J. QUIN.

VENTILATING SYSTEM FOR MINES.

APPLICATION FILED JUNE 1, 1908.

911,525.

Patented Feb. 2, 1909.

2 SHEETS—SHEET 1.

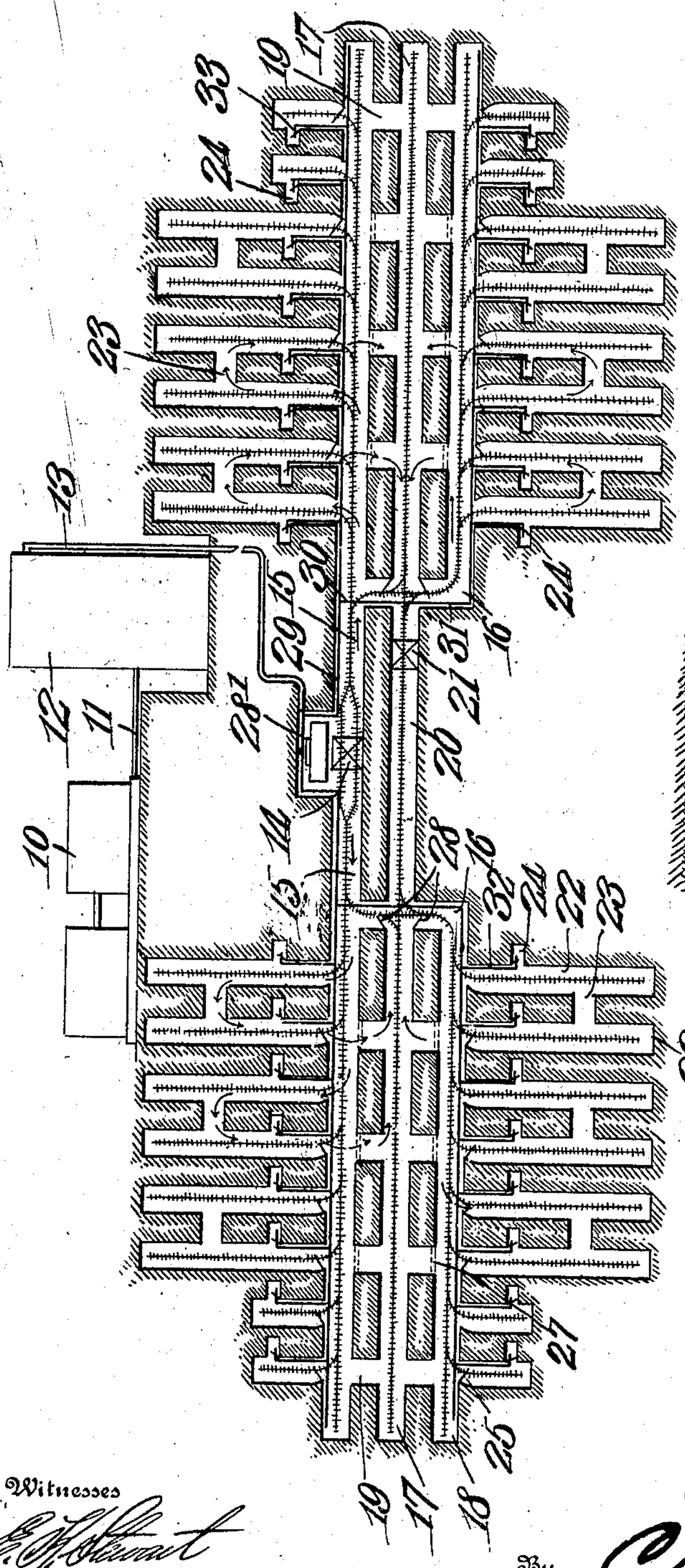

Fig. 1.

