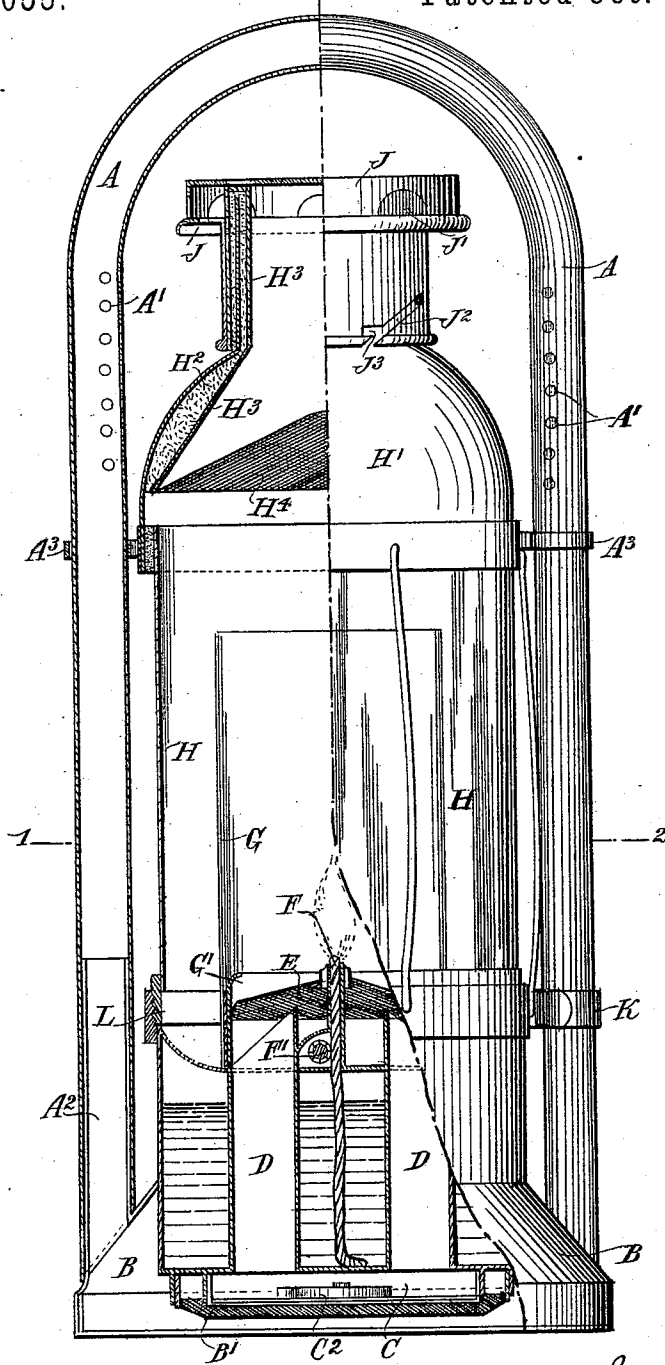


W. E. FIELD.
MINER'S SAFETY LAMP.

No. 527,055.

Patented Oct. 9, 1894.



Witnesses
 W. C. Pinckney
 Isaac P. Storm

Fig. 1.

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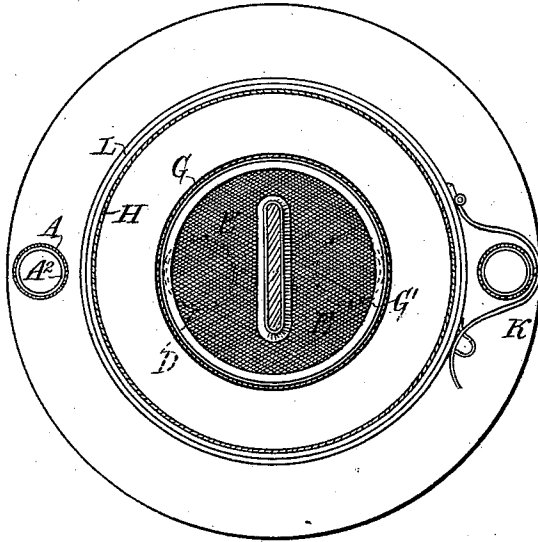


Fig. 2

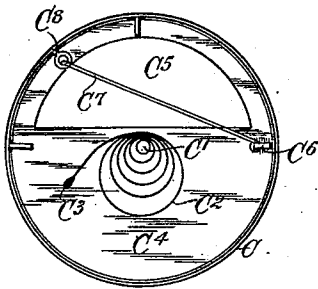


Fig. 3.

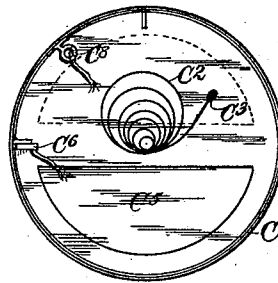


Fig. 4

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UNITED STATES PATENT OFFICE.

WILLIAM E. FIELD, OF HAWTHORN, VICTORIA.

MINER'S SAFETY-LAMP.

SPECIFICATION forming part of Letters Patent No. 527,055, dated October 9, 1894.

