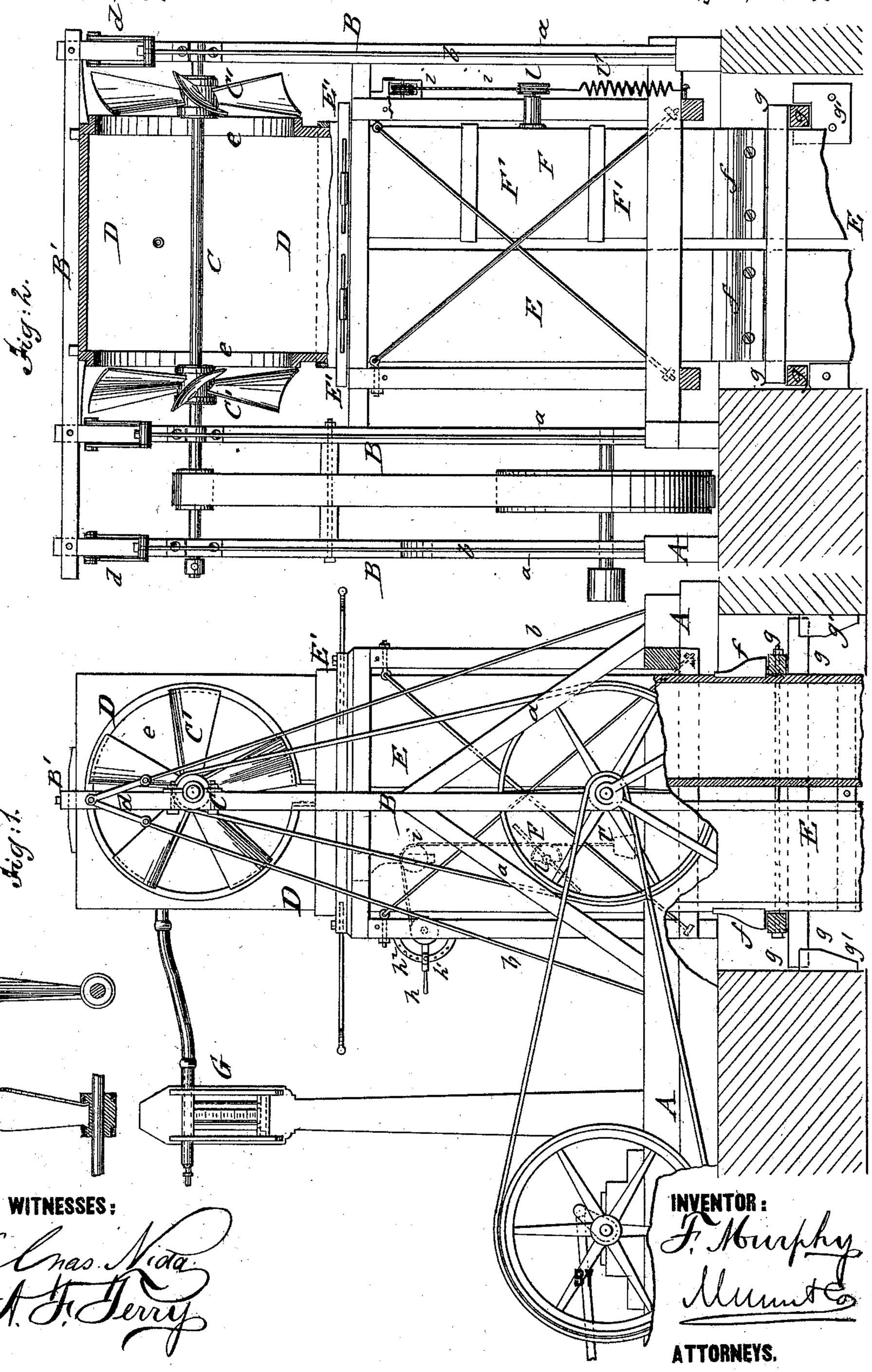
# F. MURPHY.

## VENTILATING APPARATUS FOR COAL-MINES.

No. 176,757. Patented May 2, 1876.

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# UNITED STATES PATENT OFFICE.

FRANCIS MURPHY, OF STREATOR, ILLINOIS.

## IMPROVEMENT IN VENTILATING APPARATUS FOR COAL-MINES.

pecification forming part of Letters Patent No. **176,757**, dated May 2, 1876; application filed April 10, 1875.

*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 Improved Ventilating Apparatus for Coal-Mines, &c., of which the following is a specification:

In the accompanying drawing, Figure 1 represents a side elevation of my improved ventilating apparatus for coal-mines, &c.; Fig. 2 an end view of the same, and Fig. 3 shows detail side and end views of a blade of my spiral fan.

