M. J. LIDE.

MINE VENTILATION.

APPLICATION FILED APR. 26, 1915.

1,280,254.

Patented Oct. 1, 1918.

2 SHEETS—SHEET 1.

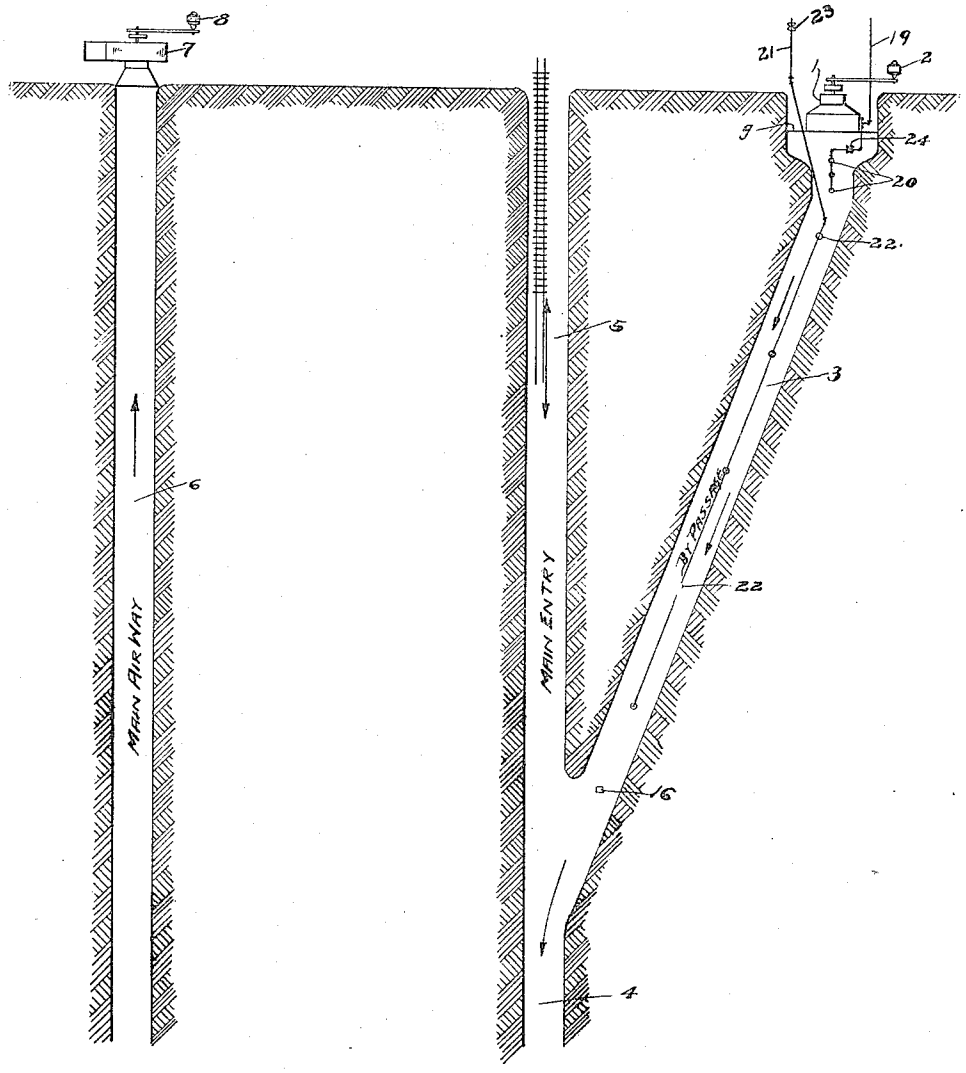


Fig. 1.

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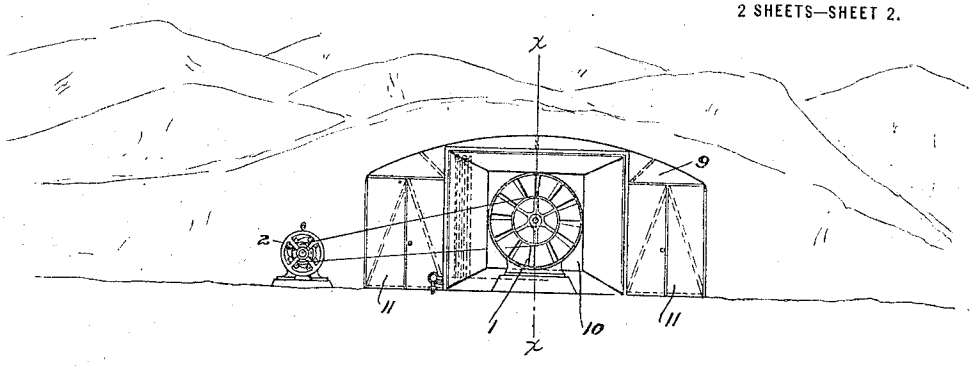


Fig. 2.

