(No Model.)

F. G. W. J. ADAMS.

SAFETY INCANDESCENT ELECTRIC LAMP.

No. 603,883. Patented May 10, 1898.

Fig. 4.

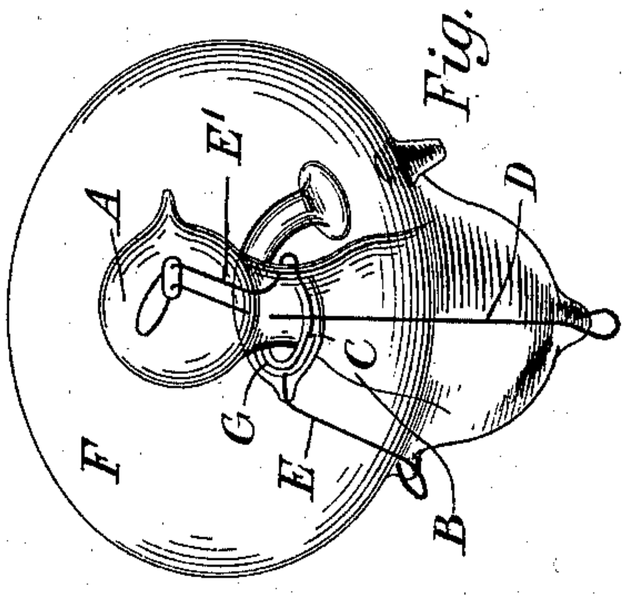


Fig. 6.

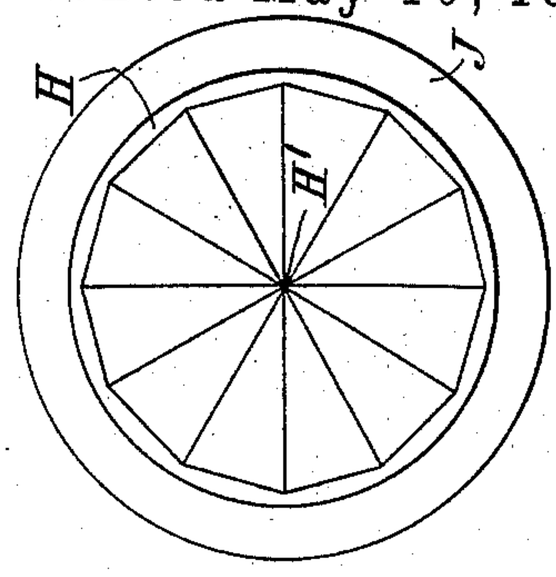


Fig. 2.

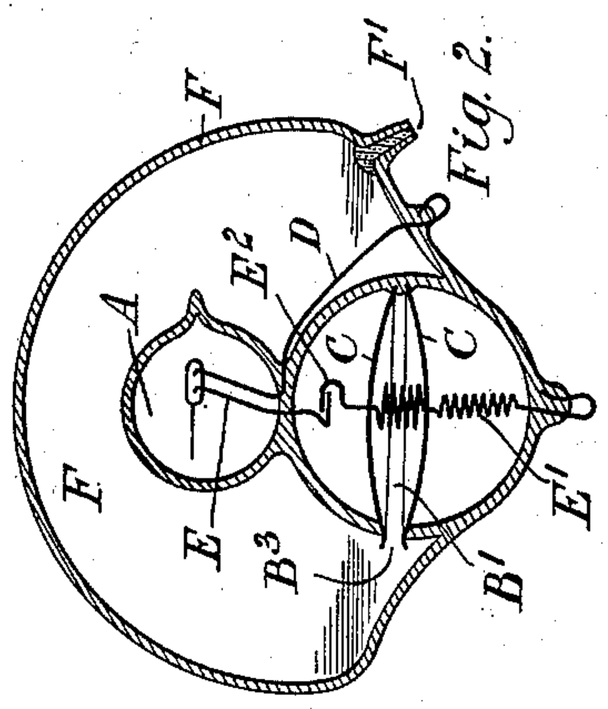


Fig. 5.

