This invention relates to safety lamps and especially to that type of lamps which is adapted for use in mines or other places in which explosive gases may be present.

An object of my invention is to produce a device of this type in which there shall not only be no danger of propagating flame from the lamp to the surrounding inflammable atmosphere but also no danger that the light will be extinguished by explosions or other severe disturbances of the surrounding atmosphere.

Another object of my invention is to produce a device of the class described in which advantage shall be taken of the fact that energy is expended in successively compressing and expanding gas by passing it through a series of orifices and which shall also take advantage of the fact that energy is lost in eddies in the moving gas.

These and other objects of my invention will be evident from the following specification having reference to the accompanying drawing in which:

Figure 1 is a vertical cross-section of a lamp constructed in accordance with my invention; and

Figure 2 is a cross-section of another form of lamp illustrating a modification thereof.

While I have shown my device used in connection with a burner for acetylene it is evident that the invention is not so limited as it is also well adapted for use in oil burning lamps.

In Figure 1, the lamp is provided with a base 10 which contains an acetylene generator or other source of fuel for a burner 11. Mounted on the base 10 are a plurality of concentric cylindrical members 12, 13 and 14. While I have shown three such members and have found three well adapted for the purpose of my invention I do not limit myself to exactly three such members.

These cylindrical members are provided at their upper ends with seats 15 for receiving a plurality of transparent cylindrical members 16, 17 and 18. Resting upon the transparent cylindrical members is a cylindrical member 19 provided with means 21, 22 and 23 for engagement with the transparent cylindrical members. A flange 24 extends outwardly from the member 19 and is provided with holes for engaging with the shoulders of bolts 25 which extend from the flange 24 to the base 10. The cylindrical members 12, 13 and 14 are provided with a series of holes 26 for the purpose of supplying air to the burner. The corresponding cylindrical members 21, 13 and 23 are not provided with such holes, with the result that the air for the burner 11 is forced to flow in a tortuous path as shown by the arrows. Screens 27 and 28 are provided for preventing flame from the burner from being propagated to the surrounding atmosphere. Cylindrical members 31, 32 and 33 are mounted on the disc 19, the first two being provided with holes 34 for forming a passage for the products of combustion. Cooling fins 35 are provided on the cylindrical member 23 for reducing the temperature of the cylinders. A wire gauze 36 is provided at the outlet of the products of combustion for preventing flame from being propagated to the surrounding atmosphere.

The operation of my device is as follows: Fuel is supplied from the base 10 to the burner 11, the air being supplied through the holes 15. Because of the arrangement of the cylinders 16, 17 and 18 this air passes along the tortuous path shown in the drawing, passing through three perforated plates 14, 22 and 12. In so doing it serves to cool the transparent cylinders 16, 17 and 18. From the burner the products of combustion pass upwardly through gauze 27 to the holes 34 in the cylindrical member 31, thence downwardly through the holes 34 in the cylindrical member 32 and are finally discharged through the gauze 36 to the atmosphere, the fins 35 serving to cool the upper part of the lamp.

In case there should be a violent disturbance in the atmosphere surrounding the lamp, such as would be caused by an explosion or the like, the sudden rush of air or gas would be forced through the holes 15 in the cylindrical member 14. After passing through this restricted orifice the gas would expand and flow upwardly toward the plate 22 where it would again be compressed and expanded with a corresponding energy loss. The same loss of energy would occur in passing through the member 12. I have found that by providing the holes as shown it is possible for the lamp to withstand a considerable disturbance in the surrounding atmosphere without being extinguished. It is evident that the same
action would take place if any rush of gas were forced inwardly through the outlet for the products of combustion.

In the embodiment shown in Figure 2, the base 41 contains a source of fuel for a burner 42. Surrounding the burner 42 are transparent cylinders 43 and 44, these cylinders resting on a plate 45. Resting on these transparent cylinders 43 and 44 and secured to the base 41 by any suitable means, not shown, is a drum or casing 46 containing a plurality of cylinders 47. In the cylinders 47 are a number of spaced apertured plates 49. While I may arrange the plates with their apertures in line, I prefer to arrange them with the apertures in a helix so that the gas in passing through the same will be caused to set up eddies. Suitable gauze members 49 are provided for preventing the propagation of flame to the atmosphere.

The operation of this modification of my invention is as follows:

Fuel is supplied to the burner 42 from the base 41 where it burns forming combustion products which pass upwardly through the central cylinder of the casing 46, the air for supporting the combustion being drawn down the upper cylinder 47 and passing through perforations in the plate 45 to the burner. In case of any sudden rush of gases in the surrounding atmosphere the plates 48 serve to set up eddies which together with the alternate compression and expansion of the gas due to the orifices in the plates 48 reduce the pressure and velocity of the advancing wave front so as to render it harmless.

I claim:

1. A lamp comprising a burner, a chamber surrounding said burner, a series of tortuous passages for supplying oxygen to said burner and another series of tortuous passages for permitting the removal of gaseous products of combustion and a series of apertured plates in both series of said passages whereby the gases are alternately expanded and compressed with a resulting loss in energy.

2. A lamp as claimed in claim 1 in which the apertures in said plates are so arranged that eddies will be set up in the gas between the plates.

3. A safety lamp comprising a plate, a burner mounted on said plate, a pair of transparent concentric cylinders on said plate surrounding said burner, said plate being provided with apertures between said cylinders and between the inner cylinder and the burner, a plurality of tubes communicating with the upper ends of the cylinders and a plurality of apertured plates in said tubes.

4. A safety lamp comprising a plate, a burner mounted on said plate, a pair of transparent concentric cylinders on said plate surrounding said burner, said plate being provided with apertures between said cylinders and between the inner cylinder and the burner, a plurality of tubes communicating with the upper ends of the cylinders and a plurality of apertured plates in said tubes, the apertures in said plates being helically arranged.

5. A safety lamp comprising a burner, a pair of concentric transparent cylinders surrounding said burner, means providing a passage from the space between said burner and the inner cylinder and the space between said cylinders, a casing mounted on said cylinders, a plurality of tubes in said casing, part of said tubes communicating with said inner cylinder and part with the space between said cylinders and means in said tubes for absorbing the energy of a sudden rush of gas.

6. A safety lamp comprising a burner, a pair of concentric transparent cylinders surrounding said burner, means providing a passage from the space between said burner and the inner cylinder and the space between said cylinders, a casing mounted on said cylinders, a plurality of tubes in said casing, part of said tubes communicating with said inner cylinder and part with the space between said cylinders and a plurality of spaced apertured plates in said tubes.

7. A safety lamp comprising a burner, a pair of concentric transparent cylinders surrounding said burner, means providing a passage from the space between said burner and the inner cylinder and the space between said cylinders, a casing mounted on said cylinders, a plurality of tubes in said casing, part of said tubes communicating with said inner cylinder and part with the space between said cylinders and a plurality of spaced apertured plates in said tubes, the apertures in said plates being helically arranged.

In testimony whereof, I affix my signature.

HARRY S. GEORGE.