

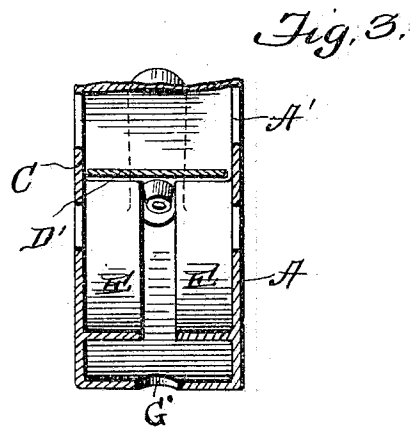
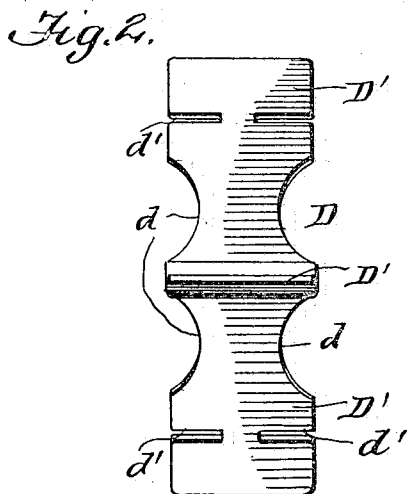
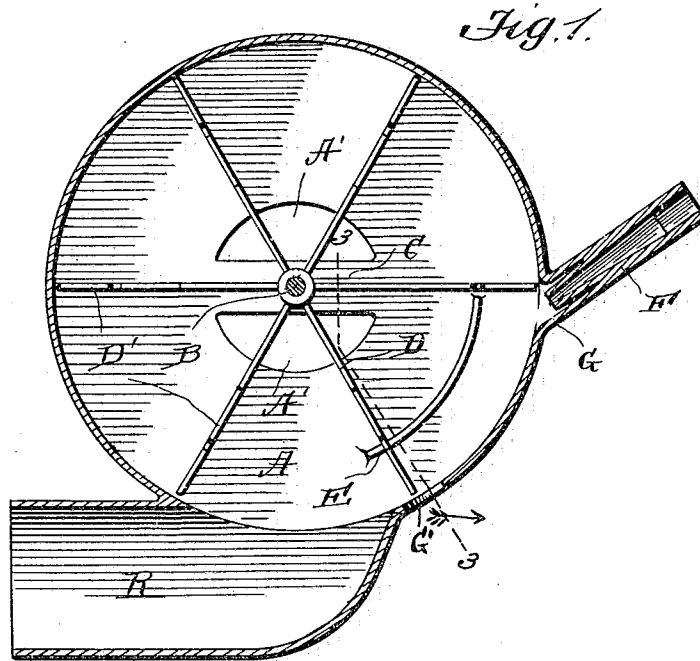
No. 809,653.

PATENTED JAN. 9, 1906.

M. J. WARD.  
APPARATUS FOR VENTILATING MINES.

APPLICATION FILED APR. 11, 1904.

