by oil and hydrogen flames of the same height; thus, supposing that the testing flames in both instances are a ¼ in. in height, and applied in the same type of safety lamp, the oil flame would produce a "cap" of $\frac{3}{10}$ in., whereas the hydrogen flame would give a "cap" of 1 in.

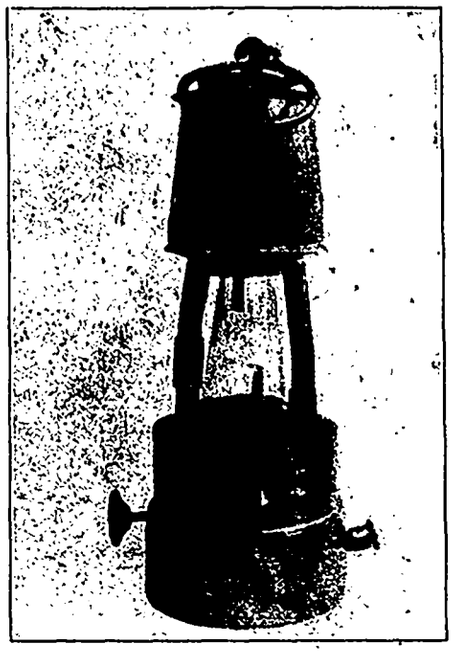

FIG. IV.—Ashworth-Gray with separate oil and alchol spirit gas-testing burners.

high. Alcohol and benzolene would give shorter "caps," but much more distinct than a colza-petroleum flame. For further proof of this rule, if we take the hydrogen flame and increase its height to $\frac{6}{10}$ in., we shall find that the "cap" for 1 per cent. of firedamp has become 3 in. high. Roughly stated, a colza-petroleum flame "cap" indicating 5 per cent. of firedamp is only equal in height to that produced by the hydrogen flame when indicating 1 per cent. of firedamp.

Having thus obtained some idea of the great divergence in the percentage of firedamp indicated by "caps" ⅛ in., $\frac{3}{10}$ in., ¼ in. and ½ in. in height, it is still necessary to ascertain which of these "caps" is dangerous, if indicated on the reduced flame of the lamps in use in

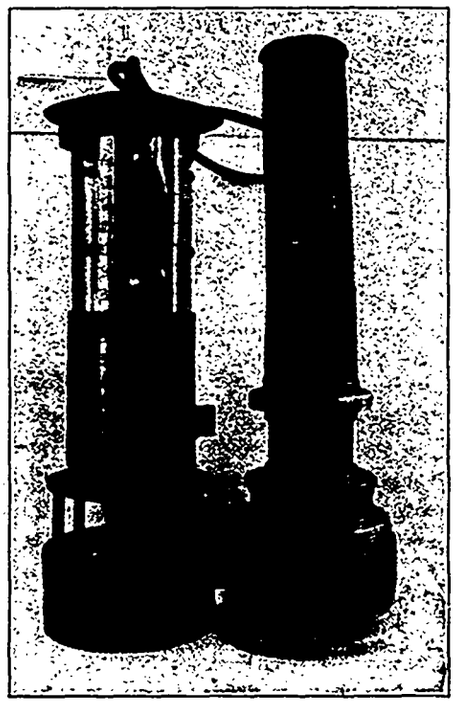

FIG. V.—G. Chesneau's alcohol spirit gas-testing lamp.

the majority of the collieries; and for information on this point we may turn to the Mines Accident Report of 1886. In this report it is stated that neither the Davy nor the Clanny lamps will show 2 per cent. of firedamp, and therefore a "cap" of ⅛ in. high must indicate some percentage of firedamp in excess of 2 per cent. The Commissioners also reported that 2 per cent. of firedamp with the addition of a normal quantity (not a cloud) of coaldust is inflammable in the presence of an open light.

As probably many others besides Mr. Hardie are desirous of having all possible information on the point of danger when both coal dust and firedamp are factors, I may state from personal experience that the flame will pass out of a Davy lamp and explode the outer atmosphere, when the latter consists of a normal quantity of coal dust floating in an air current having a velocity of six feet per second, if 4½ per cent. of firedamp is added to the mixture. The life of a lamp under these conditions is only equal to 10 seconds purchase.

Mr. Hardie refers to the Clowes and Stokes safety lamps, and therefore I have added photographs of these lamps from which he and your members will see, without any added description, that both are what is known as the Ashworth's Hepplewhite Gray deputy lamps. The addition of the hydrogen test to this lamp was originally the Ashworth and Clowes patent, Fig. 2, and similarly the alcohol detachable arrangement is the Stokes patent, Fig. 3, and not the lamp.

As to the power of these lamps for detecting gas they are as follows:—(1) The Ashworth-Clowes hydrogen test; (2) the Ashworth, Fig. 4, Pieler, and Chesneau alcohol tests, Fig. 5, and (3) the Stokes alcohol test, Fig. 3. That is to say the capacity of a safety lamp to detect firedamp is due to the heat of the flame and its non-luminosity and the hydrogen therefore possesses the highest qualification.

I need scarcely say that I shall be glad to add to these notes when requested, or to correspond with any member in relation to safety lamps.

Mr. Kirby's Detailed Figures.

The detailed figures referred to and promised by Mr. Kirby as part of the discussion of his paper on "The Influence of Government upon Mining," have been furnished and are as follows:—

POPULATION OF BRITISH COLUMBIA.

The census of 1901 is not yet published. The estimate of the Provincial Government (see argument of Hon. James Dunsmuir in Report of Delegation to Ottawa) is 150,000, including 23,000 Indians and 15,000 Japanese and Chinese, and 112,000 whites. This is undoubtedly low and will probably be found near to 125,000 to 130,000 whites.

REVENUES CONTRIBUTED TO GOVERNMENT BY THIS POPULATION.

These are Dominion, Provincial and Municipal revenues.

Dominion Revenues.—From the "Report submitted to the Lieutenant-Governor by Hon. James Dunsmuir, Premier, and Hon. D. M. Eberts, Attorney-General, on their mission to Ottawa as a delegation from the Government of British Columbia," March 15th, 1901. This at much length calls the attention of the Dominion Government to the fact that the revenue contributed by British Columbia to the Dominion is excessive, and out of proportion to that furnished by other Provinces, and estimates its amount for 1901 at $3,750,000 from the aforesaid population.

Provincial Expenditure and Revenue:—

Expenditures (from "Estimates of Revenue and Expenditure for year ending June 30, 1902"), page 2	$2,475,335 00
Supplementary Estimate No. 1 (see separate sheet)	50,440 00
Supplementary Estimate No. 2 (see Estimates for year ending June 30, 1903) page 31	192,408 00
Total	$2,718,183 00