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W. E. ELLIOTT & J. G. WILSON.

SYSTEM FOR VENTILATION OF MINES.

APPLICATION FILED FEB. 1, 1908.

FIG. 1.

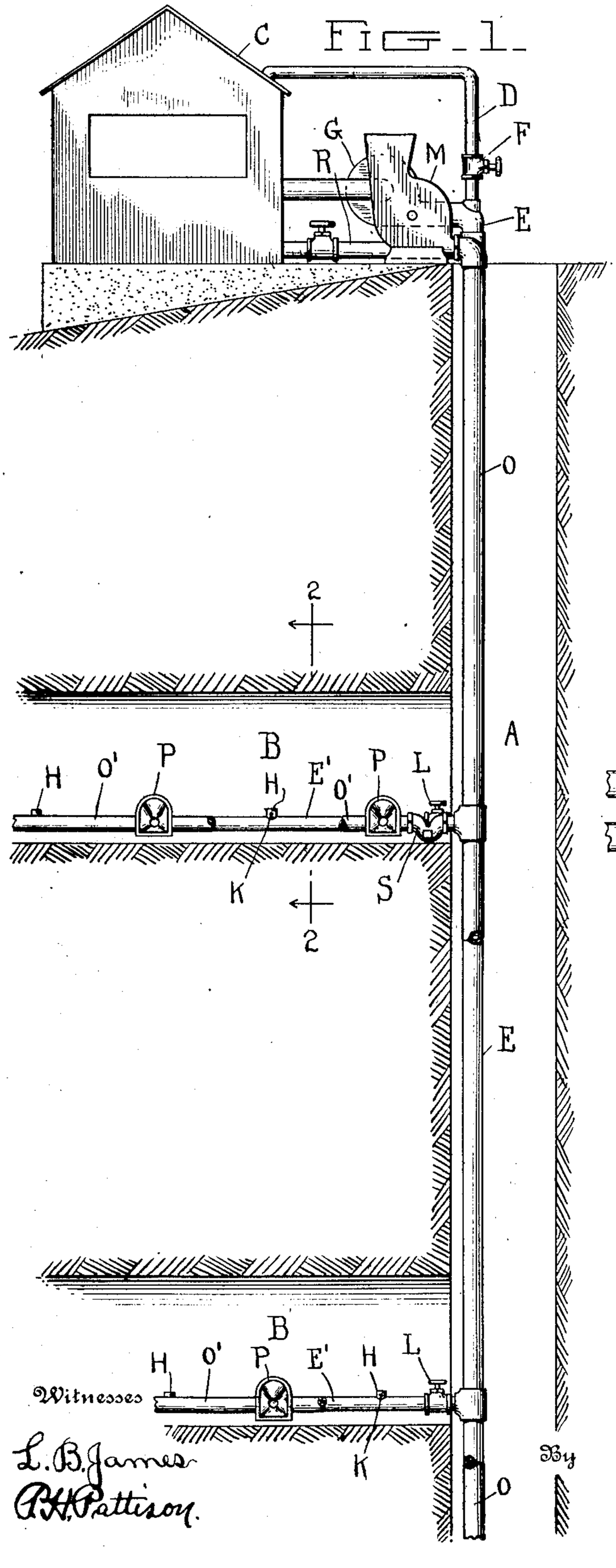


FIG. 2.

