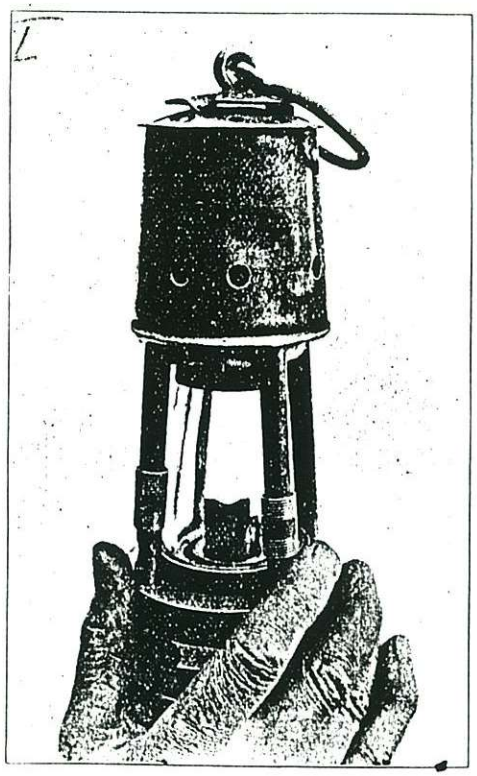
Ashworth Safety Lamps

Mark Ballard and James Van Fleet

The lamp developed by James Ashworth, English Mining Engineer, is one of the most beautiful and interesting flame safety lamps. It was also one of the most sophisticated methane gas testing instruments in use at the turn of the century.

The original Ashworth "Deputy" or "Fireman's Lamp" was developed around 1889. It was based on the Gray patented safety lamp, which was highly recommended for gas testing in a report of the Royal Commission on Mine Accidents, 1886.

"After the publication of the report an improved form [of Gray lamp] was brought out by [Ashworth], who has had a life-long experience in experimental work with safety lamps, and his lamp is well known throughout the English coal-fields and also in the colonies, as Ashworth's patent Hepplewhite Gray."



The original caption for this illustration, from a 1902 paper by Ashworth, reads: "Ashworth's patent Gray, Deputy or Fireman's Lamp. Showing mode of manipulation when testing for firedamp."

There is some evidence of a rivalry in the early 1890's between Ashworth and other lamp inventors such as Mr. Stokes. The Stokes lamp was similar in design, but burned alcohol for testing for small percentages of methane gas or "firedamp."

In a publication from 1910, J.B. Marsaut, inventor of another popular flame safety lamp, was critical of the Gray style of lamp with its large, hollow standards "since these large tubes through which the air is conducted into the Gray lamp cast rather large shadows."

Most of the rival gas testing systems were eventually brought together, and by 1900, James Ashworth had included in his lamps many of the features patented by Mr. Stokes, Dr. Clowes, and Mr. Gray. In an article published in 1902 James Ashworth defends his own lamps, which were being manufactured by Messrs John Davis & Son, Ltd, All Saints Works, Derby, England. He writes:

"As late as 1901 the original inventor, Mr. Gray, again took out a patent, which he called No. 2, combining all the best points of the Gray and Ashworth lamps."

By that date, the Ashworth lamps are available in five different styles:

1) The basic Ashworth-Hepplewhite-Gray.

2) The Clowes hydrogen gas-testing lamp.

3) "The Ashworth-Gray with Stokes alcohol spirit gas-testing attachment."

4) "Ashworth-Gray with separate oil and alcohol spirit gas-testing burners."

5) "a tri-wick safety lamp, for burning petroleum spirit, and fitted with a Wolf patent relighter."

In the examples of these lamps shown in Ashworth's article, some are bonneted, some unbonneted. The tri-wick lamp is shown with a bonnet and ordinary wire standards.

Ashworth writes that "the capacity of a safety lamp to detect small percentages of firedamp depends principally on its heat, and these are the reasons why hydrogen gas and alcohol spirit were adapted by the writer to his Hepplewhite-Gray type for laboratory and main air current testing in coal mines."