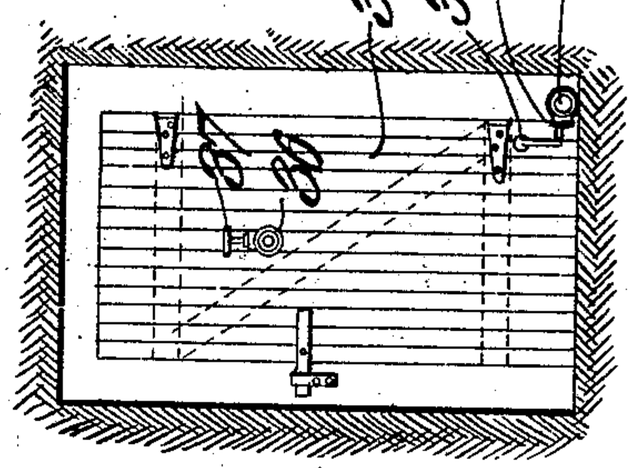

Fig. 4.

Witnesses

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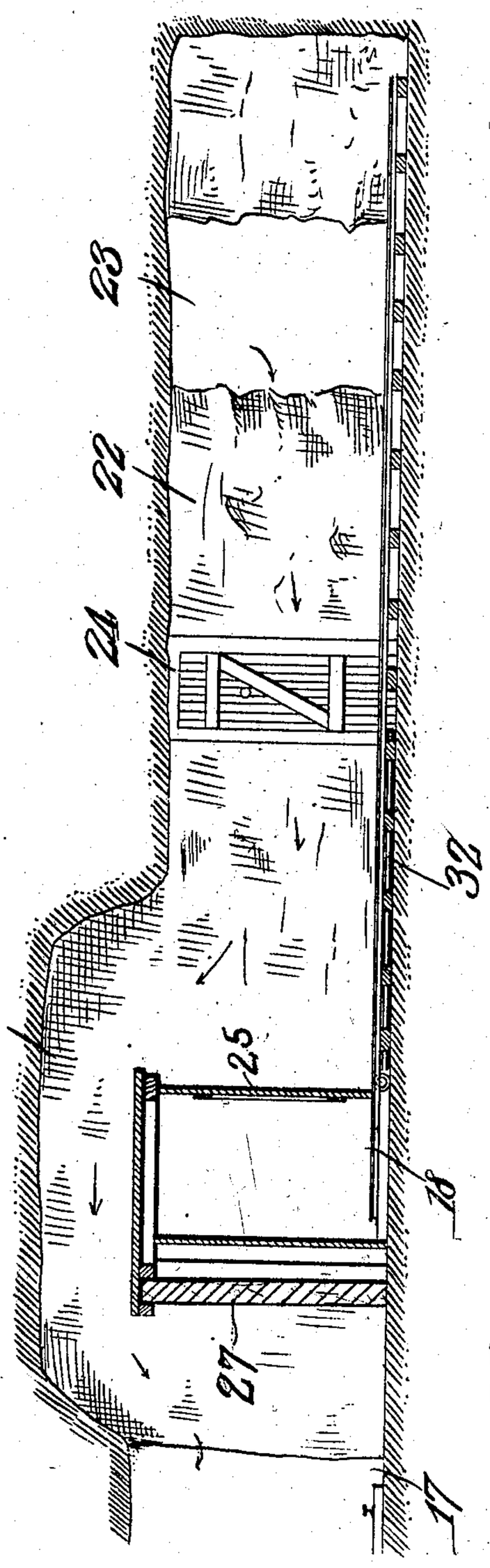

Fig. 2.

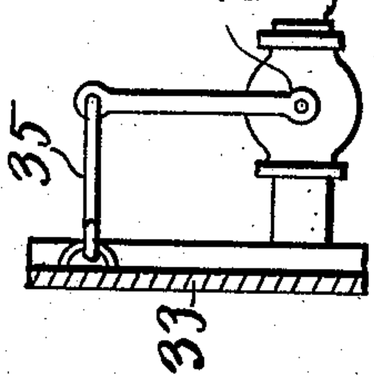

Fig. 5.