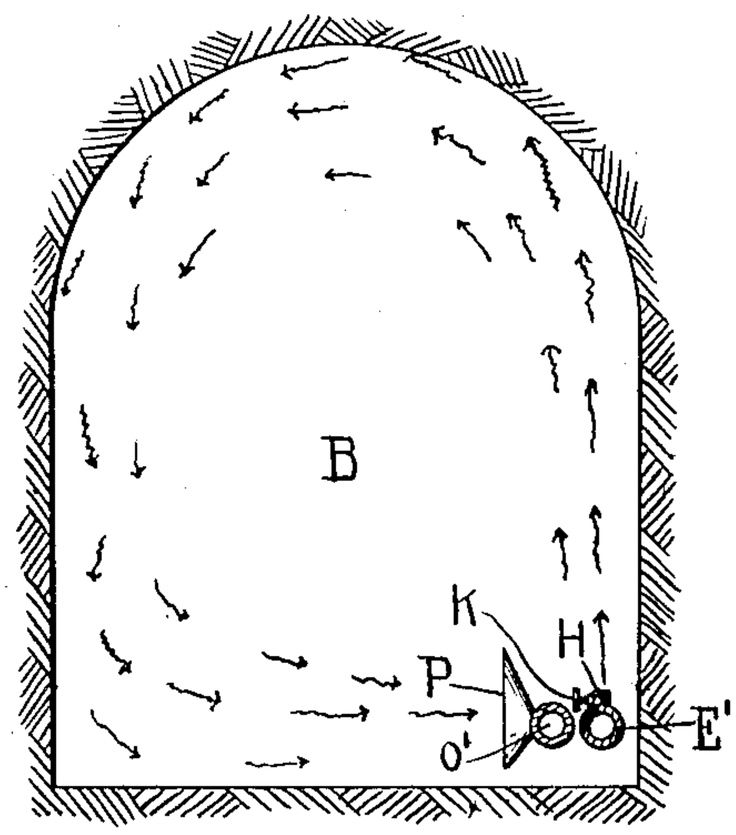


FIG. 3.

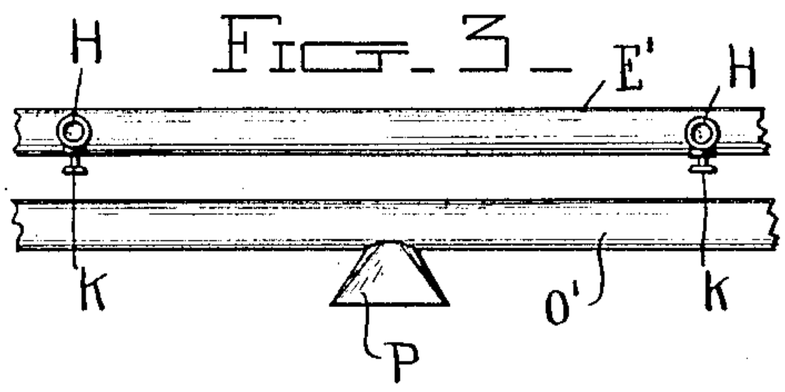
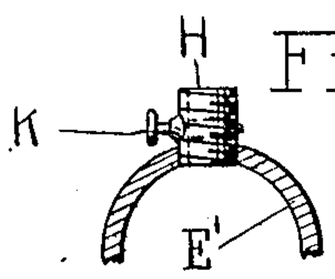


FIG. 4.

FIG. 5.



Witnesses

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SYSTEM FOR VENTILATION OF MINES.

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Application filed February 1, 1908. Serial No. 413,858.

To all whom it may concern:

Be it known that we, WILLIAM E. ELLIOTT and JOHN G. WILSON, citizens of the United States, residing at Sharon, in the county of Mercer and State of Pennsylvania, have invented certain new and useful Improvements in Systems for Ventilation of Mines, of which the following is a specification.

This invention pertains to improvements in the ventilation of coal and other mines, and is intended primarily to be installed in conjunction with the present existing systems of mine ventilation, placing them entirely only when their presence is unnecessary.

The systems of mine ventilation now in use or proposed include not only those by which one continuous current of air is maintained throughout the main drives and leads, but also those piping systems either extending along the drives or tapping the drives or individual galleries from a pipe lying on the surface of the ground. The proposed piping systems for primary ventilation are impractical for two main reasons. First, as is well known the minimum amount of fresh air required for men working under ground is 100 cubic feet per minute for each man and for horses and mules, from three to six times that amount each. The limited capacity of pipes whose size would not interfere with the working of the mine makes it impossible for sufficient air to be supplied by that means in mines employing a large number of men. Second, although where the mine is tapped in a number of places and the main lies wholly on the surface of the ground, the main may be of any size, yet the great cost of sinking the shafts, especially where the main drive lies hundreds of feet below the surface, prohibits the use of this system. The other sysems—namely, directing currents of air throughout the various drives, leads and galleries—has been found to supply sufficient air for breathing purposes under normal conditions but not, however, sufficient means for carrying explosive gases and mixtures out of the mines.

The present invention therefore contemplates an auxiliary system of ventilation for accomplishing the latter result. The main ventilating system may be of any preferred type as the installation of our auxiliary system in any mine will not interfere with the working or efficiency there in use.

