E. S. DRAKE
Safety-Lamp.

No. 197,110. Patented Nov. 13, 1877.

Fig. 1.

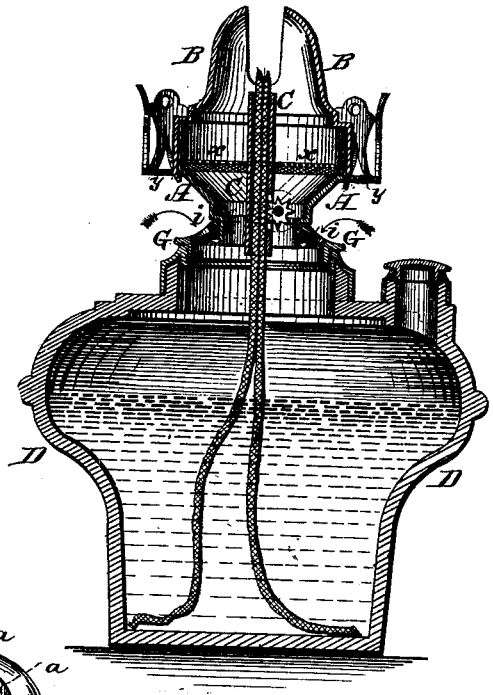


Fig. 3.

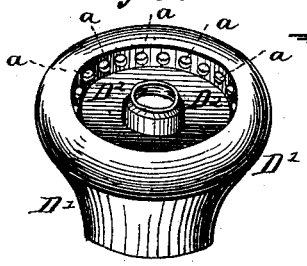


Fig. 2.

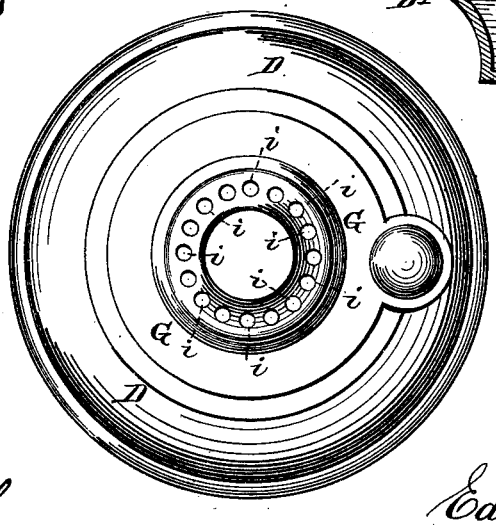
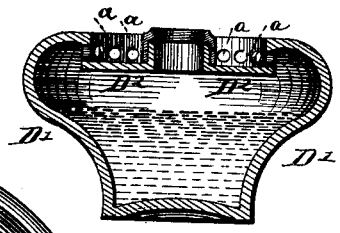


Fig. 4.



Witnesses:
F. C. Dieterich.
Frank H. Duffy.

Inventor:
Edwin S. Drake.
Per C. H. Watson & Co. Attorneys.

UNITED STATES PATENT OFFICE.

EDWIN S. DRAKE, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN SAFETY-LAMPS.

Specification forming part of Letters Patent No. **197,110**, dated November 13, 1877; application filed September 11, 1877.

To all whom it may concern:

Be it known that I, EDWIN S. DRAKE, of Brooklyn, in the county of Kings and State of New-York, have invented certain new and useful Improvements in Safety Lamps and Burners; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to that class of lamps in which coal-oil and its products are burned, and which are liable to accident from explosion.

The effort made to prevent the explosion of this class of lamps has heretofore been expended in two directions—first, by such construction of burner as shall prevent the passage downward of heat from the flame, which heat would stimulate the evaporation of the more volatile part of the oil; and, second, by means of gas-tubes and gas-vents to provide a way for the escape from the lamp-fount of such gas as may be generated by the downward transmission of heat from the flame. Both these means are unreliable and inefficient, for the following reasons: the first, because the insulation of the burner cannot be made so perfect that no heat shall pass downward to the oil, and as the coal-oils of commerce differ so much in density, a burner that would be perfectly safe with oils that were up to the fire-test prescribed by law becomes unsafe when oil of a less specific gravity is used; and the second, from the fact that all the vapors or gases evolved from coal-oil are heavier than atmospheric air, and, by reason of this superior gravity, cannot rise to avail themselves of the means of escape offered by a gas tube or vent.