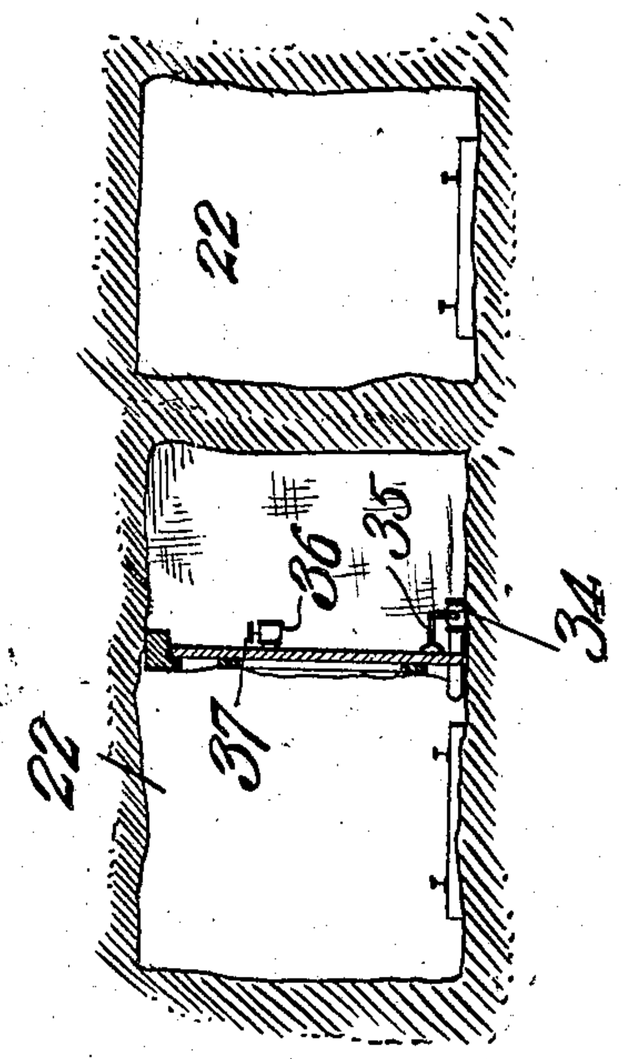

Fig. 3.

Witnesses

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UNITED STATES PATENT OFFICE.

JOHN QUIN, OF HOUTZDALE, PENNSYLVANIA.

VENTILATING SYSTEM FOR MINES.

No. 911,525. Specification of Letters Patent. Patented Feb. 2, 1909.

Application filed June 1, 1908. Serial No. 436,099.

To all whom it may concern:

Be it known that I, JOHN QUIN, a citizen of the United States, residing at Houtzdale, in the county of Clearfield and State of Pennsylvania, have invented a new and useful Ventilating System for Mines, of which the following is a specification.

This invention relates to ventilating systems for mines.

The invention further relates to an improved arrangement of the headings, rooms, cross cuts and shafts for use with such a ventilating system.

It is a well known fact that many lives are annually lost in the operation of mining coal, and that by far the larger percentage are lost through the lack of fresh air after an explosion of fire-damp or through the liberation of a quantity of choke-damp by a fall or blast. In either of these cases the value of the ordinary ventilating system is apt to be totally destroyed, either by the force of the explosion breaking down the usual brattices and stoppings, or by the fall obstructing some of the passages. As is well known, the choke-damp is a heavy gas that flows almost like water and in that way floods the lower headings of a mine even though they be uninjured by explosion or fall. Further, it frequently happens after an explosion that a portion of the mine is flooded with water. This also causes much loss of life, as miners are caught and imprisoned at the ends of headings, and the little air that is entrapped by the water is soon vitiated, and the men die from lack of oxygen.

