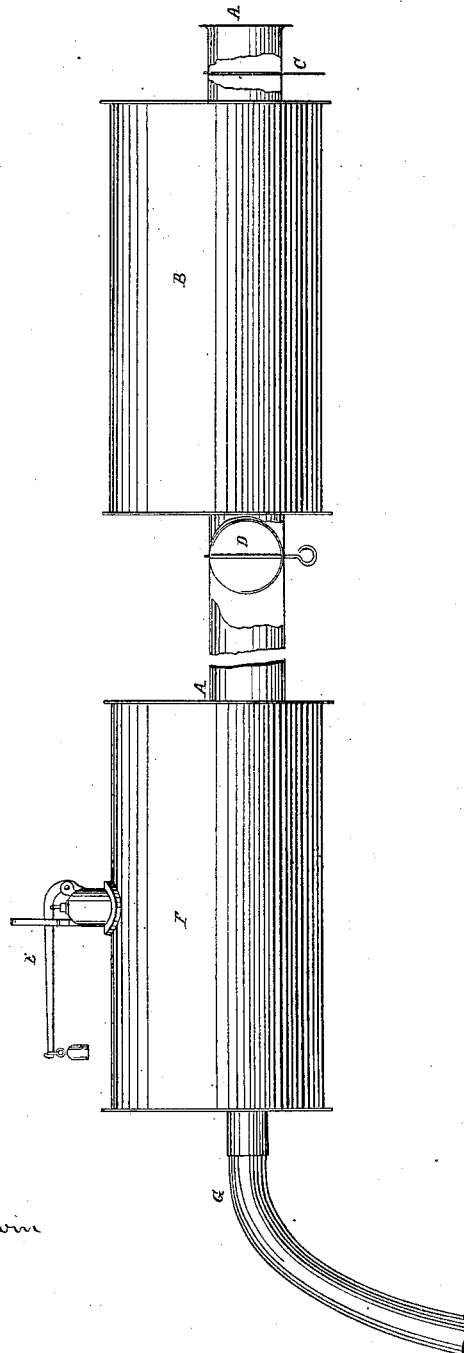


*Fisk & Westerman,*

*Mine Ventilator.*

*N<sup>o</sup> 45,918.*

*Patented Jan. 17, 1865.*



*Witnesses*

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# UNITED STATES PATENT OFFICE.

JOHN S. FISK, OF MEADVILLE, AND JAMES WESTERMAN, OF SHARON, PA.

## IMPROVED MODE OF VENTILATING MINES.

Specification forming part of Letters Patent No. 43,918, dated January 17, 1865.

*To all whom it may concern:*

Be it known that we, JOHN S. FISK, of Meadville, Crawford county, Pennsylvania, and JAMES WESTERMAN, of Sharon, Mercer county, Pennsylvania, have invented a new and useful Improvement in Machinery for Ventilating Mines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, which makes part of this specification, and which represents two reservoirs of compression, and their induction and eduction pipes, being all of the mechanism necessary to illustrate our invention.

In the modes hitherto adopted for ventilating mines by machinery or for the employment of compressed air as a motor for operating mechanism within them, it has been usual to pump the air from the mouth of the mine through pipes of uniform diameter and discharge it at the point desired within the mine. This method is attended with two very serious difficulties—namely, the want of a proper reservoir in connection with the pumping apparatus leaves the mine unventilated in the event of any accident to the pumps or their connections; and, secondly, the friction of the air on long pipes of uniform diameter in deep mines renders it difficult to deliver the quantity of air required under an effective pressure either for ventilating or motive purposes, and even when done it is only by the use of powerful and expensive machinery, and the air is discharged in irregular puffs instead of in a steady stream.

It is the object of our invention to obviate the above-mentioned and other objections to this plan of ventilating mines by currents of air forced through pipes and of using the same currents as motors for machinery; to which end the improvement herein claimed consists, first, in combining one or more reservoirs for compressed air, located within the mine, with a force-pump or engine located at or near the mouth of the mine, substantially in the manner hereinafter described, so as to exert a uniform pressure at the working-point where compressed air is used as a motor, and to prevent the stoppage of the ventilation in case of a temporary stoppage of the engine; secondly, in the employment of one or more reservoirs for compressed air, located within the mine,

into which air is pumped through large tubes or pipes, and from which it is withdrawn through smaller eduction-pipes for use either for ventilation, as a motor, or for both.

The accompanying drawing, which exemplifies one mode of carrying out the objects of our invention, shows so much only of the mechanism as is necessary to illustrate our invention.

An engine for pumping and lifting is essential to all mines of any extent, and is generally located near the mouth of the pit or shaft. This engine is generally idle at intervals during a large portion of the day. Under our system this idle time may be usefully employed in compressing air into the reservoirs, and thus dispense with the necessity of employing an extra engine for that special duty.

The air is forced through an induction-pipe, A, into a reservoir, B, where it is compressed to any desired degree. The reservoir is provided with stop-valves C D (in this instance located in the pipes) of any proper kind, and may likewise be provided with a safety-valve, (as at E,) to prevent rupturing the reservoir by an excess of pressure. This reservoir may be located at any point most convenient within the mine, and at any desired distance from the engine. We prefer, however, to locate it as near the working-point as convenient. From the reservoir and eduction-pipe, G, conducts the air to any desired point, either for ventilating or for actuating mechanism. We prefer to use a large induction-pipe to diminish friction, and a small eduction-pipe for convenience, which pipe, for greater convenience, may also be made flexible, if desired.

As the mine is extended, it may be expedient to introduce additional chambers of compression or reservoirs F, which may in all respects be constructed like reservoir B. The advantages of this duplication are, that the pressure of the escaping current is equalized, and the pumping can be discontinued for a longer period without stopping either the mining machinery or the ventilation. To the same end a reservoir may be placed near the pumping-engine outside the mine, but a reservoir thus located would not alone accomplish the objects of our invention.

By our improved system of ventilating and working mines we are enabled to dispense

with nearly half the "dead-work" heretofore required, for we can thoroughly ventilate a mine through a single shaft, while in the majority of mines it is necessary to open an additional shaft solely for ventilation.

We are likewise enabled by our invention to use machinery for mining without danger from explosion from the use of fire in the mine and the inconvenience and discomfort of smoke or dampness created by the condensation of the escaping steam.

It is obvious that the materials, the form, and the dimensions of the reservoir may be varied to suit the circumstances of the case, and that the air may be applied as a motor in various well-known ways without departing from the spirit of our invention.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination, with a forcing-pump or

engine located at or near the mouth of the mine, of one or more reservoirs for compressed air, located within the mine at a distance from the engine and near the working-point, substantially in the manner herein described, for the purposes of ventilating the mine, and of exerting a uniform pressure as a motor, as set forth.

2. The combination of one or more reservoirs, arranged substantially as herein described, with a large induction and small education pipe and stop-valves, as and for the purpose set forth.

In testimony whereof we have hereunto subscribed our names.

JOHN S. FISK.

JAMES WESTERMAN.

Witnesses:

WM. D. BALDWIN,

EDM. F. BROWN.