

No. 771,461.

PATENTED OCT. 4, 1904.

W. CLIFFORD.
VENTILATING FAN STRUCTURE.

APPLICATION FILED JUNE 8, 1903.

NO MODEL.

FIG. 1.

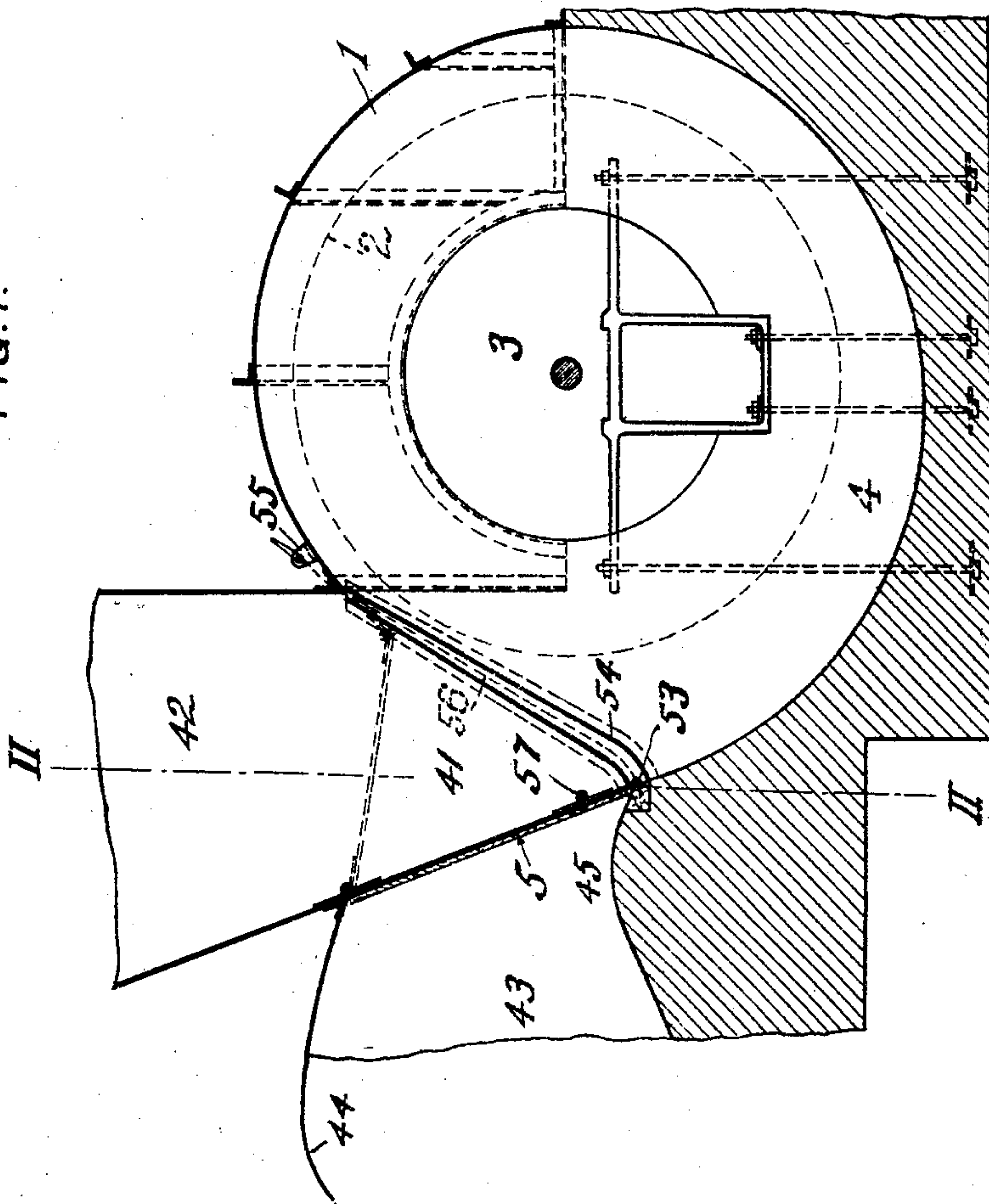
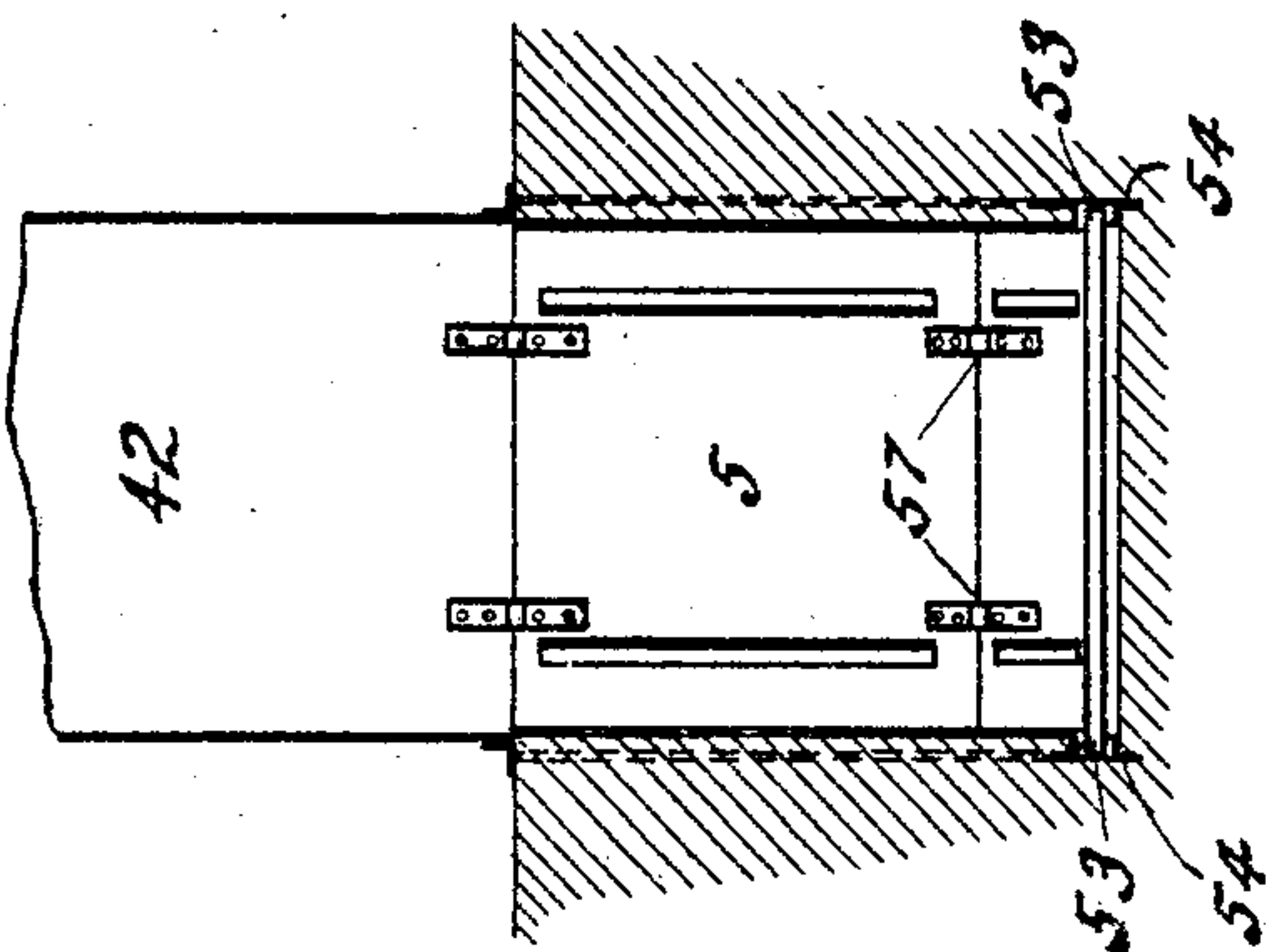