Fig 1.

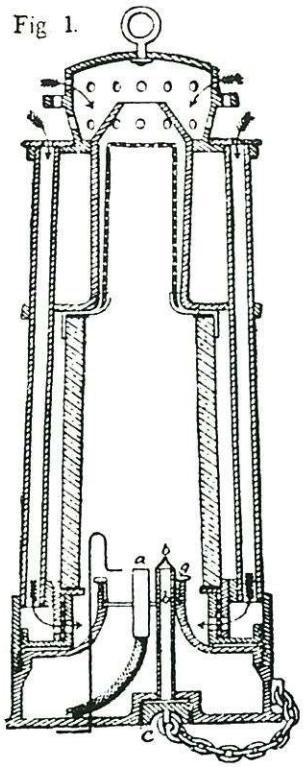
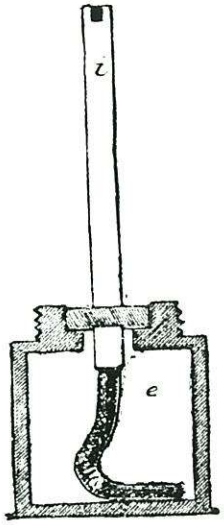
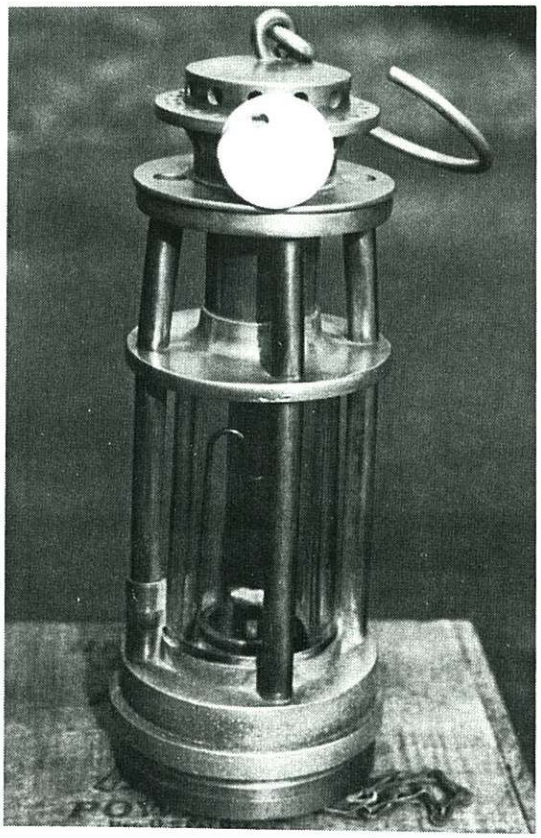


Fig. 3.

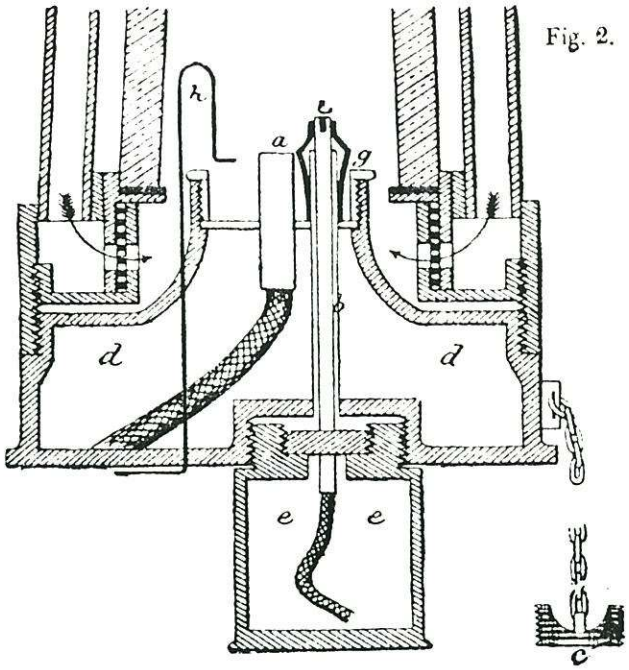


The Stokes alcohol gas testing lamp.



