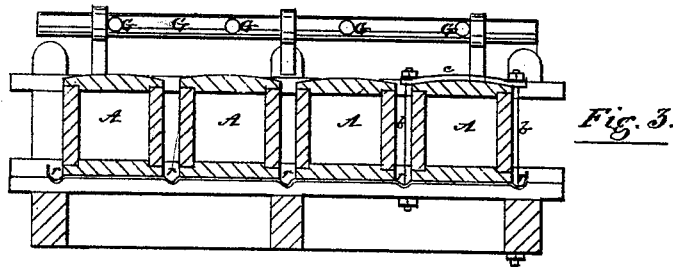
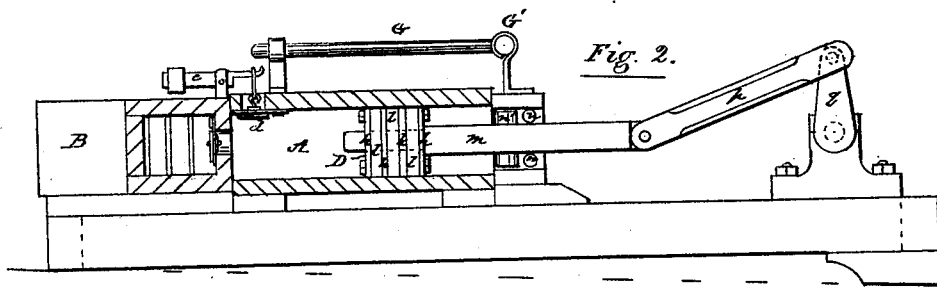
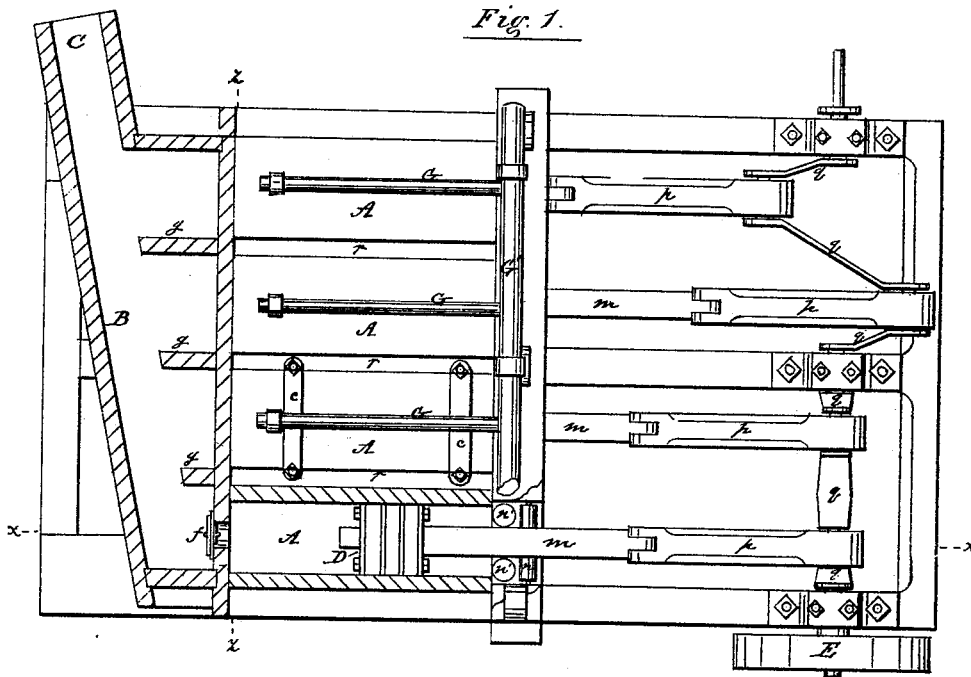


W. GREIS.

APPARATUS FOR VENTILATING MINES.

No. 182,916.

Patented Oct. 3, 1876.



WITNESSES

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WILLIAM GREIS, OF SHENANDOAH CITY, PENNSYLVANIA.

IMPROVEMENT IN APPARATUS FOR VENTILATING MINES.

Specification forming part of Letters Patent No. 182,916, dated October 3, 1876; application filed July 26, 1876.