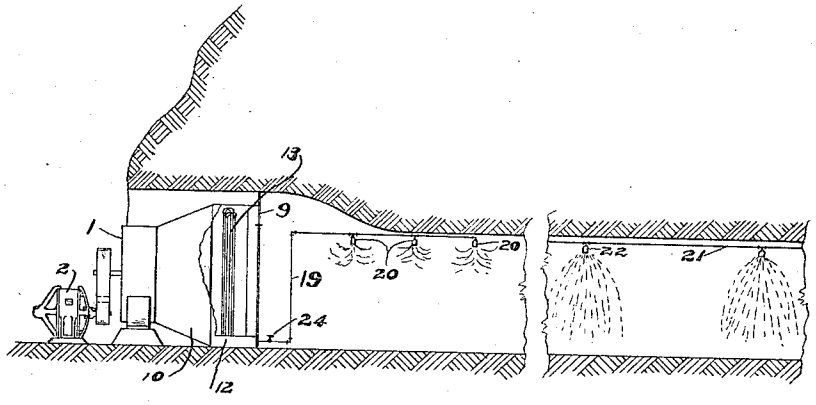


Fig. 3.

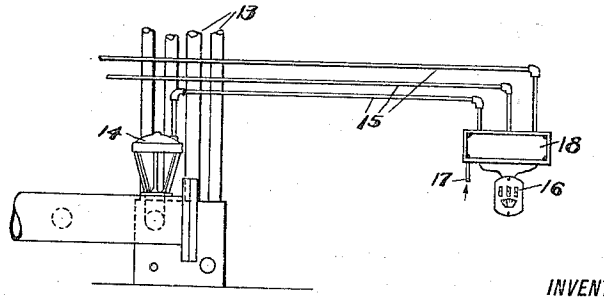


Fig. 4.

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UNITED STATES PATENT OFFICE.

MARTIN J. LIDE, OF BIRMINGHAM, ALABAMA.

MINE VENTILATION.

1,280,254. Specification of Letters Patent. Patented Oct. 1, 1918.

Application filed April 26, 1915. Serial No. 24,127.

To all whom it may concern:

Be it known that I, MARTIN J. LIDE, a citizen of the United States of America, residing at Birmingham, in the county of Jefferson and State of Alabama, have invented certain new and useful Improvements in Mine Ventilation, of which the following is a specification.

This invention is an improved method and means for introducing air, properly heated and humidified, into a mine.

The object of the invention is to prevent the danger of mine explosions, incident to the drying out of mines and the consequent accumulation of coal dust therein.

It is well known that, when large volumes of air are introduced into a mine at a lower temperature than the mine, the air will absorb the moisture from the mine, and hence dry it out. This is due to the fact that, not only does the fresh air enter the mine usually in an unsaturated condition, but to the further fact that, when this air is heated to the temperature of the mine, its capacity for absorbing moisture from the mine is increased.

The usual process of ventilating a mine is, therefore, a drying process, and this is especially true in the winter season when the outside air is considerably colder than the inside of the mine. If, however, the fresh, entering air could be heated to a temperature higher than that of the mine, and if after being heated, moisture could be added to the air, it readily follows that the moisture would be precipitated from the air after entering the mine, and that, therefore, the process would be reversed from a drying to a wetting process.

Moreover, if automatic and adjustable means are provided for maintaining the temperature and relative humidity of the entering air at any desired fixed points, it readily follows that the rate of deposition, or of extraction of moisture, in or from the mine, can be controlled. It is the purpose of this invention to provide a method of introducing the air into the mine, whereby this result can be achieved.

My invention therefore contemplates treating the entering air by artificially heating it until its temperature reaches a predetermined relation with that of the existing mine temperature and where desired to further treat the heated air by the addition of moisture thereto so as to prevent the absorption of moisture from the mine and to cause, if desired, a deposit of moisture from the air throughout the mine.

My invention consists in a novel method of introducing the treated air into the mine. This phase of my invention has for its object to provide for the effective treatment of the air without interfering with the free movement of the haulage or hoisting equipment in mines where the fresh air enters the main slope, shaft or entry used by such haulage equipment. To this end I provide an auxiliary or by-pass leading from the open air into the mine air intake or main entrance near its outer end and I force the air supplied to the mine through such by-passage at a pressure that will overcome the resistance of the heating and moistening media and also balance the suction pull of the mine exhaust fan working at the outlet for the mine air and therefore produce in the main mine entrance a balanced or static condition of air.

The function of the by-passage in combination with the balancing air supply and exhaust fans is to produce such a balanced or static condition of the air in the main air intake or entrance to the mine that such entrance can be left open and yet approximately all of the air entering the mine is caused to flow thereinto through the by-passage where it can be heated and humidified and none of the treated air will short circuit and back out through the mine entrance. The balancing fan will be experimentally adjusted to such a pressure in relation to the main exhaust fan and the resistance of the air treating media to be overcome that air will enter the mine only through the by-passage.

The balancing fan will blow the air through some commercial form of steam or hot water heater. The temperature of the air will be controlled by some commercial system of temperature regulation, whereby the amount of steam or hot water entering the heater will be automatically adjusted through the agency of valves on the heater, and thermostats located in the by-passage, to maintain an approximately constant temperature of the air at a predetermined value.