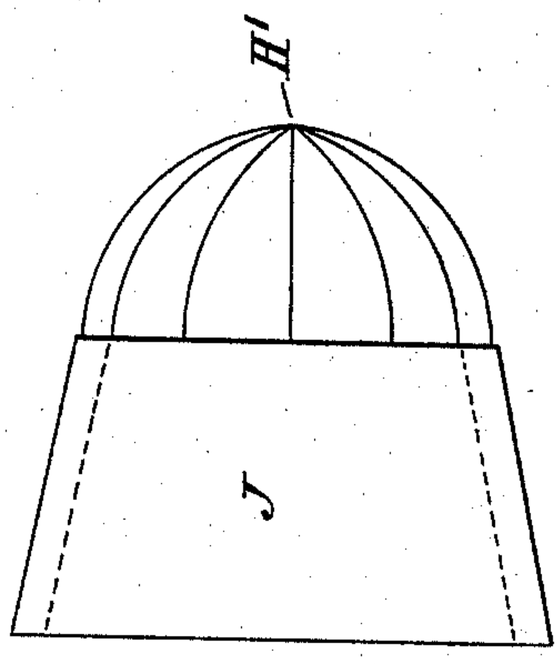


Fig. 1.

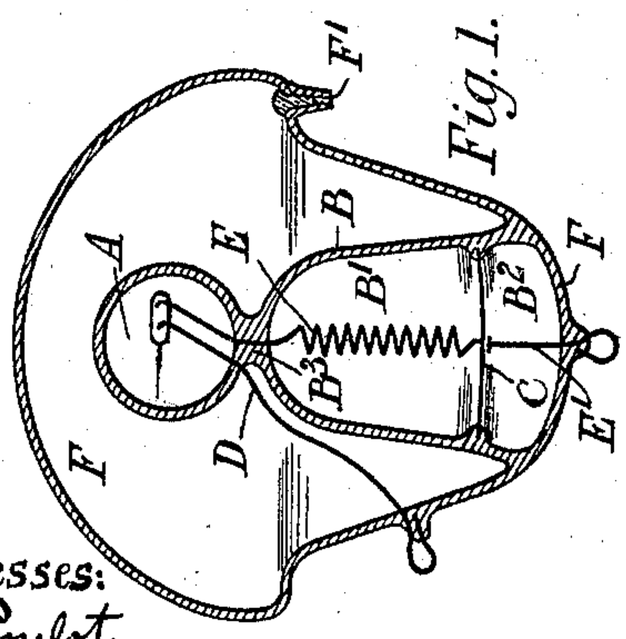
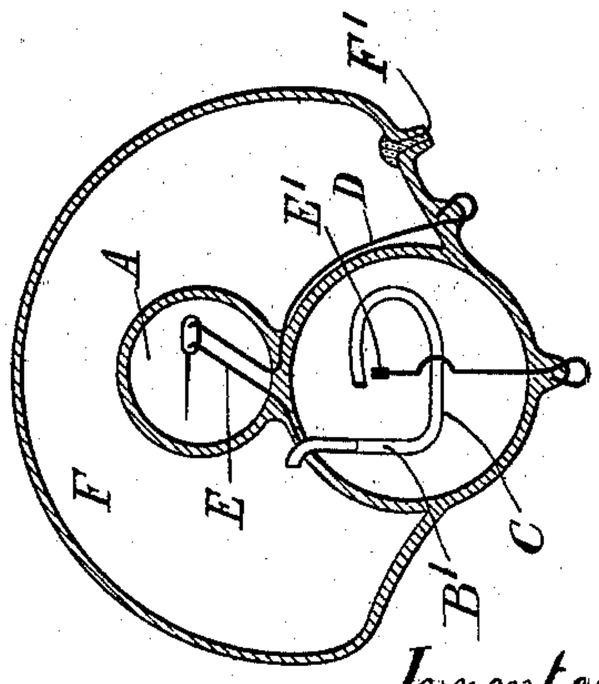


Fig. 3.



