2 Sheets—Sheet 1.

F. MURPHY.

MINE-VENTILATING APPARATUS.

No. 176,756. Patented May 2, 1876.

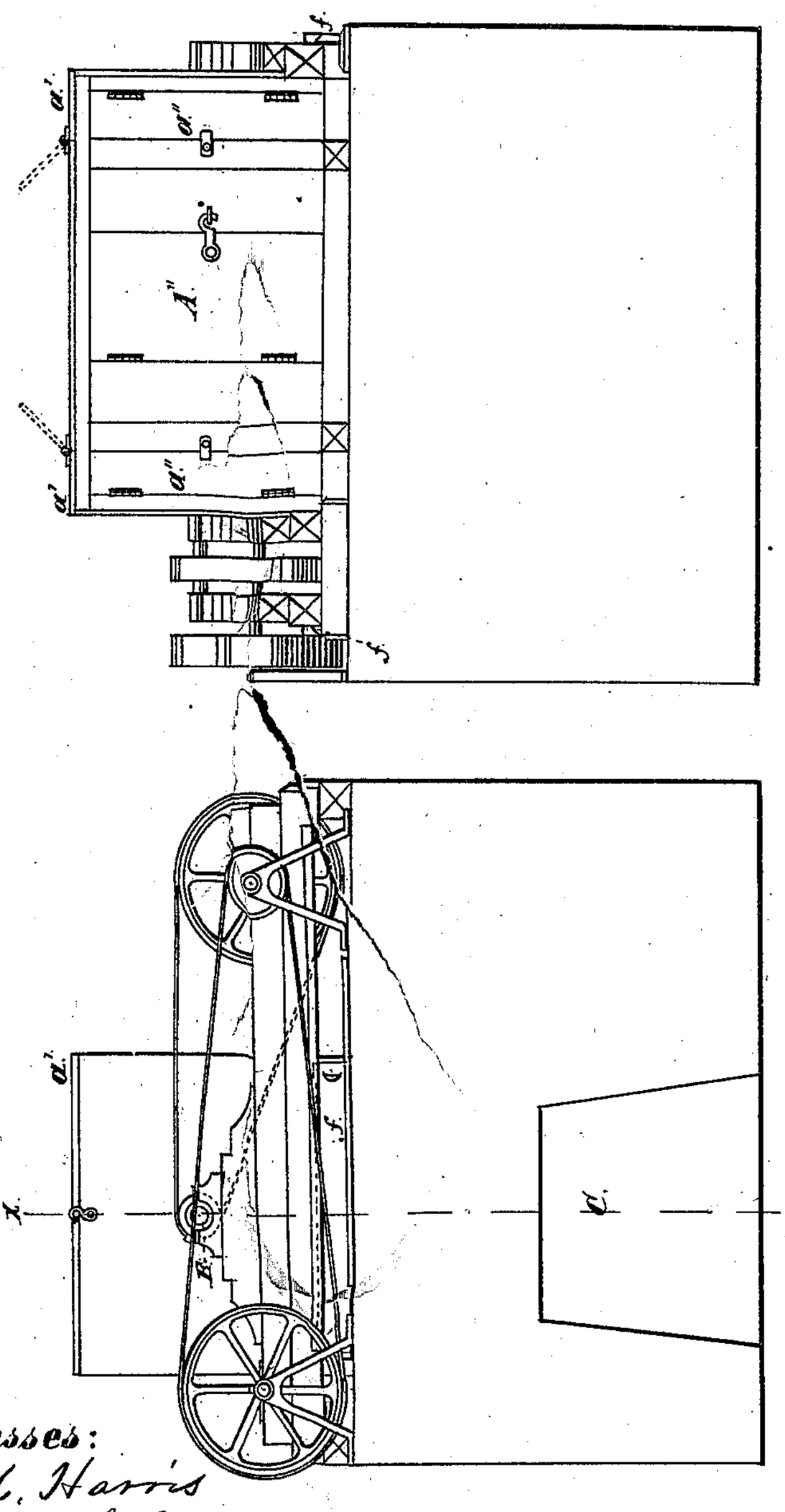

Fig. 2.

Fig. 1.

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2 Sheets—Sheet 2.

F. MURPHY.

MINE-VENTILATING APPARATUS.

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Fig. 3.

