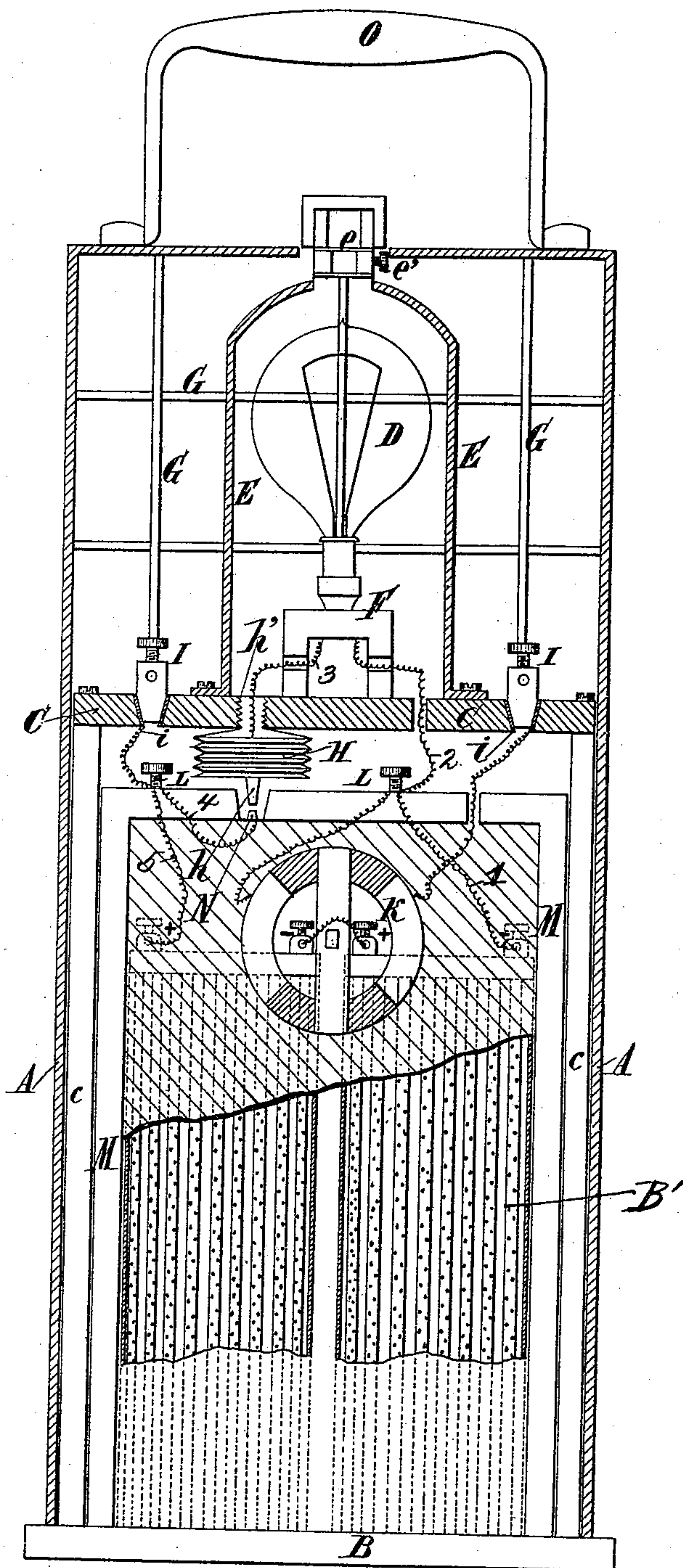


(No Model.)

D. TOMMASI.  
ELECTRIC LAMP.

No. 459,872.

Patented Sept. 22, 1891.



Witnesses:  
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# UNITED STATES PATENT OFFICE.

DONATO TOMMASI, OF PARIS, FRANCE.

## ELECTRIC LAMP.

SPECIFICATION forming part of Letters Patent No. 459,872, dated September 22, 1891.

Application filed January 14, 1891. Serial No. 377,788. (No model.)

*To all whom it may concern:*

Be it known that I, DONATO TOMMASI, a citizen of the Kingdom of Italy, at present residing at Paris, in the Republic of France, have invented certain new and useful Improvements in or Relating to Electric Lamps, of which the following is a specification.

The object of this invention is to enable incandescent electric lamps to be used for lighting mines, powder-magazines, and other similar places where ordinary lighting methods are liable to lead to explosions and fires. Owing to the construction of the lamp herein described, fires and explosions are effectually avoided, as no flame comes in contact with the external air, as even should the glass lamp-bulb break the instantaneous extinction of the carbon-filament obviates all danger.

The invention will be best understood by reference to the accompanying drawing, in which the improved electric lamp is shown in section.

The lamp is inclosed in a rectangular or cylindrical case or frame A, the sides of the upper portion of which may be provided with glass or other transparent or translucent material to enable the light from the electric lamp to pass therethrough. The lower portion of said case A may be entirely of wood, metal, or other suitable material, to the lower end of which a bottom plate B is screwed, soldered, or otherwise secured. The space within this case is divided into two distinct compartments by a horizontal partition C, retained in place by supports c, one of which contains the incandescent lamp and the other a battery, an electrical accumulator, or any source of electricity. I have shown a battery B' located in the lower compartment of the casing, having suitable electrical connections with the electric lamp presently described.