Application filed September 2, 1892. Serial No. 444,909. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM EDDINGTON FIELD, analyst, a citizen of Melbourne, and a resident of Hawthorn, in the Colony of Victoria, have invented a certain new and useful Miner's Safety-Lamp, of which the following is a specification.

This invention has been devised to provide an improved lamp for the use of miners in mines where there may be dangerous gases or vapors and is arranged in such a manner as to prevent the possibility of explosions occurring if the lamp be lowered or used in places where combustible gases or vapors exist. At the same time it is so constructed that its working is not affected by drafts or wind.

The lamp is preferably constructed in a shape somewhat resembling an ordinary swing hand lamp, but the interior consists principally of a chamber inclosing the flame of the wick the sides of which said chamber are impermeable to gases, while the top and bottom of the chamber are wholly or partially constructed of wire gauzes, through which the incoming and outgoing gases and vapors must pass. This chamber terminates at its top in the form of a pipe for the purpose of insuring an updraft from the flame. This pipe or tube is covered cowl-wise by a ventilator cap or shutter. This latter is arranged in such a manner as to enable the operator to adjust it and in the case illustrated to raise it or lower it at his discretion, and is also provided with a diagonal slot working on a pin, fixed in the aforesaid pipe chimney. The cap lifts up and down quite freely and when desired can be closed right on to the top of the pipe and thus cause the flame to go out through lack of oxygen. The handle of the lamp is made preferably in the form of a yoke and consists of a hollow tube near the top of which holes are suitably arranged for the inlet of air to support the combustion in the lamp. This air proceeding down to the bottom of the aforesaid tube handle enters into a chamber to be hereinafter explained, where a false bottom of wire gauze is provided. Immediately above this false bottom a circular horizontal shutter device is placed, the said shutter being actuated by a spring and kept in an open position by a

piece of combustible material such as string, or easily melted wire; and from this chamber two upright tubes ascend and terminate under a wire gauze cap. This latter surrounds the wick. The wick is arranged in the ordinary manner, is adjustable by the usual thumb screw, and depends into a chamber of oil which takes up all the unoccupied portion of the bottom of the lamp. An inner glass chimney is preferably provided for surrounding the wick and consists of a simple glass cylinder, but its use is not arbitrary. The upper portion of the lamp, under the cap piece, is made in the shape of a dome and contains an inner lining of non-combustible material, such as asbestos, between it and the inner plate.

I will now direct attention to the drawings herewith, in which—

Figure 1 is an elevation of my lamp, half being in section. Fig. 2 is a cross section on line 1—2 of Fig. 1, while Figs. 3 and 4 are plan views respectively of the circular horizontal shutter device in its open and closed positions.

In the drawings "A" is the yoke shaped pipe handle provided with holes "A'" for the ingress of air and terminating at the bottom in a circular chamber "B." In this chamber "B" stands the lamp, at the bottom of which is a wire gauze "B'" in the form of a circular plate and above which is placed a stationary disk, having a segmental opening shown in dotted lines in Fig. 4 and adapted to be closed by a suitable shutter disk, the two combined forming a circular horizontal shutter device "C," (Figs. 1, 3 and 4.) This shutter device is composed as follows: Attached to a central pivot "C'" is a spring "C²" the end of which is fastened at "C³" to a circular shutter disk "C⁴" having a segmental opening corresponding in size with the opening in above stationary disk "C⁵" and small lug "C⁶" provided with an eyelet hole. To this eyelet hole a piece of combustible string or fusible wire "C⁷" proceeds to and is fastened on a rigid eyelet "C⁸," the whole being so arranged that normally the opening in the shutter disk coincides in its position with the opening in the stationary disk, but that if the string "C⁷" be at any time burned by contact with flame the tension of the compressed spring will ro-

tate the shutter disk round to the closed position as shown on Fig. 4 and thus cut off the supply of air, vapor or gas to the flame above. Over the top of the casing carrying the said shutter are arranged two inlet pipes "D" for conveying the air to the wick at the point of combustion, but before the air reaches the wick it is made to pass through a gauze screen "E." This screen is circular in shape and surrounds the base of the wick and flame "F." Being placed in close proximity to the flame gaseous vapor that may pass through the fine perforations in such gauze, will before an opportunity is given to form a large and dangerous body of gas within the lamp be ignited by such flame.

"F" is an ordinary ratchet actuated by the thumb and finger for adjusting the height of the wick.

"G" is an internal glass chimney, cylindrical in form and kept in position by springs attached to the brass rim "G'."

"H" is the glass chamber inclosing the light and terminating at its top in a dome "H'," made of copper or other suitable metal, and provided with an asbestos inner jacket "H²" and diaphragm plate "H³." In the interior of this dome is another wire gauze partition "H⁴" and at the top of the dome a covering cap "J" is provided. This cap contains a set of ventilator holes "J'" and is made to fit neatly around the top portion or chimney of the dome "H'." The cap "J" may be also provided with a diagonal slot "J²," said slot being set with a pin and a small subsidiary slot for fixing the position of the cap when the lamp is at work.

