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W. CLIFFORD.  
VENTILATING FAN STRUCTURE.

APPLICATION FILED JUNE 8, 1903.

NO MODEL.

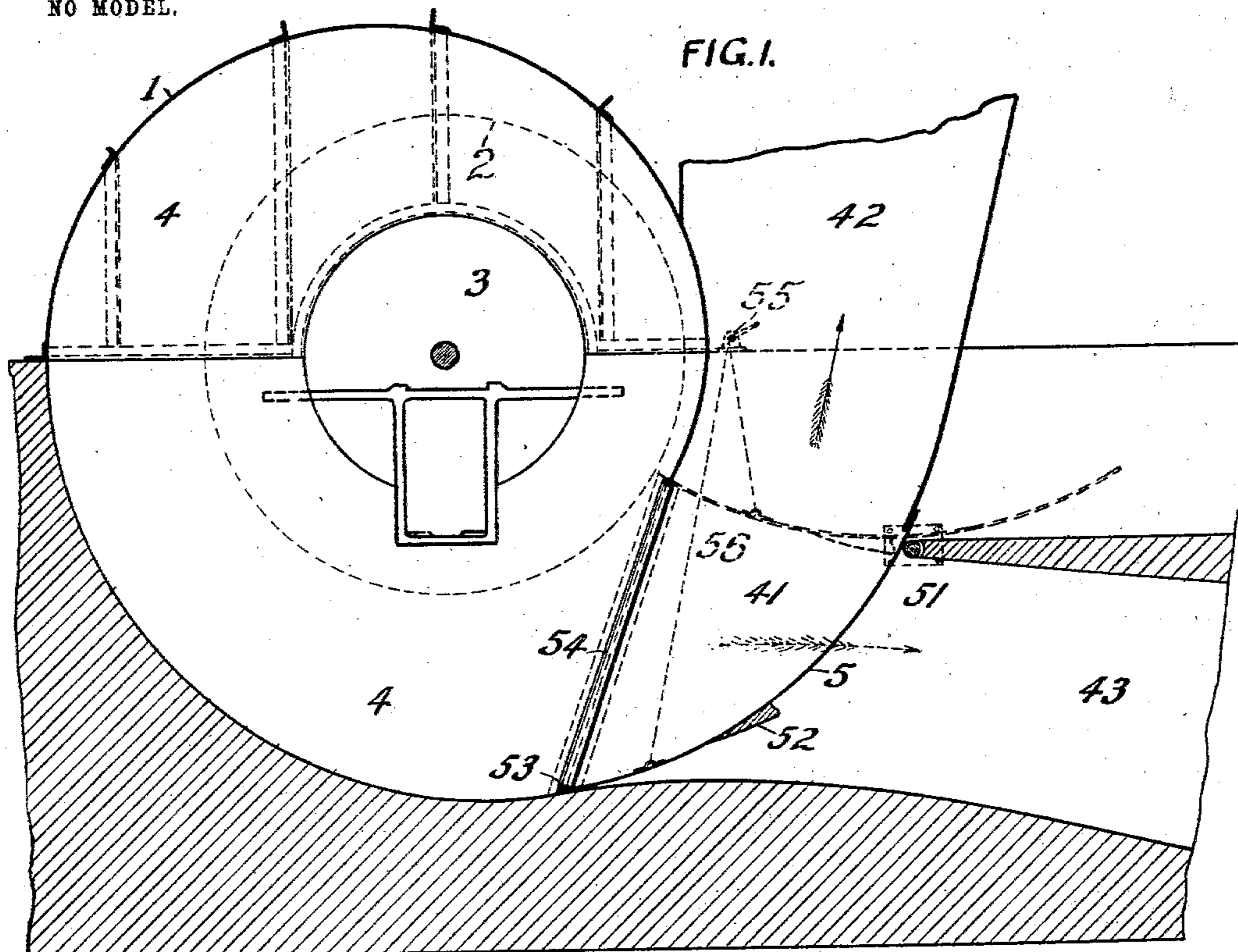
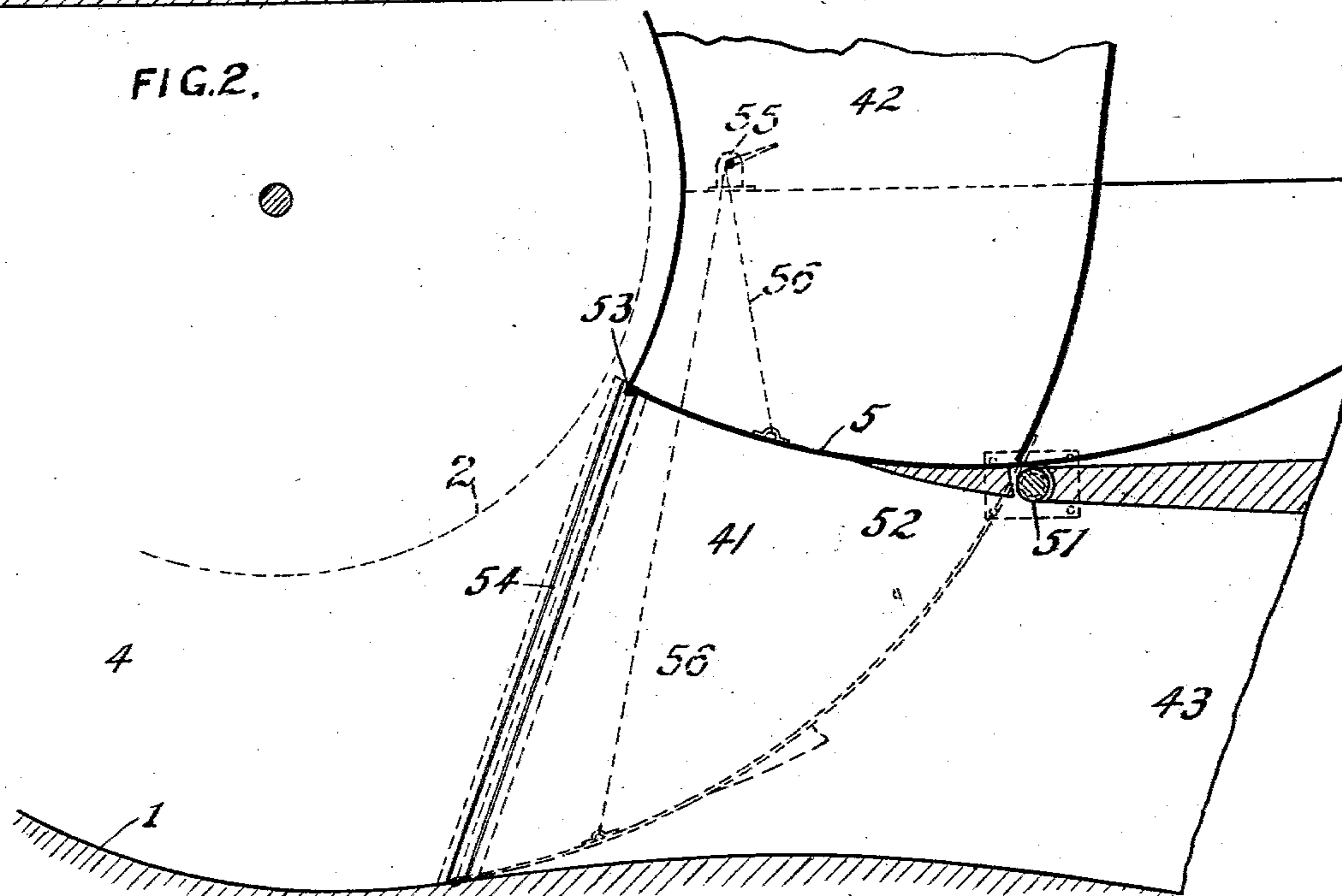


