

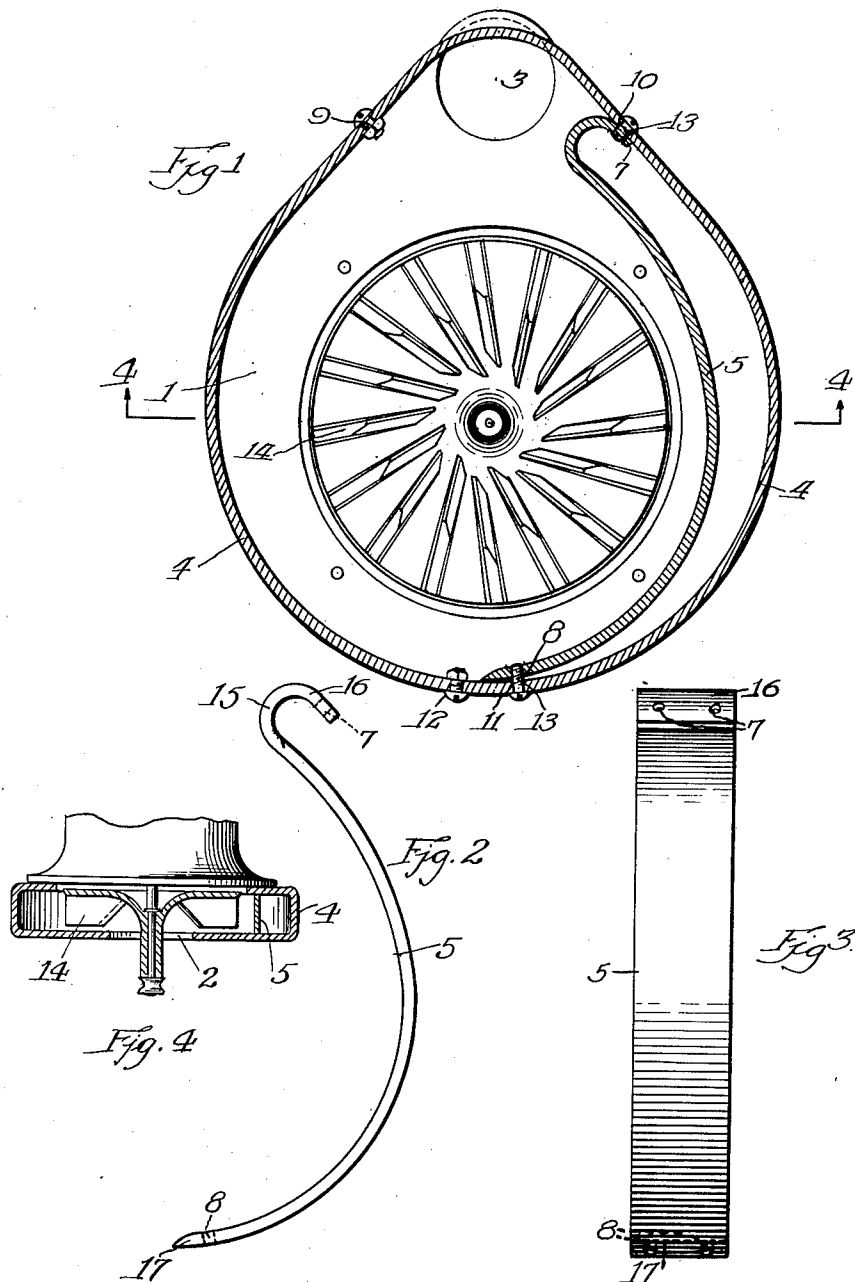
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FAN CASING

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FAN CASING

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This invention relates to fan chambers and more particularly to fan chamber elements adapted to be positioned within a fan chamber having an inner periphery of constant radius, said element being further adapted to be placed in a plurality of positions within said fan chamber, resulting in the determination of the angular advance of the volute.

