## 10 BRITISH COAL INDUSTRY

contact with a naked light or even a spark. In the words of Dr. Shufflebottam : "When methane is present the flame of the safety-lamp fliekers and a pale, non-luminous, slightly blue cap is seen above the ordinary flame." An expert miner, armed with the safety lamp properly trimmed for testing purpose, is thus able to tell at once if any considerable quantity of the gas is present. Firedamp, unlike after-damp, is not poisonous, though like black damp being devoid of oxygen it will not support life. It does not poison but suffocates.

After-damp is the old name given to the mixture of gases caused by the explosion of fire-damp. Its deadly component is carbon monoxide which is extraordinarily poisonous. A percentage of even 0.4 of carbon monoxide will have a fatal result unless the person attacked is able to get into pure air quickly. After a fire-damp explosion the percentage may be anything from 1.0 to 5.0 per cent. Anyone caught in such an atmosphere would die in a few minutes.

Carbon monoxide is eaused by the imperfect oxidation of carbon. Its generation can occasionally be seen in the hearth fire, the gas burning with a bluish lambent flame. It follows, as we have seen, upon an explosion of fire-damp thus:

 $2CH_4 + 7O = 4H_2O + CO_2 + CO$ when  $CH_4 =$  fire-damp and CO = carbon monoxide. It is also caused by what are termed gob fires.

We shall have oceasion later to describe the gob. goaf, or waste, and it is sufficient here to note that