The objects of the present invention are to provide an auxiliary system of ventilation which will be unaffected by any of the ordinary explosions or fall and further to provide an arrangement of rooms and safety chambers so arranged that the workmen may readily enter one of the safety chambers and by the simple operation of closing the door shut off the foul gases and at the same time open the emergency system.

A further object of the invention is to provide an emergency system of high pressure which is adapted to overcome the pressure of rising water or choke-damp.

With these and other objects in view, as will become hereinafter more apparent, the invention consists in certain novel arrangement of headings, rooms, safety chambers, cross-cuts, over-casts, ventilating piping, and ventilating machinery, together with the necessary doors, valves, and stoppings.

The invention further consists in certain novel details of arrangement hereinafter fully described, illustrated in the accompanying drawings, and specifically set forth in the claims.

In the accompanying drawings, like characters of reference indicate like parts in the several views, and Figure 1 is a diagrammatic view showing a mine and a ventilating system connected therewith in accordance with this invention. Fig. 2 is a longitudinal section through one of the rooms, and one of the inlet and the outlet headings. Fig. 3 is a transverse view through a pair of adjacent rooms and the safety chamber. Fig. 4 is a transverse section of the safety chamber showing the door with the apparatus connected thereto. Fig. 5 is a detail view showing on a larger scale the valve by which the emergency pipe is opened on the closing of the door of the safety chamber.

In Fig. 1 it is to be understood that the mechanism there diagrammatically illustrated is generally located above the ground, and that, for the sake of clearness, the same is shown out of proportion to the balance of the view.

In this view the numeral 10 indicates an air compressor of any of the usual types. This air compressor is preferably of sufficient capacity to supply all the necessary air for use in ventilating the mine when in the free or uncompressed state. It is further to be understood that, in the event of the mine being a large one, it may be necessary to use a plurality of air compressors and that portion of the diagrammatic view indicated by 10 is to be taken as indicating compressing mechanism in general and without reference to the number of compressors. A pipe 11 leads from the air compressing mechanism to a tank or receiver 12 of suitable capacity. From the tank or receiver a main air supply pipe 13 leads down to the different mine levels, but one of which is deemed necessary here to be shown.

The mine is preferably worked in two directions from the main or hoisting shaft 14. In order to accomplish this purpose drifts or headings 15 are made in both directions from points on the shaft 14. After these drifts or headings 15 have been driven the required distance, cross-cuts 16 are made

extending laterally therefrom. From the cross-cuts 16 the drifts 15 are continued in their original direction and other drifts 17 and 18 are also made from the cross-cuts parallel to the heading 15. These three are united at various points by cross-cuts 19, and the headings 17 are connected as shown at 20. At a suitable point on the connecting heading 20 is located the up-take shaft 21. Rooms 22 extend laterally from the drifts 15 and 18 being arranged in pairs. Each pair of rooms is connected by a cross-cut 23. In each of the rooms 22 is formed a safety chamber 24, the preferable floor dimensions of which are about 6 by 10 ft. In the preferred arrangement one of the rooms 22 of each pair lies opposite one of the cross-cuts 19 between the headings 15, 17 and 18, while the other lies intermediate each pair of cross-cuts 19. Doors 25 are provided on one of each pair of the rooms 22 and an over-cast 26 extends from the room closed by the door to connect with one of the cross-cuts 19 opposite that door. All of the cross-cuts except the one nearest the end of the headings are provided with suitable stoppings 27, and the cross-cuts 16 are provided with doors 28. These doors are arranged to be normally closed except during the passage of a mine car or person. Above the cross-cut 16 there is provided suitable over-casts not here shown as the construction is that usual in such cases. At any point which may be found convenient there is provided a ventilating fan 28′, arranged to work on the plenum system.

