

To the....

## MARITIME MINING RECORD

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## SELECTED QUESTIONS AND ANSWERS.

(Science and Art of Mining.)

## MINE FIRES.

Q.—What causes have been assigned for the spontaneous ignition of coal in mines, and how should such fires be dealt with?

A.—The question of spontaneous ignition of coal in mines has in recent years been the cause of much discussion amongst mining engineers, many of them being at variance as to the chief cause of such ignition.

Formerly it was supposed that pyrites, present in many seams, was the cause of all spontaneous ignitions of coal. This theory is still held by many, but the majority of authorities on the subject place it in a secondary position to the theory that most fires are caused by the oxidation of the coal itself, this being based upon the fact that many seams are subject to spontaneous combustion when pyrites are entirely absent. No doubt when pyrites are present they greatly assist in the formation of the fires.

Such fires usually occur in soft seams that are easily broken up, these presenting a large surface to the action of the air, owing to the crushed nature of the coal. As the chemical action goes on between the carbon of the coal and the oxygen of the air, heat is generated, gases given off, and the generation of heat continues until it is so intense as to ignite the gases, which in turn ignite the coal.

The pressure of the superincumbent strata upon the coal also plays an important part in the formation of fires, especially when small ribs or pillars have been left in the goaf. The pressure itself causes a certain amount of heat to be generated, and it also causes friction between the pieces of coal; this also generates heat.

Sometimes spontaneous ignition does not actually take place in the seam itself, but in the shales which are often found above the coal.

When working a seam of coal which is liable to spontaneous ignition some special method should be used to extract the coal; the districts should not be made too large and should be separated one from another by barriers of coal. These barriers should be of sufficient thickness to withstand the roof pressures, and prevent air being drawn through the coal in the event of one district having to be sealed off.

When the above method is adopted it is an easy matter to seal one district up without affecting the other, this sealing up being done so that the gases produced by combustion may collect and

put out the fire, and to keep the air from getting to the fire and feeding it.

Sometimes when the coal lies to the dip of the shafts the long wall retreating method is adopted, and the goaf allowed to fill with water.

When fires are occurring in long wall workings they are very difficult to deal with. Wax walling has been used, but it is not much of a success owing to the cracking of the clay due to the heat.

Probably the best method in such instances is to cut around the seat of the fire, and dig it out, filling in the space with sand or fine dust.

When building dams to wall back the fire they should be made of sufficient strength to withstand the force of an explosion. The brickwork should be let into the roof, sides and floor, and then backed up with sand for about 8 or 10 yards, where another brick wall may be built.

Filling the mine with carbon dioxide gas has been tried with varying success, the  $\text{CO}_2$  being taken into the mine compressed in boxes or through pipes from the surface.

When all other means fail flooding has to be resorted to, but this is an expensive and difficult method, and should only be used in extreme cases.

In working mines liable to spontaneous ignition the pillars should be left large enough to withstand the crush, and all crushed coal should be removed as soon as possible. No ribs of coal should be left in the goaf, and a good ventilation should be maintained to keep the surface of the coal cool.

## ELECTRICITY.

Q.—To what uses is electricity applied in coal mines? What are its dangers?

A.—No person has yet clearly defined what electricity is. It is only known by the effect it produces, and as a condition known to exist in different substances or bodies.

Electricity is used as a transmitter of power from one place to another in a mine for the purpose of winding, haulage, pumping, coal cutting, drilling, ventilation, lighting, signalling, shot-firing and relighting of safety lamps.

The peculiar conditions under which winding has to be done counteract against the use of electricity, because it cannot as yet be adapted to its work with the same ease and safety as steam. Starting from rest with a full load, increasing to full speed, then counteracting the resulting acceleration, and finally bringing the whole again to rest, all in a very short space of time, requires careful consideration and delicate handling, to which electricity up to the present time has hardly been brought.