FIG. 2.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

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## VENTILATING-FAN STRUCTURE.

SPECIFICATION forming part of Letters Patent No. 752,956, dated February 23, 1904.

Application filed June 8, 1903. Serial No. 160,599. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM CLIFFORD, a citizen of the United States, residing at Jeannette, in the county of Westmoreland and State of Pennsylvania, have invented or discovered certain new and useful Improvements in Ventilating-Fan Structures, of which improvements the following is a specification.

My improvements concern the construction of centrifugal-fan apparatus.

The object of my invention is a construction of the discharge-passages from such a fan—a construction such as to increase the efficiency of the fan.

The fan to which my invention appertains is one of a class which are primarily used for ventilating purposes—to impel a current of air to and from a mine, a building, or other place requiring ventilation. A centrifugal fan is a fan of rotary type. It takes its supply of air through an axially-arranged opening or openings and discharges the current of air which it generates from its periphery. The delivery-chamber of such a fan is commonly of spiral form, and from the delivery-chamber the current of air is led off. It is common in the installation of these fans to provide two passages leading from the delivery-chamber, the one leading to the place to be ventilated, the other opening to the atmosphere, and to provide a valve capable of moving to close one or the other of these two passages and at the same time to leave the other passage open. It is to the construction of these passages and this valve that my invention is directed. This alternative discharge-passage finds its most important use when coöperating with a plurality of passages leading to the fan on its supply side. These fans are commonly constructed so that they may take air either directly from the atmosphere or through a passage from the place to be ventilated. When taking air directly from the atmosphere, a proper location of the valve on the discharge side of the fan will cause the current to flow to the place to be ventilated, and when the fan is taking air from the place to be ventilated a proper shifting of the valve will cause the current to be discharged directly to the atmosphere. In the former case the fan acts

as a blowing-fan. In the latter it acts as an exhaust-fan.

In the accompanying drawings, which form part of this specification, Figure 1 is a view in vertical section of the casing of a centrifugal fan having my improvement embodied in its construction. Fig. 2 is a similar view, on larger scale, of a portion of the construction.

Parts which are shown in both figures bear the same reference-numerals in each.