In manufacturing it is desirable whenever possible to standardize through the elimination of unnecessary sizes and designs. The use of the present invention in the manufacturing of fan casings permits of the use of one type of fan casing regardless of the direction in which the fan is to revolve therein. As is well known in the art the angular advance of the volute is in the direction of rotation of the fan and so it follows that some means must be provided to adapt the standard fan casing to either clockwise or counter clockwise rotation. The present invention requires the use of only a simple member readily manufactured in large quantities and which is adapted to be positioned in a standard fan chamber with ease.

An object of the present invention is to provide a fan chamber element which permits of the use of a standard fan casing for fans having either clockwise or counter clockwise rotation. A further object of the invention is to provide a member adapted to be positioned within a fan chamber having an inner periphery of substantially constant radius throughout, which will permit of the use of said fan chamber with fans having either clockwise or counter clockwise rotation. A still further object of this invention is the provision of a member through the use of which a standard fan casing may be used with fans having either clockwise or counter clockwise rotation.

Referring now to the drawings in which like parts are indicated by the same reference characters throughout:

Figure 1 is a cross section through a fan chamber having a circular inner periphery with the fan chamber element positioned therein and showing the fan in place.

Figure 2 is a side view of the member

adapted to convert a standard circular fan chamber into a structure having either clockwise or counter clockwise volutes.

Figure 3 is a front view of Figure 2.

Figure 4 is a cross section on the line 4-4 of Figure 1.

Referring now to Figure 1 in particular the reference character 1 indicates a fan chamber comprising a main circular portion having a wall 4 which at one point departs from the otherwise circular formation to encompass the exhaust outlet 3. The inlet opening of the fan chamber is designated by the reference character 2 (see Figure 4) and is situated upon the center line thru the outlet 3 which bilaterally bisects the casing with its center somewhat lower than the center of the circular casing. Spaced in the walls 4 at intervals are openings designated by the reference characters 9, 10, 11 and 12 which are adapted to function as hereinafter described.

Positioned within and located eccentrically of the fan chamber 1 with its center coinciding with that of inlet 2 is the fan 14 which functions to draw air through the opening 2 into the chamber 1 and exhaust same through the outlet 3. Because of the smaller radius of the fan than the enclosing casing and because the fan center is below the center of the casing, spirals or volutes of increasing size are formed on each side of the fan starting from the point diametrically opposite the exhaust outlet and increasing in size in the direction thereof. In the operation of the fan the center of the fan chamber is the point of minimum pressure while the maximum pressure is found at the periphery thereof and it follows that in the well designed fan the air inlet is at the center point of the fan and the exhaust outlet at some point at the periphery. The tendency is for the air drawn through the inlet port to the fan center to be exhausted at all points around the circumference of the fan but as it is desirable to have only one outlet opening situated at some one point around the periphery it is necessary to direct the air exhausted at other points of said circumference to that point. To accomplish this result the ordinary fan

chamber is built with a casing which is not a circle at its inner periphery but which is instead a spiral of Archimedes which has an equation $R=r$ plus $K\alpha$, where R is the straight line distance from the center of the wheel to any given point on the curve, r the radius of the wheel, α the angle of advance in radians, and K a constant. The construction of such a casing around the fan permits of an air passage which uniformly increases in area at all points up to the outlet. Such a construction is possible where the direction of rotation of the fan is known and presents no difficulties in design. The fan casing and the element therefor forming the subject matter of this invention is adapted to care for those cases in which the direction of rotation of the fan is not known or may be reversed. To accomplish this purpose it is necessary to provide means through which the direction of angular advance of the volute or spiral of Archimedes forming the air passage may be changed, that is reversed, for fans having opposite directions of rotation. This result is obtained through the provision in a fan chamber proper which has an inner periphery which has a circle as its curve of a reversible fan chamber element designated by the reference character 5 which is shown in the drawings in Figures 2 and 3. The member 5 is an extremely simple element being composed of a strip of thin metal which is, however, formed in a very definite manner. The forward end 15 of the reversible element is curved back and provided with a lip 16 approximately parallel to the front face of the element proper at that point. As the element is adapted to fit within a fan chamber having a definite radius a circle having the radius of said fan chamber would pass through the point 16 and the opposite end of the element 17. The center of a circle passing through these two points is also the locus of the spiral of Archimedes on the curve of which the forward face of the element 5 is constructed.