Similar letters of reference indicate corresponding parts.

The invention will first be fully described in connection with drawing, and then pointed out in the claims.

In the drawing, A represents the base-supporting timbers, which are arranged around the shaft-opening, with the vertical posts or standards B mortised therein. The standards B are stiffened and firmly retained in position by braces *a* and tie-rods *b*, attached to swivel-bails *d* near the top, and to sockets, washers, and nuts of the base-pieces. The posts B carry at their upper parts, in suitable bearings, the fan-shaft C, which is revolved by pulley-and-belt connection from the engine. A top cross-piece, B′, is securely fastened to the top of posts B, and bears, by intermediate wedges, on the top of the air-chamber D, which is thereby rigidly retained in position, its base part being bound to the connecting-tube column E by the metallic valve-frame E′ of the same. The air-chamber D is provided with circular openings *e* at opposite sides, the fan-shaft passing centrally through the same, and carrying outside and near each opening a fan, C′. The fans C′ are equal in every respect, with the exception that one has right and the other left or contrary-spiraled blades. The fans are keyed firmly to the shaft and balance each other, so as to neutralize the lateral pressure of one fan, and utilize the power of the fans to a greater extent. The blades or wings of the fans are of wrought iron or steel, and firmly dovetailed to the hub, being made thicker near the hub, and with a gradual taper, as shown in Fig. 3. Each blade is curved in the manner shown in Fig. 2, to produce the cutting of the air at a certain angle, and thereby the exhaustion of the shaft by being revolved in one direction, and the forcing in of air by being turned in the opposite direction.

The working capacity of the balanced fans is nearly doubled without enlarging the apparatus, as compared with a single fan, while the safety of the apparatus is increased by the neutralization of the lateral pressure.

The air-chamber or casing is carried over the fan-shaft by having slots or recesses at the lower side, which are closed by dovetailed pieces when the air-chamber is seated on the tube-column.

The downward-descending shaft-tubes E are supported at suitable distances by being provided with inverted brackets *f*, of the width of the tubes, that are firmly attached to the outer sides of the same, resting on surrounding and bolt-connected cross-pieces *g*, which are supported by brackets *g′* of the shaft-linings. The different tube-sections are thus separately supported as extended downward into the shaft without producing any pressure or weight on the lower sections of the column. The setting up, replacing, and detaching of the tube-sections, is thus accomplished in a quick and convenient manner.

When the shaft is sunk to a lower vein or level, having one or more working-veins above, it is necessary to regulate and control the ventilation between them. This is done by means of the valve F, which is shown in Fig. 2, above ground, but which should be applied to the tube-section at the required depth below. The valve F may be partly or entirely opened and closed by the attendant stationed above ground, the telegraph-alarm connection with the different headings and levels informing him how to set the same. The ventilation of the whole mine is thereby controlled entirely from the surface in a reliable and easily-attended manner.

The valve F is pivoted and fitted to a metal casing, F′, and set, as required, by means of a lever, *h*, that is connected by a rope and pulley, *i*, with a sector-shaped pulley, *l*, on the valve-shaft lever *h*, holding the valve F in any position by being fastened by a stop-pin, $h^1$, to a perforated circular guide-piece, $h^2$. The sector-shaped pulley *l* of the valve is acted

upon in opposite direction by a weight or spring, $l'$, so that, as soon as the lever is released, the valve is readily swung into closed position. The valve-casing is fitted accurately to the air-tube, and the joints closed by a suitable cement, to make them air-tight and secure the reliable exhaust and supply action of the fans.

The air-chamber is connected by a flexible tube with a mercurial gage, G, that is placed on any suitable standard or point free from the vibrations of the machinery. The gage indicates, on a graduated scale of the glass tube, the degree of exhaustion produced by the fans.

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

1. The combination of tube-sections having inverted side brackets and surrounding supporting-pieces, with brackets of shaft-lining for bearing the tube-sections separately of each other, as set forth.

2. The combination of the valve F, lever $h$, rope and pulley $i$, sector-pulley $l$, spring $l^1$, and lever-locking plate $l^2$, with the air-tube E of a mine-ventilating apparatus, as and for the purpose set forth.

3. The combination of the air-receiving chamber D, provided with openings $e$ at opposite sides thereof, and the balanced fans C′, arranged on the same shaft and outside of the air-receiving chamber, all constructed and operating substantially as described.

4. The combination, substantially as described, of the air-receiving chamber D, the balanced fans C′, and the shaft-tubes E, provided with suitable valves F.

FRANCIS MURPHY.

Witnesses:

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