Aluminum and brass Stokes gas tester. Note the painted glass. Photo by Fred D'Ambrose.

Fig. 2.



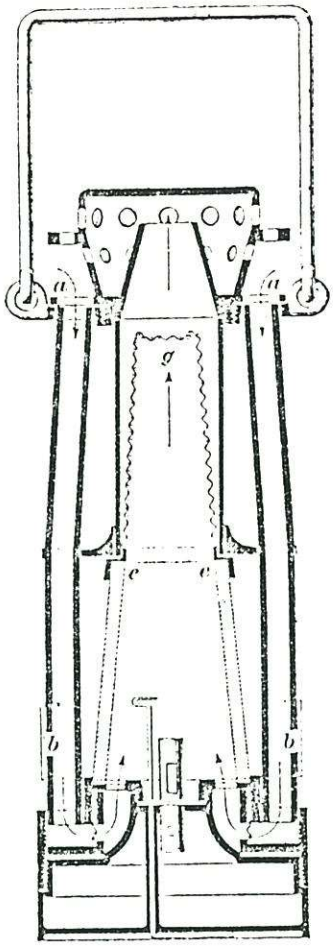
The Clowes and Stokes varieties produce the high heat needed to detect small percentages of methane gas, as low as .25%, up to 2%. Higher percentages were detected using the wick flame, burning colza, paraffin, or other oil fuels.

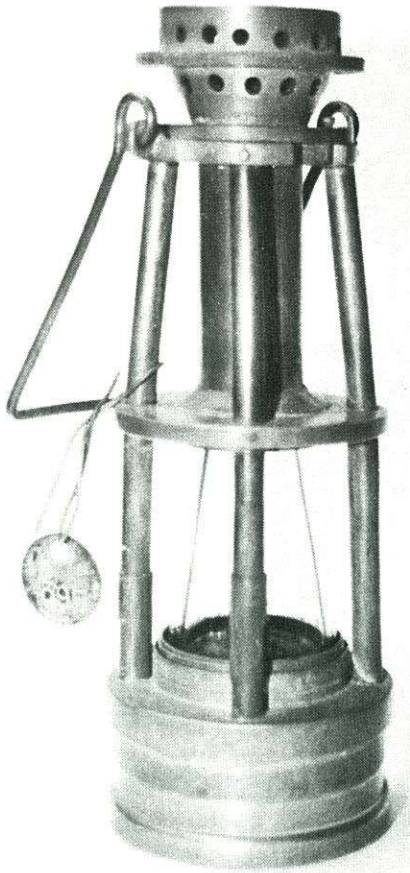
The AHG lamp is described best in a 1920 report:

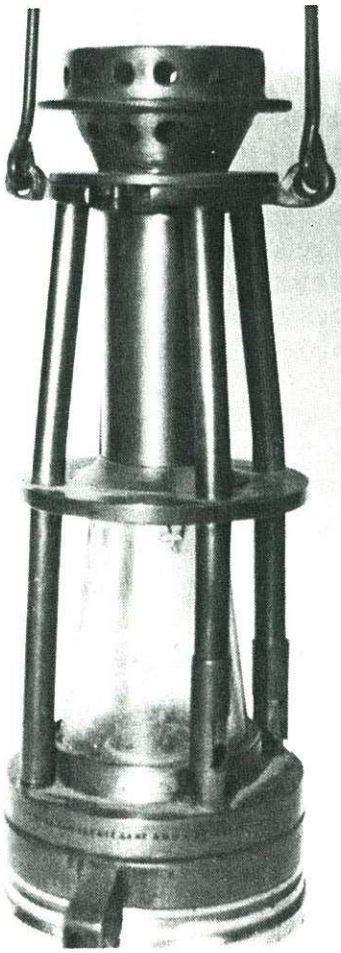
"As usually constructed, there are four hollow-tube standards. When the lamp is used for testing, the air enters the tops of the standards and passing downward enters the lamp through the gauzed openings below the flame. By this means, a thin layer of gas against the roof may be detected without tilting the lamp. When the lamp is used for general work, the holes in the tops of the tubes are closed by a sliding lid, and the lower apertures in the tubes, which are closed when testing for gas, are opened to admit air more freely to the flame."