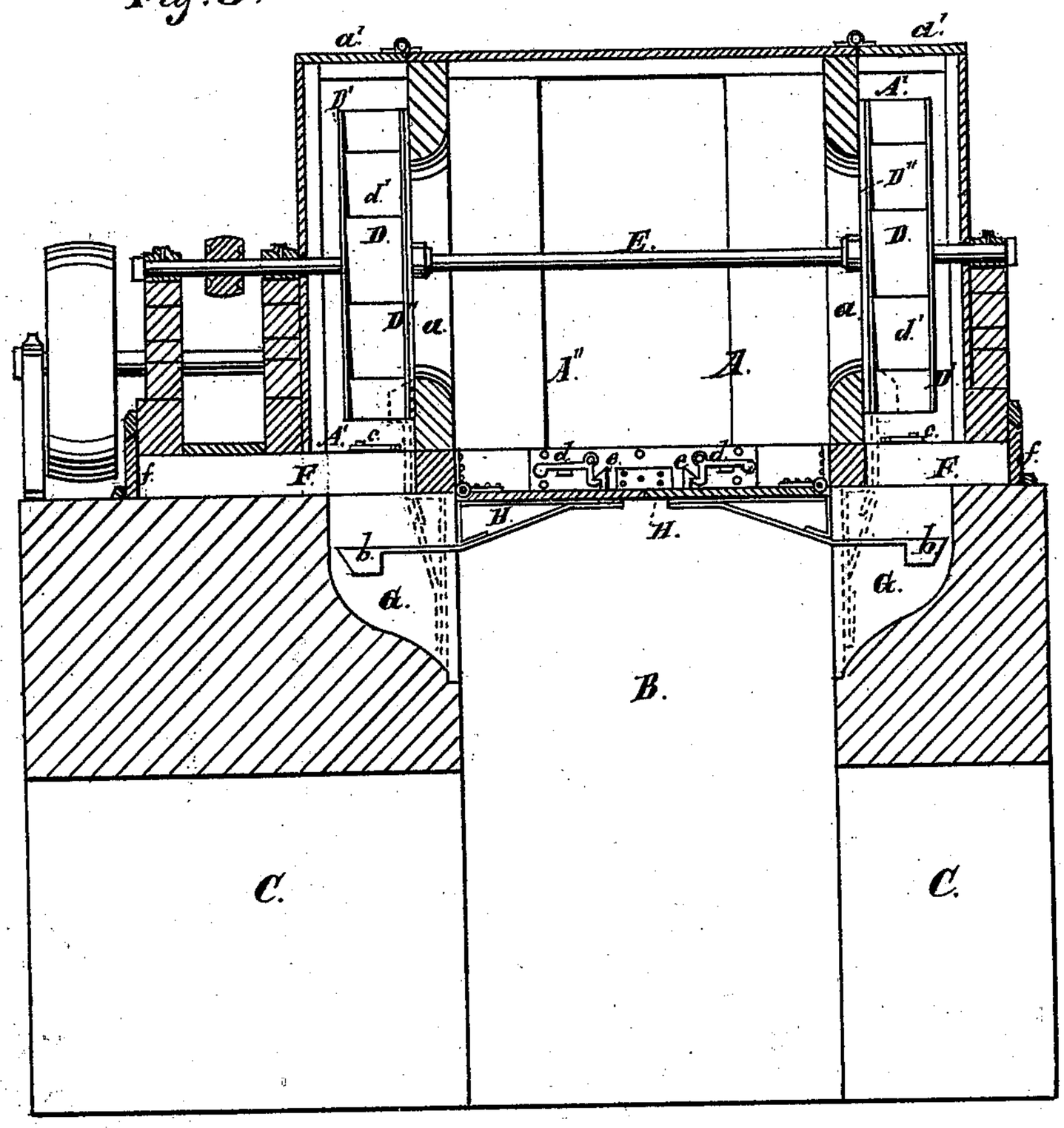
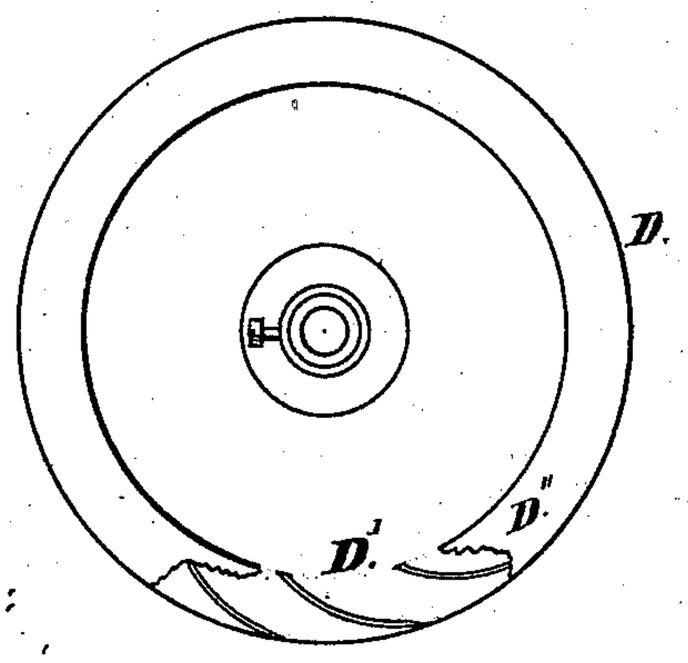


