be ignited at the same instant, thus enabling a photographer to obtain results and effects which heretofore were impossible. The advantages of being able to simultaneously and instantaneously operate with the shutter of the camera any quantity of flash-light powder, irrespective of its position or distance from said camera, puts a power in the control of the photographer which is of inestimable value. This is of special advantage in taking interior pictures with moving objects, such as stage-settings in a theater, as the shelves containing the flash-light powder can be arranged in the wings on each side and behind the camera, so that the instant the push-button is pressed to establish a current the fuses will burst and all of the piles of powder will be ignited instantaneously. Where the light is thus controllable, it is obvious that heavy and objectionable shadows will be avoided in the negative, which is very desirable.

Referring now to Fig. 9, I have diagrammatically illustrated several shelves arranged in different places, each shelf being controlled by wires leading to plug-blocks 8. These plug-blocks may be built up to accommodate any number of shelves. The first plug-block contains a cylinder 9, carrying a plunger 10, which is designed to make electrical contact with the terminal 11, and thus complete the circuit through the several fuses and plug-blocks back to plug 1. This cylinder has connected to it a flexible tube 12, in the length of which is arranged a bulb 13, said bulb being also connected by a flexible tube 14 to the usual shutter-operating mechanism 15, arranged on a camera. Suitable springs may be connected with the pneumatically-operated plungers to return them to their normal positions when the bulb is relieved of pressure. This is desirable in that in photographing with the aid of flash-powders, particularly in the daytime, it is necessary to throw the shutter the same instant that the powder is ignited. If desired, the plunger 10 may have a spring arranged in advance thereof of sufficient strength to retard its action slightly in order that the shutter will be opened in advance of the ignition of the flash-light powders. Of course the difference in time between the opening of the shutter and the flashing of the powders is very slight, the principal object being to have the shutter fully open when the powders are ignited.

While I have described a construction as being operated from an electric-light system, it is obvious that the electric current used can be taken from other sources, such as a storage battery or a battery of cells. I will state, however, that it is essential that the current be strong enough to burst the fuse, as a current having only strength sufficient to heat the fuse will not instantaneously ignite the powder, there being a hesitation between the pushing of the button and the flash of the powder.

I am aware that minor changes in the arrangement, construction, and combination of the several parts of my device can be made and substituted for those herein shown and described without in the least departing from the nature and principle of my invention.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an apparatus of the character described, the combination with a support for the powder to be ignited, of electrical terminals arranged on opposite edges of said sup-

port, and a fuse in electrical connection with said terminals and traversing said support, whereby, when a circuit is established through said fuse, it will burst and the powder will be ignited directly therefrom; substantially as described.

2. In an apparatus of the character described, the combination with a support for the powder, of electric terminals arranged on opposite edges of said support, a fuse coöperating with said terminals and electrically connecting the same, said fuse traversing said support and arranged in proximity thereto, an electric circuit, and a switch in said circuit; substantially as described.

3. In an apparatus of the character described, the combination with a support for the powder, of electric terminals arranged on opposite edges of said support, wires leading to and from said terminals, a contact making and breaking device in the length of one of said wires, and a fuse arranged between said terminals, said fuse traversing the support and arranged in proximity thereto whereby, when a circuit is established, the fuse will burst, throw a part of the powder into the air, and directly and simultaneously ignite the same; substantially as described.

4. In an apparatus of the character described, the combination with a support for the powder, of terminals arranged on opposite edges of said support, wires leading to and from said terminals, a switch in one of said wires, a fuse electrically connecting said terminals and buried in the powder to be ignited, said fuse traversing said support and being arranged in close proximity thereto, an electric circuit, a cylinder and piston controlled by air-pressure which operates said switch, and a flexible tube and bulb coöperating with said cylinder, whereby, when the bulb is pressed, the piston is moved forward to close the circuit through the wires for blowing the fuse and directly igniting the powder; substantially as described.