The gas which is most generally dreaded in mines is CH_4 commonly known as fire damp. While it is true that this forms the main constituent of the gases causing mine explosions, yet special precautions need not be taken as to it, since its presence in sufficient volume to cause, *per se*, an explosion may be readily detected. The general concurrence of all mining authorities now is that coal dust, rather than fire damp, plays the most important part in colliery explosions. CH_4 by itself must be present to an extent of at least 5% to be explosive, while 11 to 12% give the most violent explosive gas. However, as has been conclusively proven, as small an amount as 1% of this gas mixed with coal dust and air form an explosive mixture, while 3% of it mixed with coal dust and air gives a mixture of tremendous explosive power. This coal dust, which is present to a great extent in all collieries, clinging to notches, floor, sides and ceiling, is practically unaffected by the main air current. Even laborious brushing and dampening is but a temporary expedient and the many recent disasters have proven the necessity of carrying it completely out of the mine. To accomplish this purpose we provide a system of two parallel pipes which extend throughout all the drives, leads and galleries of the mine. In the main drives the pipes are of much greater diameter than those branching off therefrom, and valves or dampers are provided by which the branch pipes extending into any drive may be cut off from the mains. These parallel pipes lie upon the flooring of the drives and to one side of the tracking, the pipe nearer the wall being the air supply pipe and the other the exhaust pipe. The former is provided with threaded nipples, directed toward the roof of the drive and at right angles to the direction of the pipe. To the exhaust pipes are secured, at the same distance apart as the nipples, funnels, which funnels, however, are placed midway between the air inlets. The funnels are flat bottomed and are attached to the exhaust pipe on the side nearer the center of the drive. The apex of the funnel surrounds a smooth bore tap in the exhaust pipe. It will thus be seen that we have provided means for directing auxiliary currents of air in a course at substantially right angles to the main air current. We therefore obtain a continual mixing of these currents and the air is kept in a continually agitated condition, so that, as the air is drawn into the exhaust pipe the coal

dust is sucked in with it and carried from the mine. Of course the outer part of the auxiliary current is unmixed with the main current and continues around the sides of the drive, sweeping the coal dust into the currents and causing its ultimate expulsion from the mine.

As before stated, when fire damp is present to the amount of at least five per cent., it may be readily detected by means of a Davy lamp, but when as small an amount as 1% is present its detection by ordinary means becomes very difficult or impossible. It can thus be seen how important it is that means should be devised for disposing of the coal dust that converts less than 5% of fire damp into an explosive mixture.

Another object of this invention is, by placing these parallel pipes on the flooring of the drives, to provide certain and efficient means for ventilating any part of the mine that may be cut off by a cave-in and also to carry away the poisonous carbon monoxid and other gases that result from explosions and that causes, so often, the death of imprisoned miners.

A further object is to provide means for flooding any part of a mine with water or steam in case of fire, by cutting off the air compressor, and by closing the proper nipples and main valves and connecting the inlet pipe to a water or steam supply, to direct such streams to the seat of the fire, thus obviating the necessity of an extra system of water pipes.

Our invention accordingly consists in the features of construction, combinations of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings wherein is illustrated one of the various possible embodiments of our invention; Figure 1 represents a sectional view of the workings of a mine showing our invention applied thereto, the exhaust pipe being broken away in part for the sake of clearness; Fig. 2. is a cross sectional view, on a larger scale, taken on line 2—2 of Fig. 1, and looking in the direction of the arrows; Fig. 3. is a perspective view of the pipes, showing the alternate arrangement of the inlet nipples and exhaust funnels; Fig. 4. is a cross section through a funnel and the exhaust pipe, and Fig. 5. is a cross sectional view of the inlet pipe on a larger scale, showing a threaded and valved nipple thereon.

Referring to the various figures in which like reference characters designate like parts, A represents the main shaft of a mine and B the drives leading therefrom.

C is the boiler and engine house and D, a steam pipe leading from the boiler to the air inlet main E, said steam pipe being provided with a valve F which is normally closed.

G is an air compressor, which may be of any approved type, and by means of which a constant supply of air under pressure is afforded the air inlet main E and pipes E^1.

H, H are the threaded nipples on the air inlet pipes and K, K the valves with which each nipple is provided, the nipples being threaded to afford means for hose connection in case of a small fire, while the valves allow all the nipples not wanted open in such an exigency to be closed.

L, L are valves on the air inlet pipes by means of which the pipes in any drive may be closed. Similar valves or dampers are provided for the pipes in each gallery or chamber. M is an air exhaust fan which may be of the Guibal, Waddle, Schiele, Cappell or any preferred type. O is the exhaust main and O^1 the exhaust pipes, the latter being provided with smooth bore taps at regular intervals, over each of which is a funnel P. The funnels are the same distance apart as the air inlets nipples and it will be noted that the funnels are placed midway between the nipples so as to alternate with them. This arrangement is of the highest importance in that no fresh air is taken in by the exhauster until it has made a more or less complete circuit of the drive. By having the nipples pointing upward and the funnels facing the drive side opposite to that against which the pipes are laid, the current of air is forced to pass up one side, across the roof, down the other side and return across the bottom of the drive to the exhaust funnels. In case a "blower" of CH_4 is struck, a hose having a funnel at one end and a fitting of rubber or similar substance in the form of a truncated cone at the other end, would be utilized. By inserting the fitting in the smooth bore tap of the exhaust pipe and holding the other end of the hose up to the blower, the escaping gas would be quickly carried from the mine.