The fan-casing 1 is adapted to receive a rotary fan. The position of the fan is indicated by the circle 2. Between the fan and the casing a spiral delivery-chamber 4 is formed. An orifice 3 in the casing adjacent to the axle of the fan serves to supply air. It will be understood that the supply of air may be taken either from the atmosphere or from a place to be ventilated. Particular means of effecting this alternative supply are well known in the art and are not detailed here. The delivery-chamber 4 opens through a throat 41 into a chimney-passage 42. From throat 41 a conduit 43 also leads. This conduit conveys the air-current to the place to be ventilated when the fan is blowing, and I shall refer to it hereinafter as the "blowing-passage." In throat 41 a valve or door 5 is placed, and this valve or door is so arranged that within its range of movement it obstructs alternately the passage to chimney 42 and the passage to conduit 43, leaving the other passage open to the flow of the current.

It has been found that to obtain the best results the chimney-passage should in shape approximate a spiral continuous with the delivery-chamber and that the blowing-passage should be choked or constricted. The contour of the spiral, the degree of its "flare," is a matter dependent on the "temperament" of the particular mine. ("Temperament" is a term which indicates the resistance which a mine offers to the ventilating-current.) It has heretofore been a problem in constructing these fans to maintain the contours of the chimney-passage and the blowing-passage in their most effective proportions. The door should be so constructed that when closing the blowing-passage and leaving the chimney-passage open it will conform to the spiral wall of

the passage; but when so constructed its length has been a source of difficulty, for in its alternate position it must span the chimney-passage, and the length of that span is commonly less than  
 5 the span of the blowing-passage upon the line of the spiral wall of the chimney-passage. In order to meet this difficulty, a departure from the preferred passage contours has been resorted to, and the construction of the door  
 10 itself has been modified; but the difficulty has not been overcome heretofore with entire satisfaction.

In my improved construction the door 5 has a general curved contour, such that when lowered to close the blowing-passage and leave  
 15 the chimney-passage open it substantially conforms to the wall of the spiral passage. Door 5 rests upon a support 51, (which may be and preferably is a roller suitably disposed at or  
 20 near the upper end of the door,) and the lower end of the door is supported when in its two operative positions in any desired manner, as by the mechanism presently to be described. The position of support 51 relative to the wall  
 25 of chimney-passage 42 is such that as door 5 is raised from the position shown in full lines in Fig. 1 and in dotted lines in Fig. 2 to the position shown in full lines in Fig. 2 and in dotted lines in Fig. 1 the door swings and  
 30 slides upon the support and a portion of it retires over the support and extends outside of the throat, as the drawings indicate. In consequence of this construction I am able to employ the preferred contours of the several pas-  
 35 sages unmodified and am able to employ a door which conforms to the spiral passage-wall when the chimney is open. My improved door possesses the further advantage that when it is raised and blowing-passage 43 is  
 40 open the convex side of the curved door is outward, and this curvature may be advantageously employed as a constriction of the opening to the conduit.

In order to avoid the formation of an eddy  
 45 in the gullet at support 51 when blowing-passage 43 is open, I form upon the under side of door 5 a shield 52, adapted to be adjacent to support 51 when the door is raised and to deflect the stream as it passes support 51.

50 My preferred means of operating the door are indicated in the drawings. Guides are provided to control the movement of the door. These guides are preferably constructed as shown. Arms 53 project from the edges of  
 55 door 5 upon either side and into channels 54,

formed in the passage-wall and arranged so as to bring door 5 to its two operative positions as it is raised and lowered. Ropes and winches (indicated at 55 and 56) may be employed to raise and lower the door and hold  
 60 it supported in its operative position.

I claim herein as my invention—

1. In a centrifugal-fan construction, a delivery-chamber, a chimney-passage, and a blowing-passage, in combination with a door adapted to control said passages, and a support for  
 65 said door, the said door being movable laterally and longitudinally on its support, substantially as described.

2. In a centrifugal-fan construction, a delivery-chamber, a chimney-passage, and a blowing-passage, in combination with a swinging  
 70 and sliding door having a curvature whereby when in position across the blowing-passage it forms a continuation of the spiral wall of  
 75 the chimney-passage and when in position across the chimney-passage it forms part of the constricted gullet in the blowing-passage, substantially as described.

3. In a centrifugal-fan construction having  
 80 a delivery-chamber, a chimney-passage, and a blowing-passage, the combination of a door adapted to control said passages, a support for said door, and a shield formed upon said door adapted when the door is in position to close  
 85 the chimney-passage to stand in operative relation to the support, substantially as described.

4. In a centrifugal-fan construction having a delivery-chamber, a chimney-passage, and a blowing-passage, the combination of a swing-  
 90 ing and sliding door adapted to control said passages, a support for said door upon which said door is adapted to swing and slide, and means for swinging and sliding said door to its several operative positions, substantially  
 95 as described.

5. In a centrifugal-fan construction having a delivery-chamber, a chimney-passage, and a blowing-passage, the combination of a swing-  
 100 ing and sliding door adapted to control said passages, a support for said door upon which the said door is adapted to swing and slide, and guides adapted to control the movement of the door, substantially as described.

In testimony whereof I have hereunto set my  
 105 hand.

WILLIAM CLIFFORD.

Witnesses:

F. E. GAITHER,  
 BAYARD H. CHRISTY.