D. STANYO.

FAN WHEEL.

APPLICATION FILED OCT. 30, 1917.

1,352,848.

Patented Sept. 14, 1920.

Fig. 1.

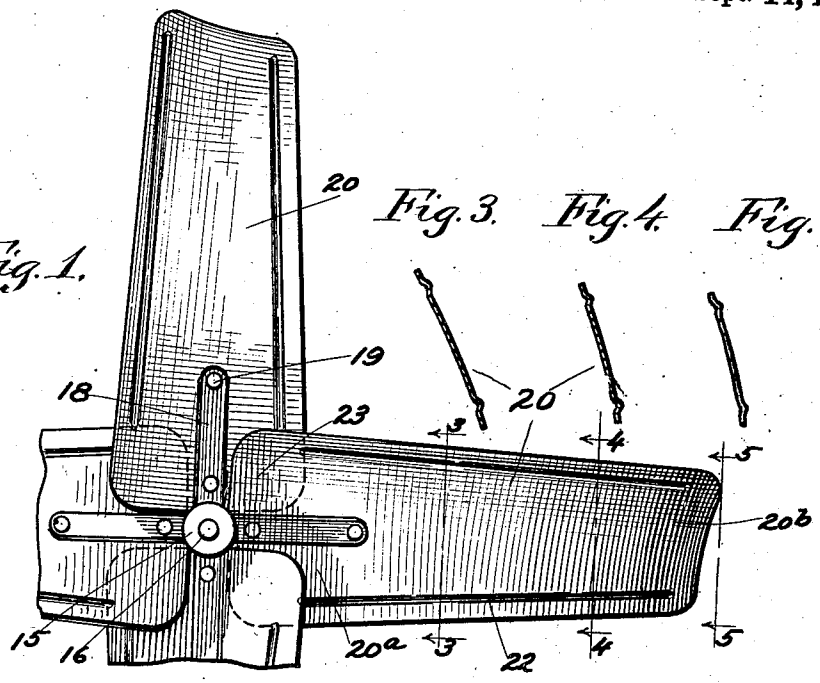


Fig. 3.

Fig. 4.

Fig. 5.

Fig. 2.

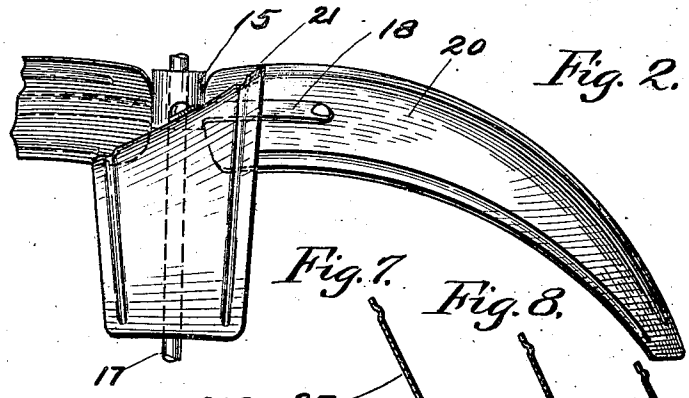


Fig. 7.

Fig. 8.

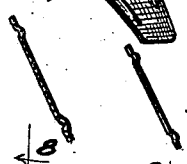


Fig. 9.



Fig. 6.

Witness

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UNITED STATES PATENT OFFICE.

DESIDER STANYO, OF MILWAUKEE, WISCONSIN.

FAN-WHEEL.

1,352,848. Specification of Letters Patent. Patented Sept. 14, 1920.

Application filed October 30, 1917. Serial No. 199,249.

To all whom it may concern:

Be it known that I, DESIDER STANYO, a subject of the King of Hungary, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Fan-Wheels, of which the following is a specification.

This invention relates to an improved fan wheel for use in ventilating fans, or in other devices in which a wheel of the general character of a fan wheel is desired.

The principal object of the invention is to provide an improved fan wheel which will project a substantially cone-shaped current of air. Another object is to provide an improved fan wheel of the kind referred to in which the intensity of the air current at points equidistant from the apex of the cone-shaped current is substantially uniform. By curving the outer ends of the fan blades away from a plane normal to the axis of rotation and containing the inner ends of the blades, it is possible to produce a current of air from the fan having substantially the form of a truncated cone, so that a much larger area may be ventilated than is possible with the ordinary fans. In combination with this feature I have provided means for producing a substantially uniform intensity of the air currents throughout the cross sectional area of the zone of air which is projected by the fan. The intensity of the air current proceeding from each unit of area or differential section of the fan blade depends upon the distance of that unit or section from the axis of rotation, and also upon the inclination of that unit with respect to a plane containing the axis of rotation and passing substantially through the center line of the fan blade, which plane may be termed the plane of the generatrix. This variation in the intensity of the air current is due to the fact that the velocity of the outer end of the blade is greater than the velocity of any portion nearer the axis of rotation, while the effective surface of the blade is measured by the projection of the blade on the above mentioned plane containing the axis of rotation. Therefore, in order to attain a uniform intensity of the air current I maintain substantially uniform the product of the radius of rotation and the area of the projection of the unit of the blade upon the plane of the generatrix. Although this rule permits many variations in the shape of the fan, I have provided one novel form of fan in which the blade is decreased in width from the center outwardly to compensate for the increased velocity of the outer portions of the blade, and in combination with this improvement I also preferably vary the inclination of the various portions of the fan blade with respect to the plane of the generatrix, so that those portions of the blade adjacent the center of the fan have a relatively large inclination, and thus provide a relatively large resisting surface to compensate for the low velocity. In this way the product of the projection of each unit of area of the fan upon the plane of the generatrix and its corresponding radius is maintained substantially constant from the center of the fan outwardly.