While the fan is here shown arranged to work on the plenum system, yet it is obvious that the same may be arranged in the up-take shaft to work on the vacuum system. Now let it be considered that all of the doors are closed and the fan in operation. A current of air will be blown along the first part of the headings 15 until it arrives at the cross-cut 16. At this point the current will pass over the cross-cut 16 through the over-cast at that point and pass down the heading 18, a part of the air continuing along the extension of the heading 15. As the air passes along it will enter each of the open rooms and pass through the various cross cuts 23 and into the closed rooms; from the closed rooms it will pass through the over-casts 26 into the heading 17, from there it will pass into the heading 20 and up the up-take shaft 21. By this it is seen that each of the rooms is provided with a supply of pure and fresh air while the exhaust air with all of the noxious gases is carried off through a closed heading which is practically unused. The workmen are thus provided with fresh air at all parts of the mine and not as is usual in most cases, where the workmen nearest the shaft secure a supply of fresh air while those further away are forced to breathe the accumulated gases from the inlet side of the brattice that is ordinarily used.

To return now to the compressed air supply. The pipe 13, as has been heretofore described, extends downward to the various mine levels. At each level it is branched to run in both directions as indicated at 29. The pipe 29 is again branched as at 30 and 31 so that one branch goes down each of the headings 15 and 18. Each of these branches is branched again at each of the rooms to form a pipe 32 extending into said rooms and angled to extend into the chamber 24 in each of the rooms 22.

Referring now to Fig. 4, each of the chambers 24 is provided with a door 33 and the pipe leading into that chamber is provided with a valve as indicated at 34. On each of the doors 33 is a lever 35 so arranged as to actuate the valve 34. This lever is so connected to the valve that when the door is opened the valve will be closed, and when the door is shut the valve will be opened. In each of the chambers 24 the door 33 is provided with a relief valve 36. This relief valve is of the adjustable type and is provided interiorly of the door with an adjusting handle 37. Under ordinary circumstances the relief valve will be set at a little above the pressure of the main ventilating system previously described, so that the pressure in the chamber will not exceed that to which the workman has been accustomed. Under some circumstances, however, it may be deemed advisable to increase the pressure in the chambers 24. If that be the case, the person in the chamber can readily adjust the valve 36 by means of the handle 37 so that the pressure may be increased to any required degree. These circumstances can best be understood by assuming a specific case. Let it be assumed that the mine is flooded by water. The workmen retreat to the chambers 24 and close the doors 33. If the rooms in which they are working become flooded, by increasing the pressure, by adjusting the valve 37, the room itself may be kept free from water as the compressed air coming in through the pipe 32, when the pressure in the room is properly adjusted, prevents the water from entering.

It will now be obvious that there has been provided a double system of mine ventilation. One, a main system of relatively low pressure actuated by a fan, and the other, an emergency system of relatively high pressure, actuated by an air compressor. It will also be obvious that certain parts of the mine may be closed off from the main system at will and the act of so closing these parts operates to automatically and simultaneously open the parts to the emergency system. While the peculiar arrangement of valve is here shown as applied to the doors of the chambers 24 it is to be under-

stood that the same may be applied to any other doors, wheresoever located throughout the mine, and that it is thus possible not only to shut off the chambers 24 from the main ventilating system, but it is also possible to shut off any heading or room in like manner.

It is to be noted, that this system in a modified form, is adapted for application to any existing mine. It is not therefore desired to confine the same to a mine laid out in exact accordance with the plan shown in Fig. 1 and herein described, but it is wished to include in general all such as properly come within the scope of the invention.

Having thus described the invention what is claimed as new, is:—

1. In a ventilating system for mines, independent main and emergency ventilating systems and means to simultaneously close one of said systems and open the other.

2. In a mine, independent fan actuated and compressor actuated ventilating systems and means to simultaneously close one of said systems and open the other.

3. In a mine, independent low and high pressure ventilating systems and means to simultaneously close one of said systems and open the other.

4. In a mine, a fan actuated main ventilating system, an independent air compressor actuated emergency ventilator, and means for simultaneously closing one of said systems and opening the other.

5. In a mine, a low pressure main ventilating system, a relatively high pressure emergency ventilating system, and means to simultaneously close one of said systems and open the other.

