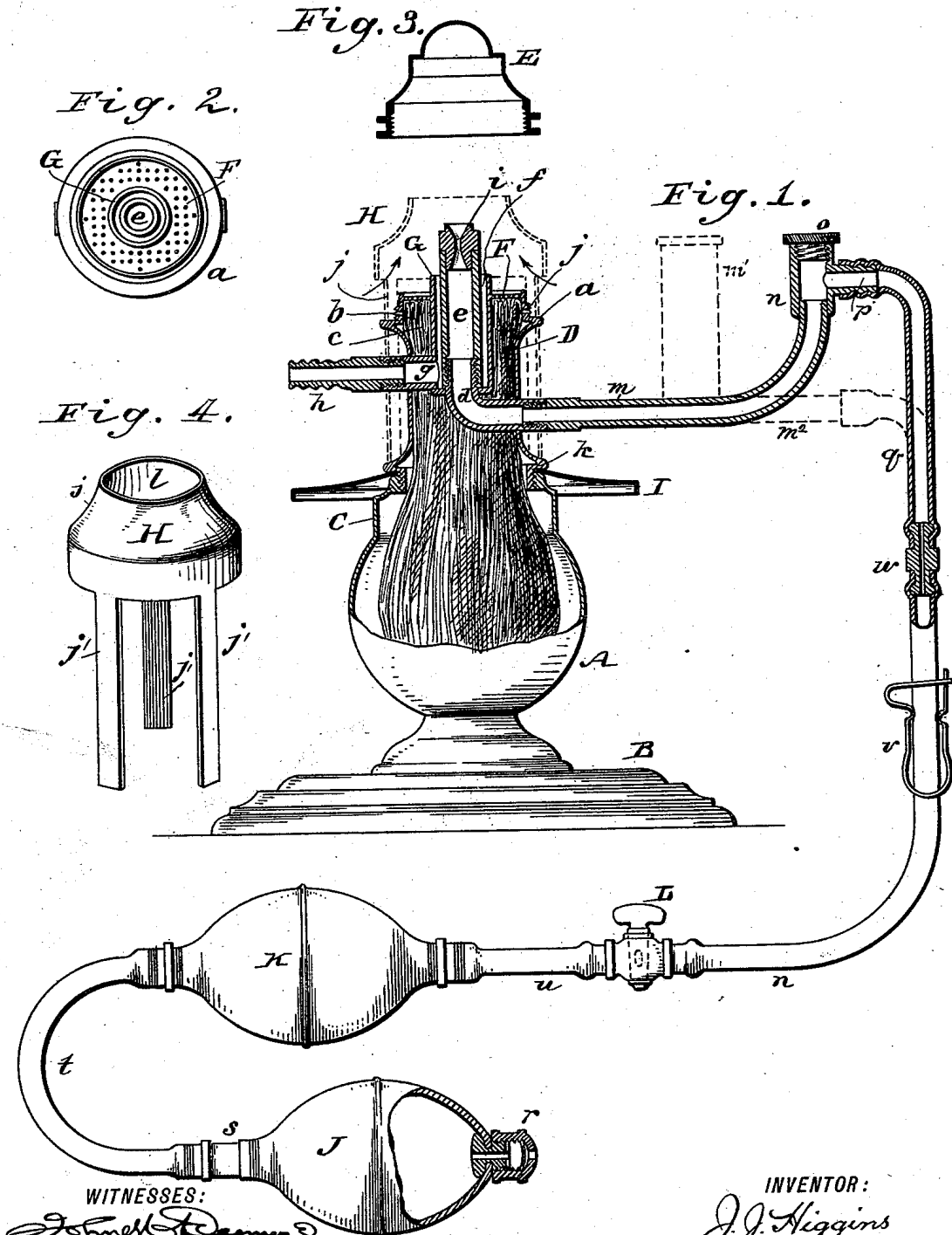


(No Model.)

J. J. HIGGINS.
MAGNESIUM FLASH LIGHT APPARATUS.

No. 417,422.

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WITNESSES:
John H. Adams
C. Bedgwick

INVENTOR:
J. J. Higgins
BY *Munn & Co.*
ATTORNEYS.

UNITED STATES PATENT OFFICE.

JOHN J. HIGGINS, OF NEW YORK, N. Y.

MAGNESIUM FLASH-LIGHT APPARATUS.

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To all whom it may concern:

Be it known that I, JOHN J. HIGGINS, of the city, county, and State of New York, have invented a new and Improved Magnesium Flash-Light Apparatus, of which the following is a specification, reference being had to the annexed drawings, forming a part thereof, in which—

Figure 1 is a side elevation, partly in section, of my improved flash-light lamp. Fig. 2 is a plan view of the wick-tube. Fig. 3 is a diametrical section of the wick-tube cap, and Fig. 4 is a perspective view of the flame-erector.

Similar letters of reference indicate corresponding parts in all the views.