Commercial means for humidifying the air by means of steam jets or water atomizing spray nozzles will be employed in the by-passage after the air has been heated.

As illustrative of the preferred method of and means for carrying out the objects of my invention, reference is made to the ac-

companying drawings which form a part of this specification, and in which:—

Figure 1 is a horizontal cross sectional view through a mine illustrating the main mine entry, the by-passage and the main air way leading from the mine to the exhaust fan.

Fig. 2 is a front elevation of the by-passage and balancing fan.

Fig. 3 is a vertical sectional view taken along the line *x—x* of Fig. 2.

Fig. 4 illustrates formally the automatic means for controlling the air heater in the by-pass.

Similar reference numerals refer to similar parts throughout the drawings.

The entering air is forced by a balancing fan 1 driven by a motor 2 through a by-passage 3 into the mine air inlet or main entry 4 at a point which will give this by-passage sufficient length for the treatment of air in the manner hereinafter described. That portion of the main entry between its outer end that opens to the atmosphere and the point of junction with the by-passage is designated by the numeral 5 and constitutes that outer end portion of the main entry in which it is my purpose to maintain a balanced or static condition of the air pressure so that, as indicated by the arrow, there will be no appreciable air movement in either direction. The air which enters the mine through the by-passage, after circulation through the mine, is drawn out through the main air way 6 by an exhaust fan 7 driven by a motor 8. The fans 1 and 7 are adjusted so that the balanced pressure condition will result in the portion 5 of the main entry and all fresh air entering the mine will take the course of the arrows and flow through the by-passage 3. In the outer end of this by-passage I provide a brattice 9 having an air inlet funnel 10 leading therethrough from the fan, and having on one or both sides doors 11 for entry to the by-passage. In an extension casing 12, into which the funnel 10 delivers the entering air, I arrange an air heater 13 of any commercial type such for instance as a heater formed by a series of vertical pipe coils through which a heating medium is circulated under the control of valves 14. These pipes are arranged in groups, each of which has its valve 14 controlled by fluid pressure conducted to the valve through a pipe 15 under control of an automatic thermostat 16 located in the by-passage 4. As illustrated, the controlling fluid pressure is delivered through a pipe 17 to a casing 18 where its delivery to the pipes 15 is independently controlled by a mechanism not shown.

Inasmuch as one important object of my invention is to effectively humidify the entering air after it has been heated, I provide, as an illustrative means to this end, a steam pipe line 19 which enters the by-passage and delivers steam through a series of jets 20 into the air to moisten it, and in addition thereto I provide a water pipe line 21 having a series of sprays 22 therein which are for convenience disposed along the roof of the by-passage. The air having humidity imparted to it by the steam jets 20 or the water sprays 22, or both of these means, then enters the main entry 4 in a heated and humidified condition. Inasmuch as it will be desirable to regulate the humidity of the entering air, I provide valves 23 and 24 for the water and steam pipes and I adjust said valves for the desired humidity to be imparted to the air. The automatic control apparatus is only formally illustrated in Fig. 3, inasmuch as the same forms no part of my present invention as I contemplate using any standard type of commercial automatic control for regulating the heat and humidity imparted to the entering air.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. The hereindescribed process of introducing treated air to ventilate mines, which consists in introducing the treated air into the mine entry at a point spaced inwardly from the open end of the entry and at a pressure adapted to maintain a substantially static condition of air in the open end of said entry.

2. The hereindescribed process of ventilating a mine having a main haulage entry and an air outlet passage, which consists in creating a current of air which enters the main haulage entry at a point spaced inwardly from its open end, and causing said current of air where it enters the main entry to have a direction of flow and a pressure which will produce a substantially static condition of air in the open end of said main entry.

3. The hereindescribed process for ventilating mines having main haulage entry and an air outlet passage, which consists in forcing an artificially warmed current of air forming the air supply to enter the main haulage entry through a by-pass at its outer end and at such pressure as to produce a substantially static condition of air in the outer open end of said entry.

4. The hereindescribed process for ventilating mines having main haulage entry and an air outlet passage, which consists in forcing an artificially warmed and moistened current of air forming the air supply to enter the main haulage entry through a by-pass at its outer end and at such pressure as to produce a substantially static condition of air in the outer open end of said entry.

5. In combination with a main entry of a mine, a by-pass entering the main entry near its open end, an air outlet passage, a fan

working to force the ventilating supply of air through said by-pass, and a fan working to exhaust said air from the mine through said air outlet passage, said fans being coördinated and adapted to produce a static condition of air in the open end of the main entry.

6. In combination with a main entry of a mine, a by-pass entering the main entry near its open end, an air outlet passage, a fan working to force the ventilating supply of air through said by-pass, a fan working to exhaust said air from the mine through said air outlet passage, said fans being coordinated and adapted to produce a static condition of air in the open end of the main entry, and means to modify the humidity of said air supply in advance of its entrance into the main entry.

In testimony whereof I affix my signature in presence of a witness.

MARTIN J. LIDE.

Witness:
NOMIE WELSH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."