To all whom it may concern:

Be it known that I, WM. GREIS, of Shenandoah City, in Schuylkill county, and State of Pennsylvania, have invented an Improved Apparatus for Ventilating Mines, of which the following is a specification:

This invention has for its object the expulsion of all sulphurous and other deleterious gases from coal and other mines, and supplying in their stead good pure air. This has been attempted in various ways; but owing to the great distance to be traveled the elasticity of the atmospheric air to be supplied, and the gases to be expelled, none have yet satisfactorily accomplished the object aimed at.

The invention, hereinafter more fully described, consists in the application of a series of air-pumps by which a direct and positive current of air may be forced to the extremity of the drift and all its cross-cuts, whereby the sulphurous and other gases are caused to flow toward and up the shaft, thus supplying all the avenues of the mine with pure air, and expelling all the deleterious gases now breathed by the numerous human beings and animals employed therein.

In the accompanying drawing, forming part of this specification, Figure 1 represents a top view of the apparatus with one air-pump and the valve-chamber in section. Fig. 2 is a vertical longitudinal section taken on the line *x x* on Fig. 1. Fig. 3 is a transverse section of the pumps taken on the line *z z* on Fig. 1.

The same letters of reference occurring on the several figures indicate corresponding parts.

A A A A represent a series of air-pumps, preferably of rectangular form in their cross-section, and made up of four plates of cast-iron rabbeted and secured together by bolts *b* and clamps *c* with suitable packing in the joints to render them air-tight. Near one end of each of these chambers, and on their upper side, is a valve, *d*, opening inwardly, and to which is connected a counterbalance-lever, *e*. Across the end of these air-chambers A is arranged an ejection-valve chamber, B, having a foot-valve, *f*, opposite the end of each of the chambers A. This valve-chamber is furthermore provided with dividing-plates *g*, spacing it off to correspond with the number of

chambers A. The side of this conduit opposite the valves *f* is arranged obliquely to the latter to deflect the air forced against it toward the conduit pipe or passage C, from which point it is to be conveyed through box-tubes, or by means of flexible hose arranged along the upper portion of the drift and all its cross-cuts, to the extremities of the mine. In each of the air-chambers A is a piston, D, made up of alternate thicknesses of metal, *h*, and leather, rubber, or other suitable packing *l* to work air-tight therein. The piston-rod *m* is of rectangular form of bar-iron, supported and guided by horizontal and vertical rollers *n n'*, and these piston-rods are connected by pitmen *p* with a series of cranks, *q*, arranged to rotate at equidistant points in the circle they describe. These cranks, and through them the pistons D, are operated, through gear or band wheels E, by steam or any suitable motor. In order to be assured that the apparatus is at all times performing its functions, I arrange a counterbalance-lever, *e*, connected with each of the induction-valves *d* in full view, to indicate the operation of each pump, or its cessation, so that any obstruction may be immediately removed.

As by the necessary friction of the pistons D in the chambers A, and the continual compression of air in the apparatus, it would be liable to heat and impair its usefulness, I arrange a series of pipes, G, one over each chamber A, and perforated on their under side to drip jets of water on the rounded tops of said chambers to keep them cool, the water being supplied to them through the main pipe G', which, dripping down the sides of the chambers A, passes off by the troughs *r* under and at the lower edges of said chambers, they being arranged on a slight incline to effect such drainage.

It will thus be seen that by this apparatus a constant and positive supply of air may be forced to the extremities of the drift and its cross-cuts, the contents of each forcing-chamber impinging against the back of the inclined conduit, each successive volume impels the preceding in its course, so that a constant current ejected at the extremity of the mine must expel all foul air generated therein. In the progress of excavation this air-duct must be

extended from time to time to the extent of the drifts and cuts.

What is here claimed as new, and desired to be secured by Letters Patent, is—

1. The combination of a series of air-forcing chambers, operating successively, with an inclined conduit extended to the extremities or thereabouts of the drift in a mine, for the purpose set forth.

2. The combination of the vertical and horizontal rollers *n n'* with the square or rectangular piston-rod *m*, substantially as described.

3. The arrangement of a series of pipes, *G*, over the rounded covers of the air-forcing chambers *A*, in combination with the troughs *r* at the bed of the latter, substantially as and for the purpose specified.

WM. GREIS.

Witnesses:

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J. W. HAMILTON JOHNSON.