It will be seen that the cap "J" can be lowered at the will of the operator to rest upon the top of the dome chimney "H³" and thus prevent any egress of gases from the interior of the lamp. I do not confine myself to the particular form of this cap, my object being to control the upward draft by means of an adjustable shutter.

The tubular handle "A" can be removed from the lamp by unclasping the latch "K." This latch "K" may be of any approved design and is only necessary on one of the legs of the yoke, as both legs of the yoke are kept in position by the inner vertical tubes "A²." (See Fig. 1.) A screwed ring "L" is secured to the main glass "H" which engages with a thread forming a portion of the oil reservoir of the lamp.

The method of working my invention is as follows: The latch "K" is unfastened. The yoke "A" is then drawn up through eyelets "A³." The body of the lamp can then be unscrewed at "L" and removed, the small inner glass cylinder "G" lifted up and the wick "F" lighted and adjusted to the necessary height by the ratchet "F'." The cylinder "G" is then replaced, as shown, and the body of the lamp again screwed into position at "L," care having been first exercised in seeing that the cap piece "J" is in its "open"

position. This latter is done by slightly lifting and turning the cap in such a manner that the pin in the slot "J'" is brought down to the subsidiary set slot at "J³." The yoke "A" is then replaced over the inner tubes "A²" and the latch "K" locked in position and the lamp is ready for use. It is presumed that the shutter disk is in its open position, as in Fig. 3. The air necessary for the combustion of the lamp enters at the air holes "A'" and descends both legs of the yoke "A" and enters the bottom chamber "B," whence it proceeds through the wire gauze "B'," thence through the open shutter device "C" into the upright passages "D" and after passing through the other wire gauze "E" arrives at, and supports the combustion of, the flame at "F." The up draft, carrying with it the unused and spent gases and vapors thence proceeds upward through the cylinder "G" toward, and through, the conical shaped wire gauze cap "H⁴" whence it is directed by the diaphragm or inner plate "H³" to the ventilated cap or shutter "J" where it may escape to the outer air. We will presume for example that the lamp has been lowered into a place containing a mixture of inflammable gases or vapors. In this case the indraft of the lamp will cause such inflammable gases or vapors to proceed down the yoke "A" (in similar manner as hereinbefore described for the air for combustion) but on the said inflammable gas or vapor passing through "E" it catches fire at that position, and owing to the close proximity of screen E to the flame, such ignitions take place instantaneously and produce a number of minute explosions which are reverberated on the plate or diaphragm "H³." (See Fig. 1.) Should however the gauze plate "E" be damaged, or from some cause work ineffectually, and allow the flame to pass down the tube "D" as far as the shutter disk, the combustible string or fusible wire "C'" (see Fig. 3) will be severed by the heat when the shutter disk, by reason of its automatic action, as hereinbefore described will close into the position shown on Fig. 4, thus cutting off the incoming supply of gaseous vapors and preventing the communication of fire from the lamp to the body of gas that may be contained in the legs of the yoke "A" or in the mine. The jacket of asbestos "H²" is for the purpose of keeping the outer surface of the dome from becoming too hot and thus inconveniencing the person carrying the lamp and at the same time allowing the inner plate of the dome to keep hot and thus assist the draft through the lamp. The holes "A'" in the yoke are arranged in such a manner as to catch a draft of air no matter from what direction it may be coming in, and it will also be seen that the ventilation in the cap piece "J," by reason of the apertures "J'" may be made equally efficacious in a draft or wind coming from any direction. The supply of oil to the lamp can be inserted at any convenient spot in the ordinary manner.

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

1. A miner's safety-lamp the sides of which are impermeable to gases and vapors, provided with wire gauze below the top of the wick, wire gauze above the top of the chimney, a cone-shaped abestos lined tube above the latter and an adjustable ventilator cap fitted to said tube, substantially as described.

2. A miner's safety lamp, the sides of which are impermeable to gases and vapors, provided with a wire gauze bottom, a shutter adjusted to move horizontally in proximity with such bottom, a device for closing such shutter, and a fusible wire or a combustible cord connected to the shutter whereby such closing device is normally held out of action, substantially as set forth.

3. In a miner's safety lamp, the combination with a chamber inclosing the flame, of two wire gauze screens interposed between the flame and the admission ports for the air, a shutter placed between such screens, a device for closing such shutter and a fusible or combustible restraining device, whereby the

closing device is normally held out of action, substantially as set forth.

4. A miner's safety-lamp the sides of which are impermeable to gases and vapors provided with a wire gauze bottom, a spring actuated shutter adjusted to close an opening arranged above said bottom and a fusible wire or combustible cord connected to said shutter and to the casing, which wire or cord when severed allows the spring to act to close the shutter, substantially as described.

5. In a miner's safety-lamp, the combination with a chamber inclosing the flame, of a contracted pipe at the top and a vertically and circumferentially adjustable ventilator cap cooperating with said pipe and provided with ventilator openings and with means for fixing it in place, substantially as described.

Signed this 19th day of July, 1892.

W. E. FIELD.

Witnesses:

A. O. SACHSE,
C. E., Melbourne.

C. W. WADE,
Clerk, Melbourne.