2 SHEETS—SHEET 1.



**Witnesses**

R. A. Boswell,  
A. L. F. Hough

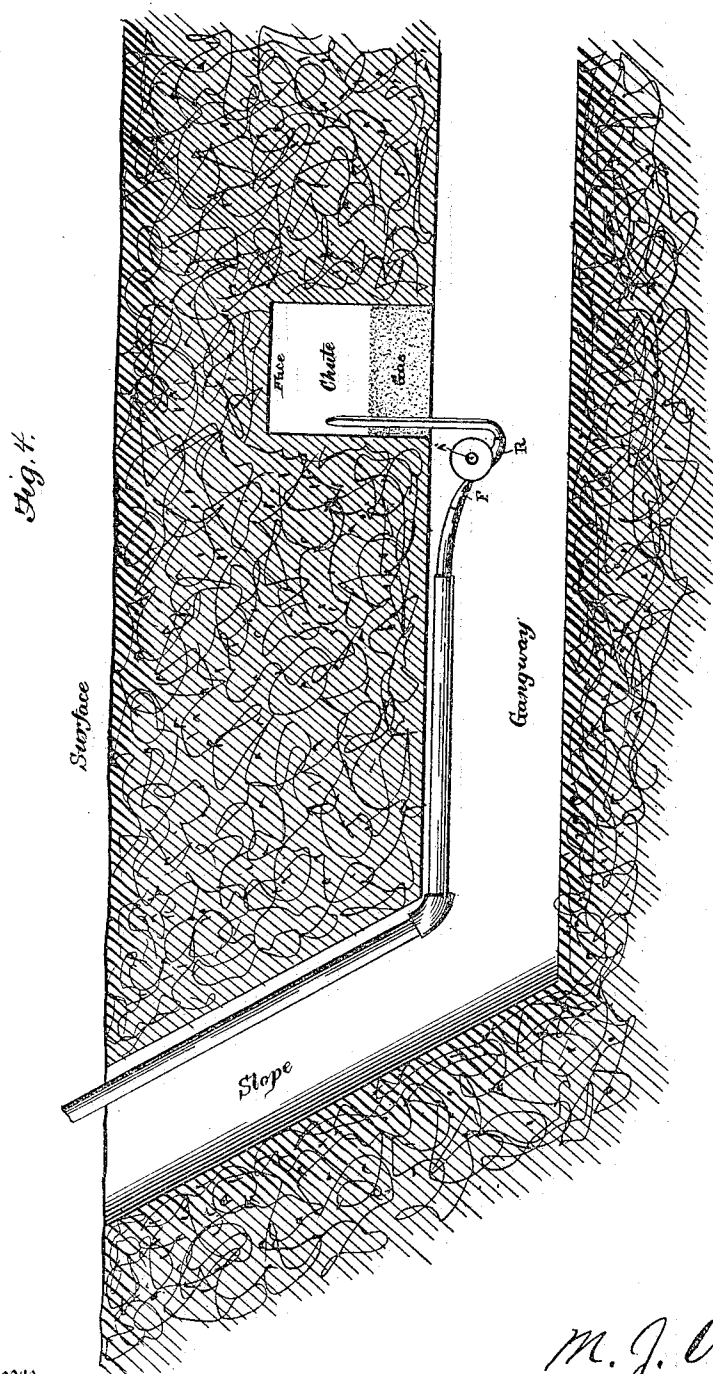
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2 SHEETS—SHEET 2.



Witnesses

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# UNITED STATES PATENT OFFICE.

MICHAEL J. WARD, OF MINERSVILLE, PENNSYLVANIA.

## APPARATUS FOR VENTILATING MINES.

No. 809,653.

Specification of Letters Patent.

Patented Jan. 9, 1906.

Application filed April 11, 1904. Serial No. 202,627.

*To all whom it may concern:*

Be it known that I, MICHAEL J. WARD, a citizen of the United States, residing at Minersville, in the county of Schuylkill and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Ventilating Mines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to new and useful improvements in pneumatic apparatus for ventilating mines; and the object of the invention is to produce a simple and efficient means whereby a fan may be operated below the foot of a chute leading up from a gangway in a mine and driven by compressed air and so constructed that fresh air may be drawn by the fan from a current of fresh air which usually courses through a gangway and forced through into the chute for the purpose of blowing out the gases, smoke, &c., provision being made for preventing a large proportion of the compressed air from mixing with the fresh air, whereby the fresh air will be comparatively free from the vitiated compressed air which drives the fan.

Heretofore it has been common to use fans in coal-mines for the purpose of supplying fresh air for breathing purposes, and with the apparatus commonly in use the compressed air is forced into the mine and carried to the chutes through small pipes, the nozzle ends of which are positioned adjacent to the place where miners are at work. The objections met with by employing an apparatus of this nature are various, as the inrushing air from the nozzles having great pressure causes a loud noise, rendering it impossible for the miner to hear the working of the coal around him when, after firing a shot, it becomes necessary for the miner to "dress off" the coal which has been loosened by the blast. This is dangerous, and particularly so when the miner is unable to hear the coal working. The compressed air has an oily smell and is not fit for breathing purposes, as it is not only offensive, but even dangerous for continuous breathing. With the apparatus commonly in use the air on leaving the nozzles loses sixty per cent. of its force before passing but a short distance from the end of

the nozzle, and the consequence is that the force of the air is not sufficient to drive the gas down and out of the chute, rendering it possible for gases to accumulate in sufficient quantities to cause a terrific explosion and the resultant injury to life and property.

To obviate the foregoing difficulties, it is my purpose to provide an apparatus which will be hereinafter fully described, and specifically defined in the appended claims.

My invention is illustrated in the accompanying drawings, which, with the letters of reference marked thereon, form a part of this application, and in which drawings—

Figure 1 is a vertical sectional view through a fan and casing embodying the features of my invention. Fig. 2 is an edge view of the fan removed from the casing. Fig. 3 is a detail sectional view on line 3 3 of Fig. 1, showing the air chest or compartment within the casing. Fig. 4 is a sectional view through a shaft, showing the application of my invention.

