

ity of explosion, and no technical knowledge is necessary for its manipulation. In Germany several villages are being lighted upon this system. The distributing mains are laid in the usual manner, though small pipes need only be used, and are connected up to a small hut in which the gas cylinders are placed. The only attention required is the changing of the cylinders as they become exhausted. The system is cheap, highly efficient, and free from danger, and even the smallest villages can become possessed of a complete gas distribution plant at a nominal outlay.

REPORT OF THE FOREIGN EXPERTS ON U. S. MINES.

The three foreign experts who recently made several weeks' tour of the United States, studying conditions in the various coal fields, made a report to Secretary Garfield covering the results of their observations, together with recommendations for promoting the welfare of employees. The following are some of the recommendations. We may refer again to the report in a future issue:—

A. Selecting the Explosives to be Used.

(1) We recommend that the Government of the United States examine the explosives now and hereafter used in mining with a view to eliminating the more dangerous explosives and to improving and standardizing such explosives as may be considered most suitable for such use, these to be designated by the Government 'permissible explosives'.

The term 'permissible explosives' is suggested for the reason that no explosives are entirely safe, and all of them develop flame when ignited; and we advise therefore against the use in the United States of the terms 'safety explosives' or 'flameless explosives' as these terms may be misunderstood and this misunderstanding may endanger life.

(2) We recommend that the operators and miners of coal use only such explosives as are included in a list of 'permissible explosives', when the same has been published by the Government, in all mines where there is risk of igniting either dust or gas, selecting that one which their own experience indicates can be used to the best advantage under local conditions.

(3) We also recommend that investigations be conducted to determine the amount of charge of such 'permissible explosives', which may be used to the best advantage under different conditions with a view to reducing danger to the minimum.

B. Carrying the Explosives into the Mine.

(1) All explosives should be made into cartridges and placed in closed receptacles before being carried into the mines, and the quantity carried into the mine during one day by any miner should be limited as nearly as practicable to the quantity needed by him for use during that day. Handling loose explosives and making them into cartridges by an open light in the mine should be prevented.

(2) Detonators or caps should be handled with great care, and should be carried only by a limited number of responsible persons.

C. Use of Explosives in the Mine.

(1) Shooting in or off the solid should not be practiced.

(2) The depth of the shot hole should be less by at least six inches than the depth of the cutting of mining. The use of very deep shot holes should be avoided as unnecessarily dangerous.

(3) The overcharging of shots (the use of a larger charge than is required to do the work satisfactorily) should also be avoided as unnecessary and dangerous. The proper standardization of explosives used in coal mining will greatly facilitate the carrying out of this recommendation.

(4) Shots should never be tamped with fine coal or material containing coal. Clay or other suitable material should be supplied and used for this purpose.

(5) The firing of two or more shots in one working place, except simultaneously by electricity, should not be allowed until a sufficient interval has elapsed between the firings to permit an examination of the working place, in order to see whether any cause of danger has arisen.

(6) Before a shot is fired the fine coal should be removed from the working place, as far as practicable, and the coal dust on the floor, sides, and roof, for a distance of at least 20 yards from the place where the shot is to be fired, should be thoroughly wet, unless it has been demonstrated that the dust in the mine is not inflammable.

(7) If gas is known to occur in the mine, no shot should be fired until, in addition to the watering, an examination made immediately preceding the time for firing, by a competent person, using a lamp which will easily detect two per cent of gas, has shown the absence of that amount of gas from all spaces within twenty yards of the point where the shot is to be fired.

(8) Believing that such will be one of the greatest advantages which can be made in safe guarding the lives of the miners, we recommend the adoption of a system of electric shot-firing, in all mines where practicable, by which all shots in the mine, or in each ventilation district of the mine, may be fired simultaneously, at a time when all miners and other employees are out of the mine.

D. Keeping the Mine Roadways Clean.

(1) The roadways of the mines should be kept as free as possible from loose coal which may be ground into dust and of rubbish in which such dust may accumulate, in order to facilitate the removal and wetting of the dust.

E. Wetting the Coal Dust.

(1) In all coal mines where explosives are used it is desirable, and in all mines containing gas it is highly important, that the dust on the walls, timbers, and floors of the working places and roadways should be kept continually wet prior to and during the work in the mine. If, however, conditions of roof or lack of water render this general watering impracticable, at least the dust within twenty yards of each shot should be wet before each firing, and other precautions against explosions should be practiced with unusual care.

It is our opinion that a system of watering which occasionally sprinkles the floor only and leaves dry the dust on the walls and timbers of the roadways is useless and is also dangerous in that it may generate an unwarranted feeling of security against an explosion.

F. Special precautions for Mines containing Gas.

(1) In any mine where as much as two per cent. of gas can be detected by suitable method only locked safety lamps of an approved type should be used so long as such condition exists or is likely to recur.

All safety lamps should be maintained in good condition, cleaned, filled, kept in a special room at the surface, and carefully examined both when delivered to the miner and when returned by him at the close of each day's work. A defective safety lamp is especially dangerous because of the false feeling of security it engenders.