FIG. 2.



WITNESSES:

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VENTILATING-FAN STRUCTURE.

SPECIFICATION forming part of Letters Patent No. 771,461, dated October 4, 1904.

Application filed June 8, 1903. Serial No. 160,598. (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 invention concerns the construction of a centrifugal-fan apparatus.

The object of my improvements is a construction of discharge-passages 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 or 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 from its periphery the current of air which it generates. The delivery-chamber of such a fan is commonly of spiral form. 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 and the other opening to the atmosphere, and to provide a valve adapted to be shifted to close one or the other of these two passages and at the same time to leave the other passage open. This alternative discharge-passage is commonly used in coöperation with a plurality of passages leading to the fan on its supply side. The fans are commonly so constructed that they may take air either from the atmosphere or from the place to be ventilated. When taking air from the atmosphere, a proper location of the valve which controls the discharge 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. It is to the construction of the discharge-passages of such a fan and of the

valve which controls them that my invention is directed.

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 structure. Fig. 2 is a view in vertical section on the line II II, Fig. 1.

Parts 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 its casing the 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 by means of apparatus known to the art and not here shown be taken either from the atmosphere or from a place to be ventilated. From delivery-chamber 4 two passages 42 and 43 lead—the one, 42, to the atmosphere, and the other, 43, to the place to be ventilated. These passages will be herein respectively termed the “foul-air” or “chimney” passage and the “fresh-air” passage. A valve 5, placed in the throat 41 of the delivery-chamber 4, is adapted to swing and to obstruct at the will of the operator either the chimney-passage or the fresh-air passage, leaving the other passage open to the flow of the current of air from the fan.