Referring again to Figure 1 it is seen that the element 5 is shown in position inside of the fan chamber 1 and secured to the walls 4 thereof by screws 13 which pass through the openings 10 and 11 of said walls into openings 7 and 8 of the member 5 fixedly securing said member in place. With the member positioned as shown in Figure 1 the fan chamber is adapted for clockwise rotation of the fan only, the air passage at the periphery of the fan increasing in area from a certain point on member 5 around to the end of the member in a manner identical to that which would be the case had the volute been constructed as part of the fan casing proper or, expressed somewhat differently, had the fan casing upon the opposite side been continued decreasing in radius at the same rate from the fan center.

In the event that it is desired that the fan should rotate in a counter clockwise direction the member 5 would be positioned on the opposite side of the fan chamber and secured by screws fastened through the openings 9 and 12 instead of the openings 10 and 11 as shown in Figure 1. The openings of the walls 4 of the fan chamber not being used to secure the element 5 in place are closed by means of screws or plugs.

From the foregoing it is seen that in a fan chamber constructed in accordance with this invention new and novel means are provided through the use of which a fan having either clockwise or counter clockwise rotation may be accommodated. The chamber is so formed and the element therein so arranged that the change from one form to the other may be accomplished with a very small effort and time expenditure. The structure when assembled, however, has the advantages of a fan chamber designed to care for rotation in one direction only as there are no projections or cavities resulting in unnecessary eddies in the air current.

I claim:

1. In combination with a fan and fan chamber having an enclosing wall relative to which said fan is eccentrically positioned, a reversible fan chamber element adapted to be secured to said wall to form an air passage in said fan chamber.
2. In combination with a fan and fan chamber enclosing said fan an air directive element adapted to be secured within said fan chamber in one of a plurality of circumferentially spaced positions to form a spiral air channel therein.
3. In combination with a fan and fan chamber enclosing said fan, said fan chamber having a circular inner periphery substantially throughout its length, a reversible air directive element adapted to be positioned within said fan chamber in one of a plurality of positions to adapt said fan chamber for clockwise or counter clockwise rotation of said fan.
4. In combination with a fan chamber having an inlet port located substantially centrally thereof and an outlet port at one side thereof, a reversible fan chamber element adapted to be placed in one of a plurality of positions within said fan chamber and forming therein a volute having its direction of angular advance toward the outlet port.
5. In combination with a fan, a fan chamber having an enclosing wall in which said fan is eccentrically positioned, and means adapted to be positioned within said fan chamber in one of a plurality of positions to form between its inner wall and the periphery of said fan a circumferentially varying air passage.
6. In combination with a fan chamber having an eccentrically located inlet port and a

marginal outlet port, said chamber being substantially bilaterally symmetrical relative to the central plane through said inlet and outlet ports, a fan, and a separate air directive member within said fan chamber and forming on one side of the central plane a volute having its direction of angular advance toward the outlet port.

7. A circular fan casing having an inlet and an outlet, a circular fan eccentrically positioned within said casing so that the walls of said casing are increasingly spaced from the periphery of said fan from a particular point forming oppositely directed volutes, and means adapted to be selectively positioned in said fan casing in one of a plurality of positions to form a continuation of one of said volutes.

8. A circular fan casing having an inlet and an outlet, a circular fan eccentrically positioned within said casing so that the walls of said casing are increasingly spaced from the periphery of said fan from a particular point forming oppositely directed volutes, and a separate air directive member within said fan chamber adapted to be selectively positioned in said fan casing in one of a plurality of positions to eliminate one of said volutes and to form a continuation of the other.

Signed at North Canton, in the county of Stark and State of Ohio the 11th day of January, A. D. 1929.

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