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THE SECOND VOLUME COMPLETE.

This number closes the second year of THE CANADIAN ENGINEER, and an index of Vol. II. accompanies this paper for the convenience of those who wish to bind it for reference. Any reader wishing to have the volume bound at our offices can do so, on remitting \$1 in addition to the subscription, and sending us the back numbers express paid. The bound volume will be returned express or post paid in a few days after receipt at either our Montreal or Toronto office. The price of the bound volume to non-subscribers is \$2.

Every reader who desires to extend the influence of the paper, and who knows a friend who would like to subscribe, will confer a favor by getting their order to begin with the new volume in May.

For THE CANADIAN ENGINEER.

DOWN IN A BELGIAN COAL MINE.

BY B. LIPPENS, MONTREAL.

(Concluded from last issue.)

Let us now speak of the dangers to which the collier is exposed. It is only just to say that everything threatens him. The four elements, earth, water, air, and fire, are all his enemies, and can destroy at any moment his feeble existence. Notwithstanding all the precautions possible, in spite of stone walls, and beams, and scaffolds, which support the ceiling, the immense volume of earth and rock above his head may fall down and bury him alive at any moment. Is this not terrible? Yet accidents of this kind may occur in any sort of mine. It happens sometimes also that sudden inundations destroy the mines. The water accumulated

in old excavations or underground holes finds suddenly an inlet, rushes in with violence, carries everything before it, men, horses and wagons, and smashes the doors and woodwork. After this scourge has passed, anyone looking on would see an underground river, the black waters of which are covered with dead bodies and fragments, and everything enveloped in a silence more profound than the grave.

But the greatest terror of the collier is *fire-damp*. This requires an explanation. Certain species of coal evaporate constantly, though in small quantities, a kind of gas called carburetted hydrogen. This gas, when pure, burns like ordinary gas, but when mixed with air, it forms an explosive mixture. One part of this gas mixed with six parts of air produces a most violent explosion.

A small spark of fire is sufficient to produce terrible accidents. It is expressly forbidden miners to have in their pockets pipes, matches, or anything that can produce fire; they cannot even open their own lamps, for they are so thoughtless and so accustomed to danger that they throw themselves into it without necessity and cause their own ruin by their imprudence. Most accidents are caused by the rashness of the miners themselves. It must be remarked here that with a safety lamp, it is possible to go into a gallery where the explosive agent is accumulated, though it would not do to work there. This lamp was invented by Sir Humphrey Davy, who discovered that a flame surrounded by a metallic tissue caused only very small explosions within the lamp. The safety lamp has been much improved since its invention, and has rendered a great service to humanity. When an explosion occurs a terrible detonation is heard at a great distance. In the centre of the explosion everything is crushed, smashed, upset. Carriages, tools, timber, rocks, coal, and dead bodies are all seen in a confused and inextricable mass. At the same time *carbonic acid*, called by the miners *choke damp*, is formed when the mine fires, and fills the galleries, killing those who are near the scene of the disaster. The shaft is often damaged and blocked up, and sometimes all sorts of debris are vomited from the shaft, which seems turned into the crater of a volcano. When there is more than one-third of pure coal gas gathered in the galleries, there is no explosion, but the gas takes fire. As that gas is much lighter than air, it fills the upper part of the galleries, and when it catches fire, the only way to escape is to run on hands and feet as quickly as possible. There may be three or four minutes time available for escape in that way, but the heat soon becomes so intense that the unfortunate colliers cannot be saved. When the galleries are not very low, interesting scenes sometimes take place. Then is the time for courage and self-devotion. Some are brave enough to run under the fire covered with an impenetrable cloak, and having on their heads a sort of absorbent hood, dipped in water; so they rush in, either to drag out those that are helpless, or to get the fire-extinguishers to work. These are cylinders which throw out a gas that serves to put out the fire. Sometimes they succeed in *choking* the fire by shutting the doors