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UNITED STATES PATENT OFFICE.

FREDERICK GEORGE WILLIAM JAMES ADAMS, OF LONDON, ENGLAND.

SAFETY INCANDESCENT ELECTRIC LAMP.

SPECIFICATION forming part of Letters Patent No. 603,883, dated May 10, 1898.

Application filed May 10, 1897. Serial No. 635,799. (No model.) Patented in England July 7, 1891, No. 11,526, and in France April 18, 1893, No. 229,458.

To all whom it may concern:

Be it known that I, FREDERICK GEORGE WILLIAM JAMES ADAMS, a subject of the Queen of England, residing at Greenwich, London, Kent county, England, have invented certain new and useful Improvements in or Relating to Electric Lamps, (for which I have obtained Letters Patent in France, No. 229,458, dated April 18, 1893, and in Great Britain, No. 11,526, dated July 7, 1891,) of which the following is a specification.

This invention relates to improvements in the construction of electric lamps and in the lenses to be used therewith. The improved lamp is especially suitable for use in coal-mines or other places liable to be invaded by explosive gas, its construction being such that the electric circuit is made or broken by the action of a difference of gas-pressure upon either side of a movable conductor. This conductor or circuit-breaker is arranged so as to close an opening leading into a chamber which incloses the lamp, the difference in the fluid-pressure upon the opposite sides of this circuit-breaker being so regulated that fracture of the inclosing envelop of the lamp will cause the circuit to be broken and the lamp consequently extinguished, thus obviating the risk of any spark or heated portion of the wire of the lamp igniting the explosive gas near which the lamp may be situated.

In the accompanying drawings, Figure 1 is a sectional elevation showing one arrangement of the improved lamp. Fig. 2 is a similar view showing a modification. Fig. 3 is a similar view showing a further modification. Fig. 4 is a perspective view showing yet another modification. Fig. 5 is a side elevation of the improved lens. Fig. 6 is a face view of the same.

Like letters indicate like parts throughout the drawings.

The lamp A is mounted upon a short length of tube B, preferably constructed of glass. This tube is divided into two parts B′ and B^2 by a flexible diaphragm C, preferably constructed of platinum. Of the two conductors D and E, leading from the lamp A, the former, D, is brought from the lamp A directly through the wall of a glass envelop F, which incloses the whole lamp. To this envelop F is securely sealed the end of the tube B, the chamber B^2 being formed by the diaphragm C and the portions of the wall of the tube B and a portion of the wall of the envelop F. Through this portion of the wall and the envelop F passes the conductor E′, which is formed by a short length of wire brought into the chamber B^2 and terminating in a suitable contact-piece, which when the chamber B′ is in communication with the atmosphere is situated a short distance away from the diaphragm C. The conductor E passes into the chamber B′ and is formed, preferably, as a spiral spring and has its end attached to the center of the diaphragm C, an opening B^3 in the wall of the tube B establishing communication between the chamber B′ and the interior of the envelop F, the latter being provided with a small opening F′, which may be readily closed. When the lamp is constructed, the air in the chamber B′ is rarefied and air or other fluid is forced into the chamber F until the pressure is sufficient to cause the diaphragm C to make contact with the end of the conductor E′ and the opening F′ is closed. The lamp is now ready for use, but if the envelop F is broken the pressure is removed from the one side of the circuit-breaker C, and the circuit consequently broken.

It is obvious that the arrangement of the pressures may be reversed—that is to say, by slightly modifying the arrangement of the conductors E and E′ the circuit may be closed by creating a vacuum in the chamber F, and consequently in the chamber B′, but broken directly this vacuum is destroyed.