The explosive gases which prove so disastrous in all lamp-explosions are a mixture of the evaporation from the oil in the fount and atmospheric air. Such a mixture will explode when it consists of one part of gas to five parts of air, and through all proportions from this point up to a mixture of one part of gas to eleven parts of air. Such a mixture is intensely inflammable, possessing, as it does, in itself, all the elements necessary to perfect and instantaneous combustion, and this composition enables it to transmit fire through long and intricate passages or tubes more readily and speedily than gunpowder would do. Such a mixture occurring in a lamp, the smallest gas-tube, or even the very small spaces between the sides of the wick-tube and the wick, afford sufficient means for communicating fire to the explosive mixture in the lamp-fount.

The large number of lamp-explosions which occur, with their attendant horrors, prove conclusively that the present devices for the burning of coal-oils are, as stated, unreliable and unsafe. With the most perfect burners now made it is possible for the conditions precedent to an explosion to occur. In view of this fact it is evident that a device is required with which, and under any and all conditions, it will be impossible to produce the conditions precedent to an explosion. These conditions are the generation in the lamp-fount of gas, and its mixture with the atmospheric air which takes the place of the oil in the fount as the volume of the oil is reduced by burning.

The nature of my invention, therefore, consists in so constructing a lamp and burner that all the air passing to the flame passes through the lamp-fount, carrying to the flame all the evaporation from the oil, so that in the burning of the lamp there shall be a rapid circulation of fresh cool air passing over the surface of oil in the fount, thus cooling it below the point at which any evaporation could take place, and at the same time, by the excess of air over gas, even if the lightest naphthas were used, combining with every equivalent of gas one thousand or more equivalents of air, and as a mixture of one part of gas with even twelve parts of air ceases to be an explosive mixture, this excess of air becomes the perfect safeguard against the possible formation of an explosive mixture in the lamp-fount.

In the annexed drawings, to which reference is made, and which fully illustrate my invention, Figure 1 is a vertical section of a lamp embodying my invention. Fig. 2 is a plan view of the same with the burner removed. Figs. 3 and 4 show modifications of my invention.

A represents the burner, constructed in such a manner that all connection between the outer

air and the deflector B, or the interior of said deflector, is cut off, except by passing up around the wick-tube C, through perforations *x x*, from the interior of the lamp-fount D; but air is permitted to pass to the flame outside of the deflector from without, through perforations *y*, without taking this circuitous course, being admitted from the outside around the base of the chimney.

The lamp-fount D is provided with a larger opening in the top than the size of the base of the burner; and to reduce this opening to the size of the burner, and provide means for admission of air to the interior of the fount, which shall pass to the burner by the way of the openings *x*, around the wick-tube an annular ring, G, is interposed, to which ring both the burner and the collar upon the lamp are fitted, said ring having holes *i*, communicating with the interior of the fount, sufficient to permit the passage of all the air required for the perfect combustion of the oil.

By the use of this perforated ring it becomes possible to use a lamp-fount having no special provision made for the admission of air; but it would be more desirable to construct a fount specially for the device, having openings for the admission of air near the outer edge of the upper surface of the fount.

Such construction of the fount is represented in Figs. 3 and 4, the fount D^1 in each case having a concentric depression or recess, D^2, in the top, with perforations *a a* in the vertical walls thereof.

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

1. A lamp-fount and lamp-burner constructed substantially as described, whereby all the air supplied to the flame must pass through the fount and up around the wick-tube to the interior of the deflector.

2. A lamp-fount constructed to provide for the admission of air at some point or points upon its upper surface, and all the air traversing the surface of the oil then passing through the burner to the flame.

3. A lamp-fount constructed as described, in combination with a burner constructed as described, and its proper chimney, or equivalent device for inducing a circulation of air, the whole operating substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

EDWIN S. DRAKE.

Witnesses:

B. B. SCHNEIDER,

G. H. BOUTON.