The object of my invention is to construct a magnesium flash-light apparatus in which the charge of magnesium powder and the blast by which the powder is projected through the igniting-flame may be varied according to the light required; also, to provide means whereby the air for projecting the magnesium powder may be compressed to any required extent, so that a large quantity of powder may be quickly projected through the igniting-flame.

My object is, further, to construct an igniting-lamp which will be both safe and effective.

My invention consists in the combination, with a lamp provided with a wick-tube having a closed perforated top, of a reservoir for magnesium powder extending into the annular wick-tube and communicating with the blast apparatus.

It also consists in the combination, with the magnesium-reservoir, of a directing-nozzle for alteration of the form of the stream of powder as it issues from the reservoir to the igniting-flame.

It also further consists in the combination, with the wick-tube, of a metallic ring or hollow cone supported a short distance above the wick-tube and adapted to intensify the heat of the flame and to gather it into a lengthened columnar form.

The invention further consists in an air-blast apparatus formed of two elastic bulbs connected with each other by a flexible tube,

and also connected with the magnesium-reservoir by a flexible tube provided with a resistance for modifying the blast of air, with a regulating-cock and a pinch-cock, one of the flexible bulbs being provided with valves and acting as a pump, and the other serving as a reservoir for air compressed by the pump.

The invention also consists in the combination, with the central cavity of the annular wick-tube, of a gas-supply tube entering the said central cavity and adapted to receive a flexible tube when it is desired to employ gas in producing the igniting-flame.

The invention also consists in the combination, with the lamp, of a horizontal reflector arranged for reflection of the light of the burning magnesium.

The lamp-body A is mounted on the base B and provided with the usual internally-threaded collar C. To the threaded collar C is fitted the wick-tube D, which is provided with a collar *a* near the upper end thereof, the part of the tube above the collar *a* being threaded to receive the screw-cap E. The upper end of the tube D is closed by a perforated annular cap F, which is set in a short distance below the upper end of the said tube. In the center of the cap F is inserted a cylindrical tube G, leaving an annular space *b* between it and the wick-tube D, in which is inserted the wicking *c*, which is crowded into the said annular space to prevent the fire from running down through the wick into the body of the lamp. The sides of the tube D above the collar *a* are perforated in the same manner as the cap F to permit of the escape of alcoholic vapor for the supply of the flame.

The tube G extends about half-way down the wick-tube D and is closed at its lower end, with the exception of an aperture for the reception of the right-angled tube *d*. One end of the said tube *d* projects a short distance into the tube G and is externally threaded to receive the tube *e*. The other end of the tube *d* extends through the side of the wick-tube D and is internally threaded. The external diameter of the tube *e* is made less than the internal diameter of the tube *d*, thus leaving an annular space *f* between the two

tubes G *e*. A gas and air tube *g* is inserted in the side of the tube G, near the lower end thereof, and extends through the wick-tube D for receiving the gas-pipe nozzle *h*. The tube G projects a short distance above the perforated cap F, and the tube *e* extends above the upper end of the tube G, and is provided with a removable nozzle *i*, having a small central aperture, which is shaped according to the form that is desired to be given to the magnesium illuminating-flame.

A short distance above the wick-tube D is supported a flame-erector II, which is formed of the hollow cone or ring *j*, provided with legs *j'*, which rest upon the lower collar *k* of the wick-tube. The central opening *l* of the flame-erector is smaller than the upper end of the wick-tube D, and the lower part of the cone *j* is larger in diameter than the upper end of the wick-tube.

A horizontal reflector I is clamped between the collar *k* of the wick-tube and the collar C of the lamp-body. To the internally-threaded end of the right-angled tube *d* is fitted one end of a tube *m*, the other end of which is curved upward and inserted in a T *n*. The top of the T is provided with the screw-plug *o*, and the branch *p* of the T is adapted to receive the rubber air-tube *q*.

The air forcing and compressing apparatus consists of the elastic bulb J, provided with an inlet-valve *r* and an outlet-valve *s*, and the elastic bulb K, connected with the outlet-valve *s* by the flexible tube *t*. The flexible discharge-tube *u*, connected with the bulb K, is provided with the stop-cock L for controlling the flow of air from the bulb K. The said flexible tube *u* is also provided with the pinch-cock *v*, of the usual well-known construction, which is adapted to pinch and close the tube *u* and hold it closed and to be instantly released, so as to permit the tube to open. The flexible tube *u* is connected with the flexible tube *q* by means of a short resistance-tube *w*.

My improved flash-light apparatus is designed more particularly for use in connection with photography; but it may be used to advantage wherever a momentary light of great intensity is required.

When it is desired to produce several successive flashes in quick succession and without the necessity of reloading the magnesium-powder reservoir, I apply to the tube *m* a magazine *m'*, as shown in dotted lines, or I connect the flexible tube *q* with a branch *m²* of the tube *m*, as shown in dotted lines, when the upwardly-curved portion of the said tube *m* will serve as the magazine. In either case, when the magazine is filled with powder, one discharge of air from the bulb K will carry forward to the igniting-flame as much magnesium powder as lies in the tube *m* below the magazine, and as soon as the air-pressure becomes normal in the tubes *g m* a new charge of magnesium powder falls into the

tube *m*, ready to be again propelled forward by the air-blast.