In the modification shown in Fig. 2 the flexible conductor C is constructed of two disks in place of one, the space inclosed between them forming the chamber B′, which is in communication, through the opening B^3, with the interior of the chamber F. These disks C carry the conductor E′, arranged in suitable spring form and terminating in the hooked portion E^2, adapted to make contact with a corresponding hooked portion on the end of the conductor E by exhausting the air from the interior of the chamber F, and consequently from the interior of the chamber B′.

The disks C are drawn together, the air in the chamber being rarefied below atmospheric pressure, and the contact between the conductors E and E′ is established; but directly the vacuum in the chamber F is destroyed the circuit is broken and the lamp extinguished.

In the modification shown in Fig. 3 the flexible circuit-breaker C takes the form of a tube with one end sealed, the interior of which forms the chamber B′. This tube is coiled around in such a manner that by exhausting the air from the interior it will be caused to coil itself up still more and make contact with the end of the conductor E′, the tube itself being connected to the conductor E. In both the forms shown in Figs. 2 and 3 it is obvious that by slightly modifying the position of the conductors E and E′, and in the last case also the circuit-breaker C, the circuit may be completed by fluid-pressure within the chamber F in place of a vacuum.

The modification shown in Fig. 4 differs from those previously described, inasmuch as the movable circuit-breaker consists of mercury or like conducting fluid. The tube B here acts purely as a support for the lamp A, the conductor D passing straight through and terminating on the outside of the envelop F. The end of the other conductor E is sealed into the closed end of a glass tube G, which is coiled around behind the lamp A. The end of the conductor E′ is sealed into this tube G about half-way along its length. Into this tube is placed a small amount of mercury C, forming the circuit-breaker, which upon the pressure of the air or other fluid in the envelop F being increased is forced down the tube G until it establishes communication between the ends of the conductors E and E′. It is obvious that directly the envelop F is broken, the pressure being removed, the mercury will flow down the tube G and break the circuit of the lamp.

A convenient means of closing the opening F′ in the envelop F is to introduce into the latter a small bead of wax, shellac, or other suitable substance. After the fluid has been compressed or exhausted through the capillary tube communicating with the opening F′ the wax bead is shaken down into the hole and by the application of a gentle heat is caused to melt and occupy it, temporarily closing its entrance and enabling the capillary tube to be broken off. The hole F′ may now be sealed off and the envelop hermetically closed. It is obvious that when the air in the envelop F is exhausted instead of setting up a pressure within the same the natural contraction that takes place will of itself automatically close the opening F′ directly heat is applied to the capillary tube.

The lens illustrated in Figs. 5 and 6 is adapted to provide an advantageous distribution of the light from a lamp such as above described. The lens is of parabolic form, having preferably a flat base and being cut upon the front with a number of facets H, running from the base or near it to the apex H′, being preferably brought to a point. The lens is carried in a holder or shield J, the holder being molded or blown in one piece either with or without facets, as may be desired.

I claim—

1. An electric safety-lamp consisting of the lamp proper which is provided with a glass chamber inclosing the lamp and joined thereto by the fusion of the glass and an automatic circuit-breaker becoming active upon breakage of the inclosing chamber, substantially as described.

2. An electric safety-lamp consisting of the lamp proper which is provided with an inclosing glass chamber integral therewith and joined thereto by the fusion of the glass, a lamp-support forming two chambers one of which communicates with the chamber formed by the lamp-inclosing glass envelop, two conductors, one passing through the glass envelop uninterruptedly into the lamp, the other passing through the support being formed of two parts and forming the circuit-breaker, as specified.

3. An electric safety-lamp consisting of the lamp proper which is provided with an inclosing glass chamber integral therewith and joined thereto by the fusion of the glass and an automatic circuit-breaker becoming active upon breakage of the inclosing envelop in combination with a parabolic lens having faces coming to a common apex and provided with a holder or shield formed integral with the lens, as specified.

In witness whereof I have hereto set my hand in the presence of the two subscribing witnesses.

FREDERICK GEORGE WILLIAM JAMES ADAMS.

Witnesses:
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HARRY B. NIDGE.