Fig. 4.



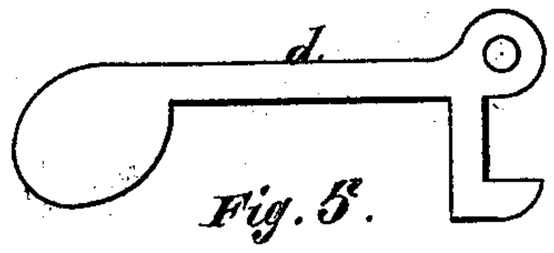


Fig. 5.

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UNITED STATES PATENT OFFICE.

FRANCIS MURPHY, OF STREATOR, ILLINOIS.

IMPROVEMENT IN MINE-VENTILATING APPARATUS.

Specification forming part of Letters Patent No. **176,756**, dated May 2, 1876; application filed January 18, 1876.

To all whom it may concern:

Be it known that I, FRANCIS MURPHY, of Streator, in the county of La Salle and State of Illinois, have invented a new and useful Improvement in Ventilating Apparatus for Coal-Mines, Tunnels, Steamboats, &c., which is fully described in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of the apparatus; Fig. 2, an end elevation of the same; Fig. 3, a cross-section, taken upon the line *x x*, Fig. 1, and on an enlarged scale; Fig. 4, a plan view of the blower-fan on an enlarged scale, with a portion of the inner rim broken away; and Fig. 5, an enlarged view of a pivoted catch, used to hold up the doors at the mouth of the shaft.

My invention consists in the arrangement of the air-receiving chamber and supplemental chambers directly above the mouth of the shaft; also in the peculiar construction of the fans or blowers; and also in the construction of the air-chamber, so that the fans may be used either as exhausters or blowers without reversing their motion, as will be hereinafter more fully described.

In the drawings, A represents the air-receiving chamber, which is placed directly over the shaft B of the mine without the intervention of any other mechanism; and C C are galleries leading from the shaft B. Two fans or blowers, D D, are placed upon the same shaft, E, on opposite sides of the receiving-chamber. Motion is communicated to this shaft by any suitable mechanism, and thus the blowers rotated in the direction indicated by the arrows. The chamber A is provided with circular openings *a*, directly opposite the fans, which are uninclosed, if the apparatus is to be used only for the purpose of exhausting foul air from the mine, and with this arrangement fresh air may be forced into the chamber and down the shaft by reversing the motion of the fans, when the latter are of ordinary construction. But to make the apparatus capable of use both as a blower and exhaust, without the necessity of reversing the motion, I construct two small supplementary compartments, A′ A′, at the sides of the receiving-chamber A, and place the fans within them, as seen in Fig. 3 of the drawings. In the two remaining sides of the receiving-chamber doors A″ are constructed, and the side compartments are also provided with doors *a′* at their tops, and *a″* at their sides. From the bottom of the chambers A′, passages F F lead to the open air, which are controlled by slides *f f*. From the same compartments A′ passages G lead to the shaft B, below the air-receiving chamber. To the lower part of the frame are hinged two doors, H H, which are suspended in front and close the mouth of the passages G G, as seen in dotted lines in Fig. 3, but may be swung up to a horizontal position, when they will entirely close the mouth of the shaft, as seen in Fig. 3 in full lines. The doors are provided with weighted catches *b b*, which assist to hold them in either a vertical or horizontal position. Small plates *c*, pivoted to the frame of the chamber, engage with these catches to hold them in a vertical position, and weighted dogs *d* are also pivoted to the inside of the frame surrounding the mouth of the shaft, which engage with hooks or catches *e* upon the inside of the doors H, when they are thrown up into a horizontal position and securely hold them in such position until released. These dogs *d* are of peculiar construction, and consist of two arms, at right angles to each other, the horizontal one being weighted at its outer end and extended forward beyond the other arm, to form a projection through which the pivot-bolt is placed. By this construction the center of motion is forward of both arms of the dog, as clearly seen in Fig. 5, so that the entire weight of both arms operates to secure quickness of action and a reliable fastening.