The operation of my flash-light apparatus is as follows: The lamp-body A being filled with alcohol and the wick being saturated, the tubes *d e* are partly filled with magnesium powder, and the nozzle *i* is placed in the upper end of the tube *e*, when the lamp is lighted at the perforations at the top of the wick-tube D. If any difficulty is found in lighting the lamp, the wick-tube D may be warmed, so as to generate alcoholic vapor before applying the match to the top of the wick-tube. The erector II is placed in position, the pinch-cock *v* is closed, and the elastic bulb K is filled with compressed air and distended to a greater or less extent, as may be required. The stop-cock L is adjusted so as to regulate the flow of air when the quantity of air required is less than would pass through the resistance-tube *w*, the said resistance-tube *w* being of such size as to permit the maximum volume of air to flow through it to the magnesium-powder reservoir. When the light is required, the pinch-cock *v* is released, and the air contained by the elastic bulb K is expelled partly by its own elasticity and partly by pressure on the bulb, thereby driving the magnesium powder contained by the tubes *d e* through the nozzle *i* and into the flame, the powder being spread or shaped, as desired, as it emerges from the nozzle *i*, so that every particle of it is brought into contact with the flame of the lamp. By removing the tube *e* from the tube *d* and placing the magnesium powder in the tube *d*, or in the tubes *d G*, the magnesium powder (owing to the large area of the tube G) will be projected only in part, a portion of it falling back into the tubes *d G* to be forced out by the next air-blast. Repetitions of the magnesium-flame may, in this manner, be rapidly made. The upper end of the tube G in this case forms the projecting nozzle.

When a greater quantity of magnesium powder is required than would naturally be contained by the tubes *d e*, an additional quantity of the powder is introduced into the tube *m* through the T *n* after the removal of the plug *o*. The plug is then reinserted, and the operation is proceeded with as before.

When alcohol is used for producing the flame, air enters through the tube *g* into the tube G and is supplied to the interior of the flame through the space *f*. Where gas is to be used for producing the flame, the nozzle *h* is connected with any convenient gas-supply and the gas is allowed to burn from the upper end of the tube G, the manipulation of the air-forcing apparatus being the same as before described.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—
1. In magnesium flash-light apparatus, the combination, with an annular igniting-

burner, of a nozzle located within the burner, a magnesium-powder reservoir communicating with the nozzle, and an air-blast pipe arranged to convey air to the magnesium-powder reservoir, substantially as specified.

2. In magnesium flash-light apparatus, the combination of the wick-tube D, the gas and air tube G, arranged within the wick-tube, and the magnesium-holding tube *e*, located within the tube G, with a space *f* intervening between the tubes *e g*, substantially as specified.

3. In magnesium flash-light apparatus, the combination, with the magnesium-powder reservoir and air-forcer connected therewith, of a nozzle adapted to spread or alter the form of the stream of magnesium in the igniting-flame, substantially as specified.

4. In magnesium flash-light apparatus, the combination, with the magnesium-reservoir, of an air-compressor, a compressed-air reservoir, and means, substantially as shown and described, for confining the air in the reservoir and releasing it therefrom.

5. In magnesium flash-light apparatus, the combination, with the air-supply tube, of a resistance-tube of smaller diameter than the air-supply tube, substantially as specified.

6. In magnesium flash-light apparatus, the combination, with the igniting-burner and magnesium-reservoir arranged within the said burner, of a flame-erector formed of a hollow cone or ring supported above the igniting-burner, substantially as specified.

7. In magnesium flash-light apparatus, the combination, with the magnesium projecting and igniting devices, of a reflector surrounding the burner or wick-tube, substantially as specified.

8. In magnesium flash-light apparatus, the combination, with the wick-tube D, provided with the perforated closed cap F, of the tube G, supported centrally in the wick-tube, the nozzle *h*, communicating with the tube G, the tubes *d m*, the tube *e*, and an air-forcer communicating with the tube *m*, substantially as specified.

9. In magnesium flash-light apparatus, the combination of the elastic bulb J, provided with valves *r s*, the elastic bulb K, communicating with the bulb J, the air-tube *u*, the stop-cock L, inserted therein, the magnesium-powder reservoir formed of the tubes *d m*, and an igniting-burner, substantially as specified.

10. In magnesium flash-light apparatus, the combination of the bulb J, provided with valves *r s*, the elastic bulb K, the tube *t*, connecting the bulbs J K, the air-tube *u*, and the pinch-cock *v*, whereby air may be compressed and suddenly released, substantially as and for the purpose specified.

JOHN J. HIGGINS.

Witnesses:

A. E. BEACH,
C. SEDGWICK.