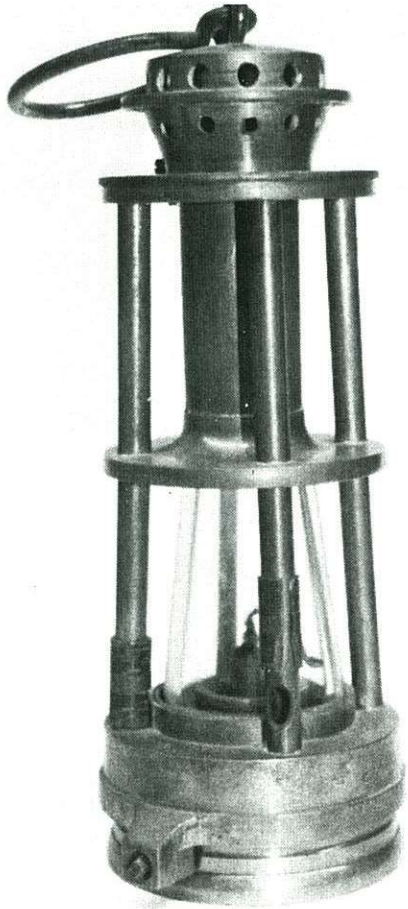
"In some lamps there are three, instead of four, standards, one only of which is hollow, the other two being of thin wire, so as to not impede the light. By a change in the oil vessel and wick tube, these lamps may be made to use either sperm or lard oil, or colza and similar oils. The Ashworth-Hepplewhite-Gray lamp has a high illuminating power, and is said to be safe in currents having velocities as high as 100 feet per second."

The mention of air current velocities, and of testing main air currents in coal mines is important. An air current moving gas through the gauzes of a lamp increased the chances of explosion. Almost all of Ashworth's lamps protect the flame with a unique conical glass. In some cases, the "back" of the glass is painted black, to allow better inspection of the flame.









OPPOSITE PAGE, CLOCKWISE:

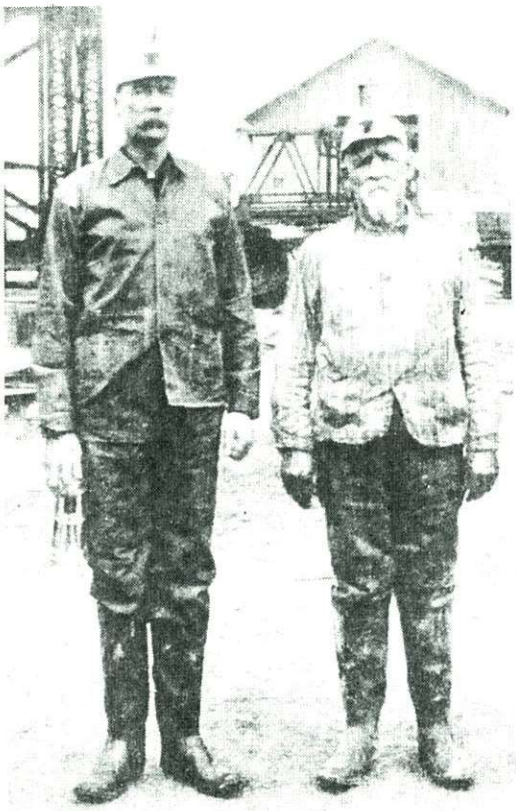
Schematic of the Ashworth-Hepplewhite-Gray safety lamp.