During the circulation of our auxiliary air current the particles of coal dust are being constantly drawn into the exhaust pipes and the powerful suction will carry them to the surface where they may be carried by pipes into vats of water and from the resulting liquor various products may be obtained. Or if preferred traps S which may be of any preferred construction may be provided at certain interval in the exhaust pipe, in which the coal dust will be collected and then removed.

While we have described one method of carrying out our invention it should be understood that various changes may be made without departing from the spirit of our invention, which contemplates, broadly, the creating of currents of air transverse of the drives in a mine.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent, is:

1. In a system for the ventilation of mines, means for creating a current of air at substantially right angles to the direction of the length of a drive, said means including alternately spaced air inlets and outlets, substantially as shown and described.

2. In a system for the ventilation of mines, the combination with the main air current, of means for creating a current of air at substantially right angles to the main air current, said means including alternately spaced air inlets and outlets, substantially as shown and described.

3. In a system for the ventilation of mines, the combination with mine drives, leads and galleries, of means for directing a current of air transversely thereof, said means including alternately spaced air inlets and outlets substantially as shown and described.

4. In a system for the ventilation of mines, means for directing a current of air against the sides, top and bottom of a drive, and means for withdrawing the current from the drive substantially as shown and described.

5. In a system for ventilating mines, means for producing a circulation of air around the sides, top and bottom of a drive, substantially as and for the purpose set forth.

6. In a system for ventilating mines, the combination of parallel pipes extending throughout the mine, said pipes lying on the same side of the drive, means for supplying air under pressure to one of the pipes and means for withdrawing the air from the pipe, substantially as and for the purpose set forth.

7. In a system for ventilating mines, the combination with the main ventilating system, of two parallel mains, parallel pipes branching therefrom, and said mains and pipes having currents of air passing therethrough, the two currents flowing in opposite directions, as and for the purpose set forth.

8. In combination, the drives, leads or galleries of a mine, parallel pipes lying therein, means for forcing air out of one pipe through nipples on said pipe and into the other, the air leaving and entering the pipes at right angles to the direction of their length, as and for the purpose set forth.

9. In a system for ventilating mines, the combination with the leads or drives of a mine, or parallel pipes extending therethrough both pipes lying on the same side thereof, nipples on one pipe and funnels on the other, as and for the purpose set forth.

10. In a system of mine ventilation, the combination of two parallel pipes, means for forcing air out of one pipe in a direction at right angles to its length, and means for drawing air into the other pipe in a direction at right angles to its length and the outlet in the first pipe, as and for the purpose set forth.

11. In a mine, the combination of parallel pipes lying on the flooring of the drives, leads or galleries, and to one side of the center thereof, air outlets at regular intervals on the pipes nearer the side and inlets the same distance apart on the other pipe, as and for the purpose set forth.

12. In a mine, the combination of parallel pipes extending along the drives, leads or galleries, and in close proximity to one side, means for expelling air from one of the pipes and for drawing air into the other pipe in a direction at right angles to the air jets of the first pipe, substantially as and for the purpose set forth.

13. In a mine, the combination of two parallel pipes, taps for the admission and discharge of air the same distance apart on each pipe, the taps on one pipe occurring midway between those on the other, substantially as shown and described.

14. In a mine, the combination of two parallel pipes extending therethrough, outlet nipples on one pipe for directing a current of air in a direction at right angles to that pipe and parallel to one wall, and inlets on the other pipe, said inlets facing the opposite wall, as and for the purpose set forth.

15. In a mine ventilating system, means for carrying coal dust and other substances from a mine, said means consisting of two parallel pipes extending throughout all the leads, drives and galleries of the mine, outlet nipples occurring at regular intervals on one pipe, inlet funnels occurring at the same intervals on the other pipe and alternating with the nipples, means for directing currents of air in the opposite directions in the two pipes respectively, substantially as shown and described.

16. In a coal mine, the combination of means for maintaining the coal dust and gases in a constantly agitated condition and means for withdrawing the mixture and separating the coal dust therefrom, substantially as shown and described.

In testimony whereof we have affixed our signatures, in presence of two witnesses.

WILLIAM E. ELLIOTT.
JOHN G. WILSON.

Witnesses:
S. F. STAMBAUGH,
FRED A. SERVICE.