It has been found that to obtain the best results the foul-air or chimney passage should in shape approximate a tangential continuation of the spiral delivery-chamber and that the opening to the fresh-air 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.) The chimney-passage being formed as a substantial continuation of the spiral delivery-chamber, (as the drawings show it,) the fresh-air passage 43 leads off laterally. In order to eliminate in such an arrangement the eddy-currents which

otherwise would be formed in the stream of air as it flows from the delivery-chamber 4 into this laterally-arranged fresh-air passage 43, the farther wall of the fresh-air passage—
 5 that is, the wall upon which the force of the stream of air is directed as it turns—is recessed, as indicated at 44, and in the nearer wall a rounded abutment 45 is formed, which projects into the passage. It will be observed
 10 that this abutment 45 increases the constriction of the opening to the fresh-air passage.

The valve which controls the flow of current from the delivery-chamber to the chimney-passage and to the fresh-air passage is in
 15 practical form a door swinging in the throat of the delivery-chamber, preferably so constructed that when the chimney-passage is open it will conform to and form a practically continuous part of the spiral wall; but when
 20 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 the span of the fresh-air passage upon the line of the
 25 spiral wall of the chimney-passage. I have heretofore devised and operated a flexible door hinged intermediate its length, which when the fan is exhausting forms a part of the continuous spiral walls of the delivery-
 30 chamber and chimney-passage and when the fan is blowing is bent upon its hinge and forms part of the wall of the fresh-air passage. Heretofore I have not been able to operate such door with entire success.

35 In my improved construction I employ a flexible door 5, hinged in the throat of the delivery-chamber and adapted to swing to close either the chimney-passage or the fresh-air passage. This door has a general contour
 40 such that when lowered to close the fresh-air passage and leave the chimney-passage open, as indicated in full lines in Fig. 1 of the drawings, it conforms substantially to the spiral passage-wall. When raised, in consequence
 45 of its flexibility, it is adapted to span and close the chimney-passage, forming at the same time part of the gullet-wall of the fresh-air passage. This is indicated in dotted lines in Fig. 1. I preferably accomplish this flexi-
 50 bility by hinging door 5 at some point intermediate its length, as shown at 57. The drawings show the hinge 57 so placed that when the door is in raised position it forms a continuation of the farther wall of the fresh-
 55 air passage, thus cooperating with the recess 44 to turn the stream without retarding its flow.

I provide means for controlling the movement of the door in swinging from one operative position to the other. The means consist of arms and channels arranged to engage
 60 one another, one member of each coacting pair being formed in the edge of the door and

the other in the adjacent passage-wall. One member of each pair is tapered in such manner that when the door is in the lowered position (shown in Fig. 1) some lateral play is allowed between the arms and channels; but as the door is raised to the position indicated by dotted lines in Fig. 1 this play is restricted and the door is brought to definite position. As the drawings show, I preferably form arms 53 upon either edge of door 5 at points anterior to hinge 57 and tapered channels 54 in the adjacent passage-walls arranged for cooperation with arms 53 in the manner already described. Winches and ropes (indicated at 55 and 56) may conveniently be employed to raise and lower the door and support it in operative position.

I claim as my invention—

1. In a centrifugal-fan construction, the combination of a spiral delivery-chamber, a chimney-passage leading from the delivery-chamber in an approximately tangential direction, a fresh-air passage leading laterally from the delivery-chamber recessed to receive and deflect a stream of air, and a flexible door conforming when in one operative position to the wall of the chimney-passage and when in
 85 another operative position to the wall of the fresh-air passage, substantially as described.

2. In a centrifugal-fan construction, the combination of a spiral delivery-chamber, a chimney-passage leading from the delivery-chamber in an approximately tangential direction, a fresh-air passage leading laterally from the delivery-chamber recessed to receive and deflect a stream of air, a flexible door conforming when in one operative position to the wall of the chimney-passage and when in another operative position to the wall of the fresh-air passage, means for shifting said door to its several operative positions, and means for controlling said door in its movement, substantially as described.

3. In a centrifugal-fan construction, the combination of a spiral delivery-chamber, a chimney-passage leading from said delivery-chamber in an approximately tangential direction, a fresh-air passage leading laterally from said delivery-chamber, said fresh-air passage being recessed to receive and deflect a stream of air as it enters from the delivery-chamber, and a swinging door controlling communication from the said delivery-chamber to the said passages, substantially as described.

4. A centrifugal-fan construction having in combination with its spiral delivery-chamber a foul-air passage, a fresh-air passage, and a door; the said foul-air passage forming a tangential continuation of the spiral delivery-chamber, the said fresh-air passage opening laterally from the delivery-chamber adjacent to the opening of the latter into the foul-air passage, its walls provided with a recess and

an abutment oppositely placed and adjacent to the opening from the delivery-chamber; and the said door adapted to control communication from the delivery-chamber to the
5 foul-air passage and to the fresh-air passage, substantially as described.

5. A centrifugal-fan construction having a delivery-chamber, a foul-air passage, a fresh-air passage, and a flexible swinging door
10 adapted to control said passages, in combina-

tion with arms extending from the edges of said door, and tapered channels formed in the passage-walls, substantially as described.

In testimony whereof I have hereunto set my hand.

WILLIAM CLIFFORD.

Witnesses:

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BAYARD H. CHRISTY.