Aluminum AHG from the collection of Mark Ballard. Note the "bent" standards.

Brass AHG lamp, with top ring handle and straight standards. From the Sterling Hill, NJ , Mine and Museum.

Brass AHG marked "American Safety Lamp & Mine Supply Co., Scranton, PA" around base. Sterling Hill Mine and Museum.

The AHG safety lamp saw use in the United States as well, and the American Safety Lamp & Mine Supply Company of Scranton, PA manufactured lamps identical in most details to the English Ashworth.



An Ashworth lamp in action. The photo shows Illinois State Mine Inspectors Hector McAllister (left) and Pres. Richard Hewsam, at the site of the Cherry Mine Disaster, 1909.

Certainly the most unusual Ashworth style lamp is the Clowes hydrogen gas-tester. It is described as:

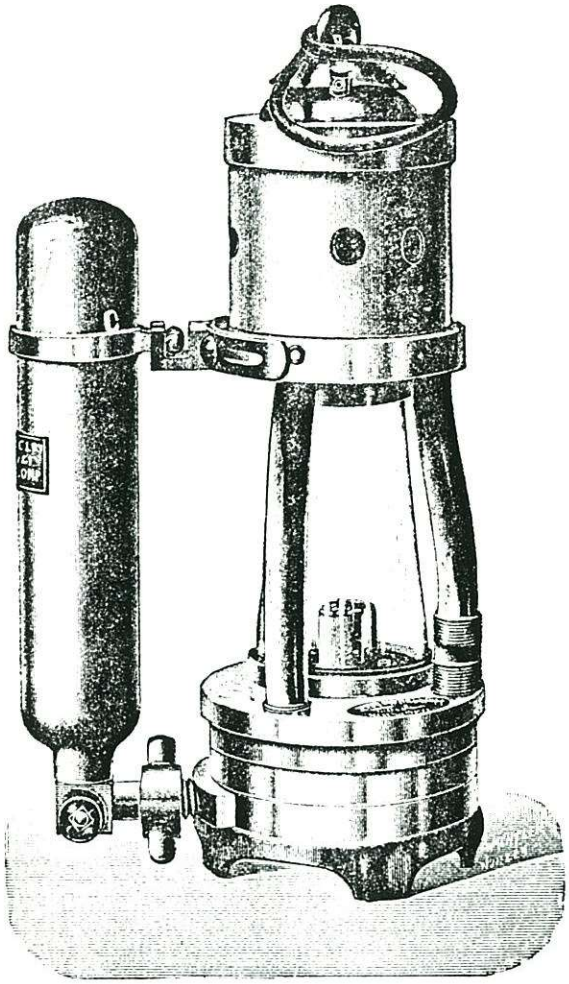
"An Ashworth-Hepplewhite-Gray lamp, with a somewhat taller glass chimney for the purpose of observing a flame cap. It is equipped with appliances for using a hydrogen-gas flame, when testing for gas. A small tank containing compressed hydrogen gas attached to the lamp by a clip and a screw. A seamless copper tube is connected with the reservoir and runs through the oil vessel and up alongside the wick tube."

"When a test is to be made, the valve is opened, which permits the hydrogen gas to flow through the tube and be ignited by the flame of the wick. The wick is then lowered until its flame is extinguished. The height of the hydrogen flame is adjusted to the zero of a scale in the lamp. This scale consists of a number of fine cross-bars supported in a ladder-like frame in a position in front of the flame of the lamp. The several cross-bars mark the heights of the flame caps caused by various percentages of gas."

We can't help noticing the similarity of this scale to a Beard-Mackie sight indicator.

Clowes lamp. The lamp is brass, and the bonnet and gas cylinder are typically painted red. Note the elegant lamp base! From the collection of Lester Bernstein.

Clowes hydrogen cylinder, bearing a brass tag marked:
Redwood & Clowes Patent
W. J. Frasher & Co.
Commercial Road East
London



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