Reference now being had to the details of the drawings by letter, A designates the casing of a fan of the general shape illustrated, and B designates the shaft of a fan which is journaled in the strips C, passing over the central openings A' in the sides of the fan-casing.

D designates a fan having blades D', which have scalloped edges *d* and notches *d'* cut in the opposite edges of the blades a short distance from the outer ends thereof. Projecting from the opposite inner faces of the casing are two curved flanges E E, oppositely disposed and so positioned that when the fan rotates the notches in the blades of the fan will pass by said flanges without interference therewith. The end portion of each blade or wing of the fan beyond the notches is of such a size as to practically close the space intervening between said flanges and the circumferential wall of the casing, and said flanges are of a length equal to the distance between the blades of the fan, whereby as one blade leaves the ends of the flanges the next blade will come opposite the opposite ends of the flanges, thereby forming an air-chamber, the marginal walls of which comprise the two adjacent faces of blades of the fan, the side walls of the casing, and the circumference.

A nozzle F is provided which is positioned within the tube G, communicating with the fan-casing, said nozzle being adapted to di-

rect air under pressure against the rotary blades of the fan. An exit-aperture G' is formed in the circumference of the casing and near the lower end of said air-chamber, whereby a considerable proportion of the air which is fed through the nozzle against the blades of the fan may make exit after its force has been exerted upon a blade for the purpose of imparting a rotary movement to the fan.

10 Leading from the circumference of the casing is an outlet-pipe R, through which fresh air which is drawn through the openings A' in the opposite faces of the fan-casing may be conducted to any suitable location within

15 the chute for the purpose of dispelling obnoxious gases and smoke from the chute.

By the provision of the construction of apparatus shown and described I have found that a large proportion of the vitiated compressed air after coming into contact with the blades to propel the fan will issue from the exit-opening G', and by the force of the vitiated air issuing from said exit-opening it will be driven some distance from the fan-casing and will be caught by the lower portion of the current continuously passing through the gangway and will not mix with the upper portions of the current of fresh air from which the supply of fresh air is drawn through the central openings of the fan-casing. While it is true that some of the compressed air might pass beyond the ends of the partitions E, being driven by the blades of the fan, this amount is appreciably small.

35 By positioning the fan at some distance from the chute the noise incident to the inrushing of the compressed air to the fan-casing is dispensed with, thereby rendering it possible for the miner to hear the working of the coal

40 around him.

While I have shown a particular construction of apparatus embodying the features of my invention, it will be understood that I may make alterations in the detailed construction of the apparatus, if desired, without departing from the spirit of the invention.

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

50 1. An apparatus for ventilating mines comprising a fan and casing therefor, with

openings in the sides thereof, curved flanges upon the opposite walls of said casing and of sufficient length to form closed compartments by the rotating blades of the fan, a nozzle adapted to direct compressed air into the space intermediate said flanges and the circumferential wall of the casing, the wall of the casing opposite the lower ends of said flanges being apertured, and a pipe leading away from the casing, as set forth.

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2. An apparatus for ventilating mines comprising a casing, a shaft journaled in said casing, fan-blades upon said shaft, said blades having oppositely-disposed recesses cut in from the edges thereof, curved flanges projecting from the inner faces of the side walls of the casing over which said recesses pass as the blades rotate, a nozzle extending into a tubular projection of the casing and having an exit end adjacent to the upper ends of said flanges, the circumferential wall of the casing having an exit-aperture opposite the lower ends of said flanges, and a pipe leading from the casing, as set forth.

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3. A ventilating apparatus for mines comprising a casing having a tubular extension upon the circumference thereof and an exit passage-way, the opposite walls of the casing having apertures for the inlet of fresh air, a shaft journaled in said casing, blades fixed to said shaft and having their opposite edges scalloped adjacent to their inner ends, each blade having elongated recesses cut in from the opposite edges thereof, intermediate the outer marginal edges of said scallops and the free ends of the blades, curved flanges oppositely disposed and fastened to the side walls of the casing and over which said recesses are adapted to pass, a nozzle positioned in said tubular extension of the casing, having an exit end opposite the upper ends of said flanges, the circumference of said casing having an exit-aperture opposite the lower ends of said flanges, as set forth.

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In testimony whereof I hereunto affix my signature in presence of two witnesses.

MICHAEL J. WARD.

Witnesses:

JOHN B. MCGURL,  
SUE DUFF.