6. In a mine, a fan actuated low pressure main ventilating system, an independent, air compressor actuated relatively high pressure emergency ventilating system, and means for simultaneously closing one of said systems and opening the other.

7. In a mine, a main ventilating system, an emergency ventilating system, a safety chamber normally supplied with air from said main ventilating system, and means for cutting off the supply of air from the main ventilating system and simultaneously admitting air from the emergency system.

8. In a mine, a low pressure main ventilating sytem, a relatively high pressure emergency ventilating system, an emergency chamber in communication with each of said systems, and means for simultaneously cutting off the supply of air from one of said sytems and admitting air from the other.

9. In a mine, a low pressure fan actuated ventilating system, a relatively high pressure air compressor actuated emergency ventilating system, a safety chamber in communication with each of said systems, and means for simultaneously cutting off the supply of air from one of said systems and admitting air from the other.

10. In a mine, a safety chamber, a closure therefor, and an emergency ventilating system in communication with said chamber.

11. In a mine, a safety chamber, a closure therefor, an emergency air supply pipe, and a valve therein acuated by said closure.

12. In a mine, a safety chamber, a closure therefor, an emergency air supply pipe, communicating with said chamber, and a relief valve to maintain uniform the pressure within the chamber.

13. In a mine, a safety chamber, and a high pressure emergency ventilating system in communication therewith.

14. In a mine, a safety chamber, a closure therefor, a high pressure emergency air supply pipe, and a valve therein actuated by said closure.

15. In a mine, a safety chamber, a closure therefor, a high pressure air supply pipe leading to said chamber, a valve therein, means carried by the closure to actuate said valve, and a relief valve arranged to maintain uniform pressure in said chamber.

16. In a mine, a safety chamber, a closure therefor, an air supply pipe communicating with the chamber, a relief valve to maintain the uniformity of pressure within the chamber, and means operable within the chamber to adjust said valve for desired pressure.

17. In a mine, a heading, a safety chamber formed adjacent to said heading, a closure therefor, an emergency air supply pipe opening into said chamber, a valve in said supply pipe, and means carried by the closure for actuating said valve.

18. In a mine, an inlet heading, an outlet heading, a pair of lateral communicating rooms leading from said inlet heading, a safety chamber in each of said rooms, a valved air supply pipe leading to each of said safety chambers, closures for said safety chambers operably connected to said valves, a stopping between one of said rooms and said inlet heading, and an over-cast from the stopped room to the outlet heading.

19. In a mine, a pair of spaced inlet headings in parallel relation, an intermediately positioned outlet heading, a lateral cross-cut affording communication between said headings at a point near the inner end thereof, pairs of spaced rooms extending laterally from said inlet headings, the rooms of each pair being in communication near the inner end thereof, a stopping for one of each pair of rooms, and an over-cast from the stopped room to the outlet heading.

20. In a mine, a pair of spaced inlet headings in parallel relation, an intermediately positioned outlet heading, a lateral cross-cut affording communication between said head-

ings at a point near the inner end thereof, pairs of spaced rooms extending laterally from said inlet headings, the rooms of each pair being in communication near the inner ends thereof, a safety chamber in each of said rooms, a stopping for one of each pair of rooms, an over-cast from the stoppedroom to the outlet heading, a compressed air pipe leading through each room to the safety chamber therein, and means for closing said chamber and opening the compressed air pipe.

21. In a mine, an inlet heading, an outlet heading, a pair of lateral communicating rooms, leading from said inlet heading, a stopping between one of said rooms and said inlet headings, an over-cast from the stopped room to the outlet heading, a safety chamber in each of said rooms, a closure for said safety chambers, a valved compressed air pipe leading to each of said safety chambers, and means carried on said closure to actuate the valve in said pipe.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JOHN QUIN.

Witnesses:
W. C. LANGSFORD,
JOHN CHARLTON.