The operation of the apparatus is as follows: When it is used as an exhaust, the passages G are closed by the doors H hanging down in a vertical position, and the chamber A opens directly into the shaft; the doors of the chamber A are closed, but those of the compartments A′ are thrown open, and the passages F are also opened by withdrawing the slides *f*, so that there may be the fullest opportunity for the escape of the foul air drawn into the compartments A′ by the revolution of the fans.

When it is desired to force fresh air into the mine, the slides *f* and the doors of the com-

partments A′ are all closed; the side doors of the chamber A are opened, and the mouth of of the shaft is closed by swinging up the doors H, thus at the same time opening the passages G from the compartments A′ to the shaft B. The fans being revolved in the same direction as before, it will be seen that they continue to exhaust air from the chamber A; but it is fresh air coming through the open doors, and not from the shaft, which is closed. The compression of the air in the chambers A′ by this operation of the fans will force a current down through the passages G into the shaft B and galleries C of the mine.

With this arrangement of chambers, fans of any ordinary construction may be used, but I have devised one of peculiar construction, which is specially adapted to this arrangement, and is shown on an enlarged scale in Fig. 4 of the drawings. It consists of a solid disk, D′, upon one side of which, also at its outer edge, are attached flanges *d′*, which are in turn surmounted and covered by a narrow annulus, D″. The flanges are of peculiar construction—from their origin upon the disk they are first projected a little distance outward upon a line tangential to a curve with a radius terminating at about the point of origin, but these are changed in direction, and follow a curve until they reach the periphery of the disk. Instead of a solid disk of metal, the back D′ may be constructed with metallic hubs and spokes, the spaces between the latter being filled with wood, for the purpose of making the blower lighter. In operation the disk D′ is placed on the outside, the annulus D″ being fitted to run close to the casing of the chamber A′. The blowers may also be placed inside of the chamber A, in a reverse position, when they will operate satisfactorily to exhaust, but not so well to force fresh air down the shaft.

Having thus described my invention, what I desire to secure by Letters Patent is—

1. The combination, substantially as described, of the air-chamber A, placed immediately above and opening directly into the shaft B, the supplementary compartments A′, and the fans D, for the purposes set forth.

2. The supplementary compartments A′, arranged on opposite sides of the chamber A, and inclosing the fans, substantially as and for the purpose set forth.

3. The combination, substantially as described, of the chamber A, provided with doors A″, the chambers A′, inclosing the fans, and passages leading directly from the chambers A′ to the shaft of the mine.

4. The combination, substantially as described, of the chamber A, provided with doors A″, the chambers A′, inclosing the fans, the doors H at the mouth of the shaft, and the passages G connecting the chambers A′ with the shaft of the mine.

5. The combination, substantially as described, of the chamber A and compartments A′, provided with doors *a′ a″*, and either with or without an air-flue, F, for the purposes set forth.

6. The doors H for opening and closing the mouth of the shaft and the passages G, substantially as and for the purposes set forth.

7. A ventilating apparatus, substantially as described, which may be used either as an exhaust or a blower without reversing the revolution of the fans.

8. The combination of the weighted catches *b* attached to the doors H, and the plates *c*, substantially as and for the purpose set forth.

9. The weighted dogs *d*, constructed with two arms at right angles to each other, and a projection at their junction through which the pivot-bolt passes, so that the whole weight of the dog will be behind the pivot.

10. The combination of the dogs *d* and doors H, having catches *e*, substantially as described.

11. The fans or blowers D, consisting of a disk, D′, flanges *d′*, and annulus *d″*, constructed substantially as described.

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Witnesses:
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