

(No Model.)

2 Sheets—Sheet 1.

D. H. FISHER.
VENTILATING FAN FOR MINES.

No. 511,519.

Patented Dec. 26, 1893.

FIG. 1.

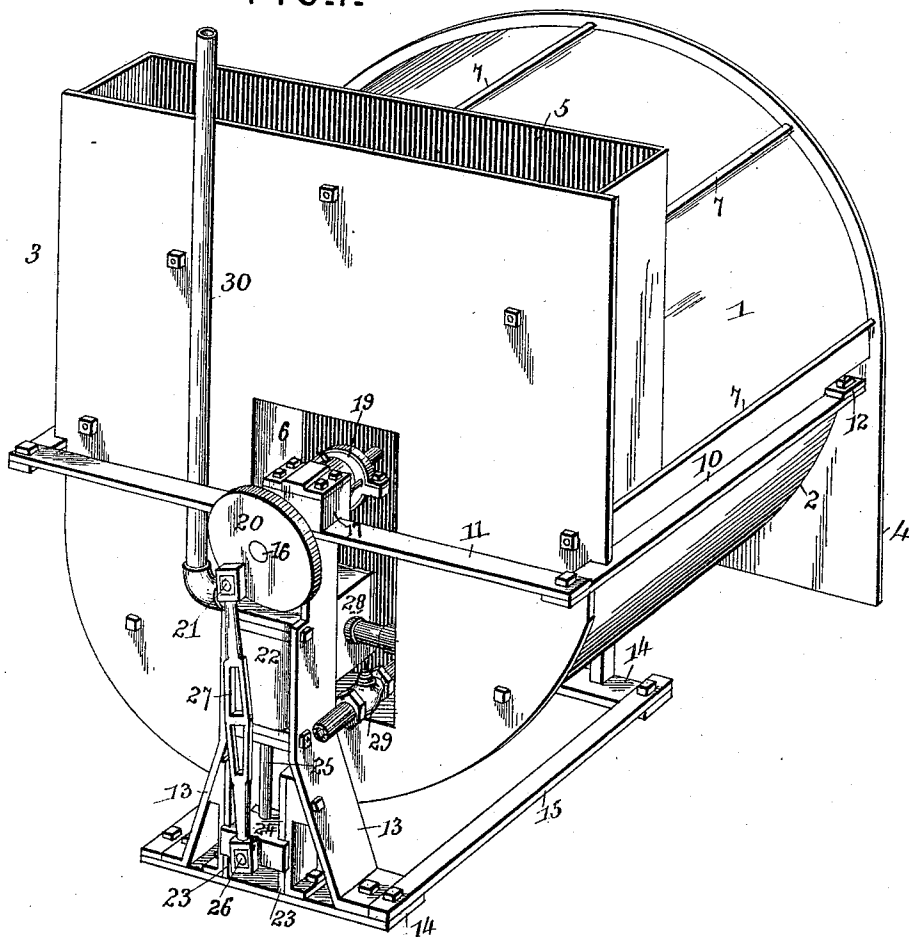
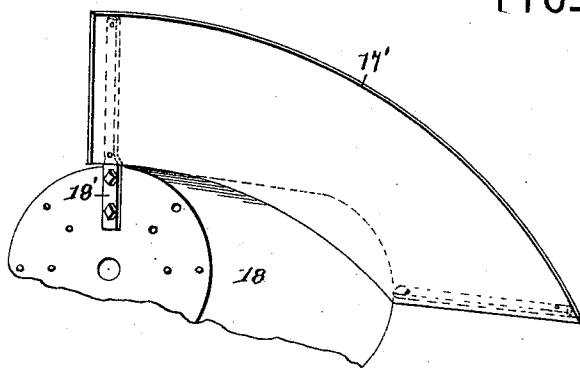


FIG. 4.



Witnesses

Inventor

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(No Model.)

2 Sheets—Sheet 2.

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FIG. 3.