5. In an apparatus of the character described, the combination with a support for the powder to be ignited, of electric terminals arranged on opposite edges of said support, a fuse coöperating with said terminals, said fuse bridging the support and lying in close proximity thereto, wires leading to and from said terminals respectively, an electric circuit, a pneumatically-operated switch for controlling the current in said circuit, a bulb and tube to operate said switch, which bulb is also in connection with the tube which by air-pressure controls the shutter of a camera; substantially as described.

6. In an apparatus of the character described, the combination with a plurality of supports for the powder to be ignited, of electrical terminals arranged in juxtaposition to said supports, fuses coöperating with said terminals, said fuses traversing the supports and lying in close proximity thereto, plug-blocks, wires connecting said plug-blocks with said terminals, a pneumatically-operated switch for controlling the current in all of said plug-blocks, a bulb and tube for operating said switch, and a shutter-plunger which is also operated by said bulb; substantially as described.

7. In an apparatus of the character described, the combination with a plurality of supports for the powder to be ignited, of terminals arranged in juxtaposition to said supports, fuses, plug-blocks connected to said terminals by wires, said plug-blocks coöperating with each other to establish electrical connection with all of said terminals from a single source of supply, and a pneumatically-operated switch for controlling the current in said plug-blocks; substantially as described.

8. The combination with a shelf, of continuous electrical conducting-strips arranged along opposite edges thereof, said strips being provided with means for receiving fuses, and a plurality of fuses which coöperate with said strips, said fuses traversing the shelf and lying in close proximity thereto; substantially as described.

9. The combination with a shelf, of continuous electrical conducting-strips arranged along opposite edges thereof and provided with means for receiving fuses, a plurality of fuses which coöperate with said strips, said fuses traversing the shelf and lying in close proximity thereto, and an electric circuit in which all of said strips and their conducting-fuses are included, whereby, when a current is established through the fuses, they will be blown simultaneously; substantially as described.

10. In an apparatus of the character described, the combination with a support in the form of a shelf, of metallic strips arranged along opposite edges of said support and extending thereabove, a plurality of fuses in electrical contact with said strips, said fuses consisting of a body portion of insulation material having metallic clips at their ends, and fuse-wires in electrical connection with said clips, said fuse-wires traversing the support between the metallic strips, and lying in close proximity to the support; substantially as described.

11. The combination with a metallic standard, of a shelf, an electrical conducting-strip secured to said shelf and in electrical contact with said standard, an electrical conducting-strip on the opposite edge of the shelf, a fuse in electrical contact with said strips, said fuse traversing the shelf and lying in close proximity thereto, and electrical conducting-wires leading to and from said electrical conducting-strips on opposite sides of the fuse; substantially as described.

12. The combination with a source of supply of an electric current, of one or more insulation-supports for flash-light powder, electrical conducting-strips arranged on opposite edges of said supports, fuses in electrical contact with said strips, said fuses traversing the

supports and lying in close proximity thereto, electrical conducting-wires leading to and from the several strips on the opposite edges of the supports, and a switch for establishing a current through all of said wires simultaneously; substantially as described.

13. The combination with a source of supply of an electric current, of a switch, supports for flash-powder, terminals arranged on said supports, fuses between said terminals, wires leading from said terminals to a plug, and terminals on the switch for coöperating with said plug, whereby the operation of the switch will send a current through all of the fuses; substantially as described.

14. The combination with the source of supply of an electric current, of a support for flash-powder, terminals arranged on said support, a fuse between said terminals, a pneumatically-operated switch for controlling the current, a shutter operated coincidently with the switch, and means connected with the switch for retarding its action or causing it to lag slightly behind the operation of the shutter-working mechanism; substantially as described.

In testimony whereof I hereunto affix my signature, in the presence of two witnesses, this 6th day of December, 1900.

SAMUEL S. PINGREE.

Witnesses:
WM. H. SCOTT,
A. S. GRAY.