To this partition C is secured the incandescent lamp D, and also a glass dome E, the object of which is twofold: first, to protect the lamp D, and, secondly, to contain air at a predetermined moderate pressure, for purposes presently to be explained.

The lamp D is secured to a support F by means of a slide, a bayonet-joint, a spring, or other suitable means of attachment. Both the lamp D and the glass dome E are protected from injury or shocks by a metal cage

or grating G. The partition C at its under side carries a bellows of india-rubber, leather, or other convenient material, provided on one side with a metal rod h and on the other with a sleeve or socket adapted to be screwed into the opening h'. At its upper side the partition C also supports two adjustable copper or brass binding-posts I, each held in an opening i, lined, preferably, with brass. A suitable switch K is located within the lower compartment of the casing and suitably supported at its ends. Two screws L serve for connecting the accumulator to the lamp, as required, by means of the switch K. A brass point or stud M makes contact with the rod h of the bellows H. The casing A is also provided at its upper part with a handle O; or, if preferred, it may carry a hook on one side for the suspension of the lamp from the belt of the person using it. In the lower compartment may be placed a casing M, within which may be located the battery B'.

The operation is as follows: Some appropriate gas, fluid, or liquid, but preferably incombustible gas, such as air, carbonic acid, nitrogen, or the like, is forced into the glass dome E through a neck-shaped opening e, provided with a cock e'. The quantity of such gas or fluid must be sufficient to enable it in passing through the opening h' to extend the bellows H until the rod h is brought into contact with the stud or point N. The cock e' is then closed, and provision is made for a perfectly air-tight closing, so that none of the gas or fluid admitted into the dome can escape. When the circuit is completed by the expansion of the bellows, the current traverses said circuit as follows: through wire 1 from one electrode of the battery to the binding-screw L on the right, the wire 2, the filament of the lamp D, wire 3, bellows H, thence through contact-points h' N to wire 4, and thence by wire 5 to the opposite electrode of the battery. When a storage-battery is employed, suitable wires may lead from the switch to the binding-screws I I, whereby to enable said battery to be charged when desired.

The introduction of the gas or fluid into the globe, as before stated, serves a double purpose. In the first place it causes the expansion of the bellows H and thereby com-



pletes the electric circuit, and, secondly, it fulfills the no less important office of extinguishing the lamp in case its glass bulb should break, thus avoiding contact between the incandescent filament and the external atmosphere.

It will be understood that should the globe, after the admission into it of a certain amount of gas or fluid, accidentally break all the gas or fluid contained in the globe and the bellows H expands and escapes, thus allowing the bellows to resume its normal contracted shape and break the contact between *h* and N, when the lamp instantly goes out. Should, on the other hand, the lamp-bulb D be broken, the result will be that owing to the vacuum existing in the bulb the capacity of the dome E will be increased, so that the gas or fluid is allowed to expand and break the contact *h* N, whereby the instantaneous extinction of the lamp is caused, as in the first case.

The same device is of course applicable to ordinary incandescent lamps or electric-lighting apparatus of other description besides miners' lamps.

I claim—

1. In an electric-lighting apparatus, the combination, with a suitable source of electricity, an incandescent electric lamp, and electrical connections between the latter and the electrical source, of a bellows located intermediate the lamp and electrical source and adapted to make and break the electrical communication between the two when expanded or contracted, in the manner and for the purpose specified.

2. In an electric-lighting apparatus, the combination, with a suitable source of electricity, an incandescent electric lamp, connections between the latter and the electrical source, and a casing surrounding the electric lamp and adapted to contain a fluid under pressure, of a bellows located intermediate the lamp and electrical source and having communication with the interior of said casing and adapted to be expanded by the fluid admitted to the latter and establish commu-

nication between the lamp and electrical source and to automatically contract when the pressure of the fluid is reduced and break said communication, as and for the purpose specified.

3. In an electric-lighting apparatus, the combination, with a suitable source of electricity, an incandescent electric lamp, connections between the latter and the electrical source, and a casing surrounding said lamp and provided with a fluid-inlet and a valve or cock for closing the same, of a bellows located intermediate the lamp and electrical source and having communication with the interior of said casing and adapted when expanded to establish electrical communication between the lamp and the electrical source and when contracted to break said communication, as and for the purpose specified.

4. In an electric-lighting apparatus, the combination, with a suitable casing divided into compartments, of a source of electricity located in one of said compartments, an incandescent electric lamp located in the other compartment, electrical connections between said lamp and the electrical source, a bellows located intermediate the said lamp and electrical source and adapted to make and break communication between the two in the manner described, a casing surrounding the electric lamp and having its interior in communication with the interior of the bellows, and means for admitting a fluid into said casing, for the purpose specified.

5. In an electric lamp, the combination, with a source of electricity, of a switch K, binding-screws I L, contact-pieces *h* N, bellows H, lamp D, glass dome or casing E, and cage G, all arranged for co-operation substantially as described, for the purpose specified.

The foregoing specification of my improvement is signed by me this 21st of November, 1890.

DONATO TOMMASI.

Witnesses:

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