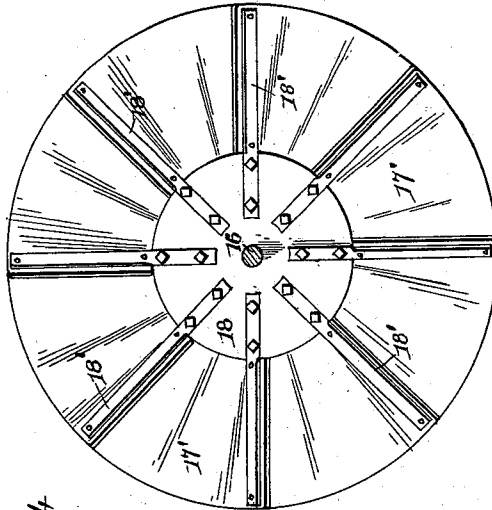
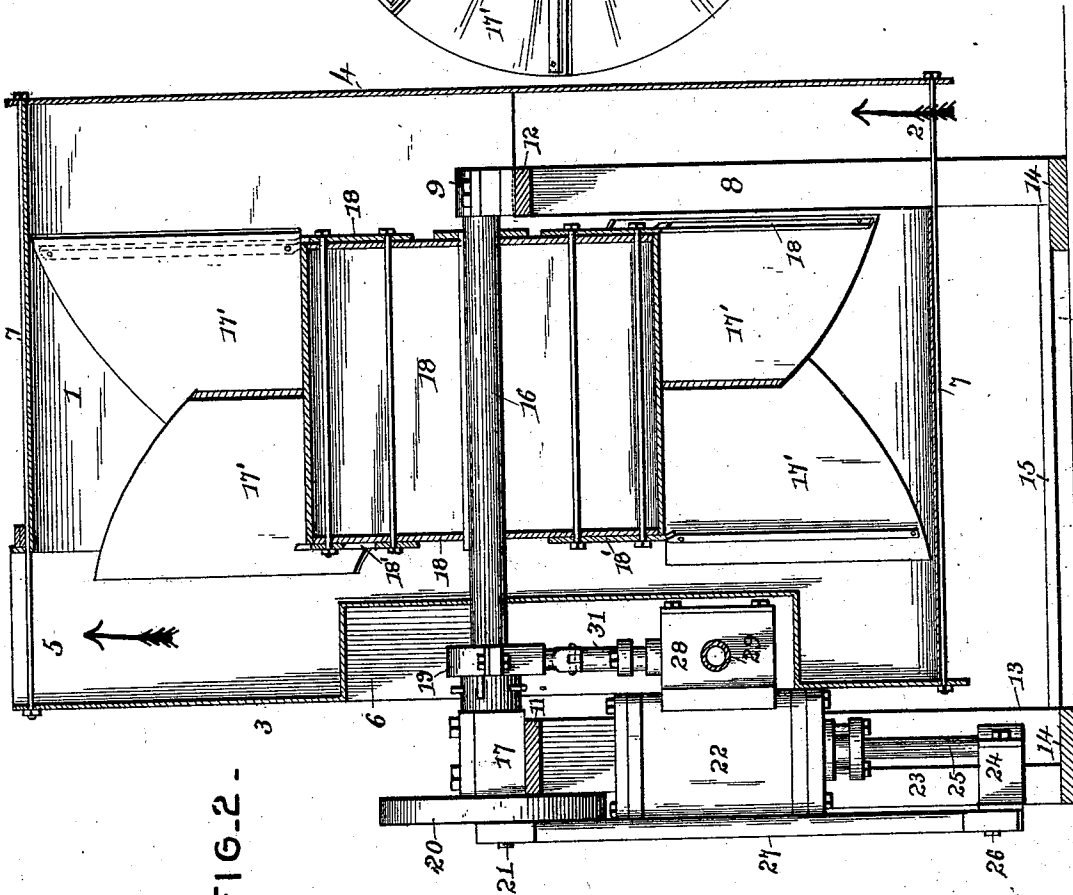


FIG. 2 -



Witnesses

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Inventor

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UNITED STATES PATENT OFFICE.

DAVID H. FISHER, OF MOUNT CARMEL, PENNSYLVANIA.

VENTILATING-FAN FOR MINES.

SPECIFICATION forming part of Letters Patent No. 511,519, dated December 26, 1893.

Application filed January 27, 1892. Serial No. 419,455. (No model.)

To all whom it may concern:

Be it known that I, DAVID H. FISHER, a citizen of the United States, residing at Mount Carmel, in the county of Northumberland and State of Pennsylvania, have invented a new and useful Ventilating-Fan for Mines, of which the following is a specification.

This invention relates to improvements in ventilating-fans, for the purpose of producing currents of air in mines, and other places.

The objects of my invention are to provide a powerful fan, so constructed as to prevent all back pressure of air, and to throw the major portion of the work of expelling the air at the outer edges of the blades, which travel faster and are more able to withstand the pressure than the inner portions, to avoid the use of belting or other gearing for the purpose of driving the fan, and provide a simple engine conveniently embodied in the framework of the fan, said engine being so constructed as to economize space, reduce friction, and operate the fan at a high speed.

Other objects and advantages of the invention will appear in the following description, and the novel features thereof will be particularly pointed out in the claim.

Referring to the drawings:—Figure 1 is a perspective of a ventilating-fan constructed in accordance with my invention. Fig. 2 is a section of the same, the engine being shown in side elevation. Fig. 3 is an end view of the fan-wheel. Fig. 4 is a perspective in detail of one of the blades, and a portion of the hub.

Like numerals of reference indicate like parts in all the figures of the drawings.

1 designates a cylindrical casing, which at its lower corner and rear side is open, forming an inlet 2. The casing is provided with a front head 3, and a rear head 4, and diagonally above the opening 2 is provided with a discharge-opening 5. The front head 3 is provided with a pocket or countersunk portion 6, near its center, and the opposite heads 3 and 4 are connected at intervals by tie-rods 7. In the opening 2 at the rear side of the casing, there is located the upper portion of a bearing-standard 8, having a journal-box 9, surmounting the same. A pair of side bars 10 embraces the opposite longitudinal sides of the casing, and their extremities are con-

nected by a front transverse bar 11 and a rear transverse bar 12, the overlapping ends of these bars being bolted to the bars 10. The bar 12 is supported at its center upon the standard 8, while the front bar 11, which traverses the front face of the head 3 of the casing, is supported upon a front standard 13. These standards rest upon transverse sills 14, and they in turn are connected by a pair of connecting-sills 15, the parts being bolted as shown to form a firmly braced bearing support for the shaft 16. The shaft 16 is journaled in the bearing-box 9 and in a corresponding box 17, the latter surmounting the standard 13 and the bar 11 at the front of the casing, said shaft passing through the front wall of the casing within the countersunk recess 6. Upon the shaft 16 there is rigidly mounted, and adapted to revolve therewith, a hollow cylindrical hub 18, which is of a diameter equaling one-third of that of the interior of the casing. The periphery of this hub is spirally traversed, at intervals, with separate parallel blades or wings 17', which are diagonally-disposed with relation to the axis of the hub, and are secured thereto by pairs of opposite radiating standards or arms 18', bolted to the opposite ends of the hub and projecting a distance beyond the periphery of the hub equal to the width of the blades or wings 17', so as to firmly brace the same in their edge-wise position on such hub, as shown. At the inner side of the bearing 17, the shaft 16 is provided with an eccentric disk 19, disposed inside the casing pocket 6, and beyond said bearing is further provided with a cranked disk 20, having the pin 21. Bolted between the upper portions or sections of the standard 13, is a steel cylinder 22, and below the same is located a pair of vertical guides 23, which as shown are bolted to the sill 14 and the standards 13. Upon these guides there is mounted for reciprocation the sliding head 24, the opposite edges of which are rabbeted, as shown, to fit the guides. The head is secured to the outer end of the piston-rod 25, and is provided with the usual wrist-pin 26. 27 designates the upright connecting-rod, the upper end of which is loosely connected with the crank-pin 21 and the lower end of which is loosely connected with the wrist-pin 26. By this arrangement it will be

seen that the connecting-rod of the engine does not increase the length of the same, but being disposed alongside the steam cylinder, occupies the same longitudinal space as the cylinder, piston and head do. At the rear side of the steam cylinder and inside of the casing pocket or countersink the valve chest 28 is located, to which steam is directed by the steam-supply pipe 29, leading from any suitable source of supply. From the upper side of the cylinder leads the exhaust-pipe 30. The valve-rod 31 extends from the upper end of the valve-chest and is connected in the usual manner with the eccentric 19, and is also arranged in the pocket 6. By reason of this specific arrangement of the motor devices a portion of which are disposed in the casing pocket or countersink 6, very little space is taken up, while at the same time permitting the mounting of a powerful high-speed motor. The location of the engine cylinder under the crank disk 20, necessarily disposes the connecting rod in an upright position, and gives the same a long sweep while at the same time taking the heavy bearing or friction off of the guide.

This completes the construction of the fan, and the operation of the same will be readily understood from the foregoing description, but may be briefly stated as follows:—Steam passing into the engine operates the same in the usual manner, and through the medium of its connecting-rod rotates the crank-disk of the fan-shaft 16. The rotations of the shaft operate the valve-rod and valves of the chest, so as to admit steam at proper intervals into the steam cylinder. The hub being solid, or closed and occupying such a large proportion of the cylindrical casing, prevents back pressure, and the air is only operated upon by the blades which are at the periphery of the hub, and consequently traveling faster than the same. The air is drawn in through the inlet-opening 2, and is forced out through the opening 5, and may be directed from thence into a mine or other place requiring fresh air. By

simply reversing the engine, a suction is produced and the fan will be found valuable where the mine becomes foul, for the purpose of drawing the foul air therefrom.

The construction of engine herein shown is best adapted for this machine, in that it occupies but small space, is capable of being run at high rates of speed, and producing but very little friction, and for the further reason that it is always ready in position for instant use, requiring no belting or other gearing to wear or become impaired, but simply to admit of the supply of steam.

Having described my invention, what I claim is—

As a new article of manufacture, a ventilating fan for mines comprising a stationary cylindrical casing having diagonally-opposite inlet and outlet openings disposed respectively at the lower and upper edges of the heads of the cylinder, an axial fan-shaft journaled in bearings in the heads of the casing, a hollow cylindrical hub fixed to the said shaft with its ends arranged respectively adjacent to the heads whereby the length of the hub lies between the vertical planes passing through the inner sides of the openings a series of radiating standards or arms secured to the hub and terminating adjacent to the rim of the casing, and a series of independent parallel blades or wings secured to diagonally-opposite standards or arms and disposed spirally or diagonally upon the periphery of the hub from end to end thereof, each blade extending one-fourth around the hub and contiguous blades overlapping each other to form a continuous double series, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

D. H. FISHER.

Witnesses:

F. A. SMITH,
A. S. CLARKSON.