The foregoing features of the invention, and numerous others, will be more clearly understood from the following specification, taken in connection with the accompanying drawings, in which certain embodiments of the invention are illustrated.

In the drawings—

Figure 1 shows a partial end elevation of one embodiment of my improved fan;

Fig. 2 shows a side elevation of the structure illustrated in Fig. 1;

Fig. 3 shows a sectional view, taken on the line 3—3 of Fig. 1;

Fig. 4 shows a sectional view, taken on the line 4—4 of Fig. 1;

Fig. 5 shows a sectional view, taken on the line 5—5 of Fig. 1;

Fig. 6 shows a plan view of a modified form of blade;

Fig. 7 shows a sectional view, taken on the line 7—7 of Fig. 6;

Fig. 8 shows a sectional view, taken on the line 8—8 of Fig. 6; and

Fig. 9 shows a sectional view, taken on the line 9—9 of Fig. 6.

Since the invention is capable of numerous applications I have illustrated merely the blades of the fan and the structure by which they are carried.

The fan wheel has a hub 15 provided with a central aperture 16 adapted to receive and form a fixed engagement with a driving shaft 17, or the like, and this hub has formed integrally therewith, or secured thereto, a plurality of radiating arms 18 which form supports for the blades 20. In the embodiment shown there are four of

these radiating arms, and they are inclined to correspond to the inclination of the fan blades, to which they are secured by rivets 19 or the like.

For the purpose of causing the fan to project a current of air approximating in form a cone, or a section of a cone, the blades are curved away from a plane normal to the axis of the shaft 17 and containing the hub 15, as shown in Fig. 2. This curvature of the blades substantially in a plane containing the axis of rotation may be effected by giving them a curvature corresponding to arcs of circles, or any other desired curvature, but the centers of curvature of the blades are preferably located some distance outwardly from the axis of rotation, so that the portions 21 of the blades adjacent the axis will incline inwardly away from the face of the fan, and thus cause currents of air to be projected thereby into the zone immediately in front of the hub. In order that the fan blades may resist forces arising from the rotation thereof and from the air resistance encountered thereby, ribs 22 are provided along the opposite edges of the blades, and where the blades are formed from sheet metal these ribs may be conveniently formed by pressing the metal inwardly from the front of the fan, as shown in Figs. 3, 4, and 5. By means of the construction just described, the air is drawn in on the rear sides of the fan blades, and is then projected outwardly from the front side of the fan in the form of a cone having its center at some point behind the fan and located on the axis of rotation.

The spreading of the current of air into the form of a section of a cone serves to distribute the volume of air projected by the fan, but it will be obvious that the intensity of the air current in different units of area of the cross-section will not be uniform unless special means be provided for compensating for the relatively high velocity of the outer portions of the fan blades as compared with the portions thereof adjacent the axis of rotation.

In the form of the invention illustrated in Figs. 1 to 5, inclusive, the blades are decreased in inclination from the axis of rotation outwardly, and are also decreased in width, so that the portions 20^a adjacent the axis of rotation are relatively wide. The outer portions 20^b of the fan blades are relatively narrow, and in addition each blade is given a torsional twist, so that the portion 20^b thereof lies at a greater angle to the plane of the generatrix than the portion 20^a near its center. The projection of a unit of area or differential section of the portion 20^a of each blade on a plane containing the axis of rotation and the center of the section is therefore greater than the corresponding projection of a similar unit of area of the portion 20^b of the blade. The decrease in width of the blade from the center outwardly, and the variation in inclination thereof with respect to the plane of the generatrix may be understood clearly from an inspection of Figs. 3, 4, and 5, which illustrate sectional views taken through the fan blade at different points along the length thereof. By suitably proportioning the variation in width to the variation in inclination of the different parts of the blade, it is possible to cause the projections of different parts of the blade upon a plane containing the axis of rotation and the center line of the blade to be inversely proportional to the distances from the respective parts to the axis, so that a given quantity of air will be projected from each section of the blade, and a substantially uniform intensity of the air current maintained throughout the cross sectional area of the cone-shaped zone into which the air is projected by the fan.

In addition to modifying the construction of the blades in the manner described above, I may also curve each blade between its edges, as shown in Figs. 3, 4, and 5, so that the velocity of the outgoing current of air may be increased as compared with the velocity of the incoming current, whereby a more efficient action of the fan is obtained. In Figs. 6, 7, 8, and 9 I have illustrated a modified form of the blade in which the variation in inclination of the different parts of the blade is eliminated, and the compensation for variation in velocity of the different parts is effected merely by varying the width of the blades. This blade 25 has a central portion 25^a which is relatively large in width, and an outer portion 25^b which is relatively narrow, strengthening ribs 26 being provided along the edge of the blades, as in the preceding form of construction. This blade is also curved in a plane containing the axis of rotation, in order to project a cone-shaped current of air, but the blade itself is substantially flat, as shown in Figs. 7, 8, and 9, and has a constant inclination with respect to the plane of the generatrix. Although this form of the inclination gives desirable results, I now prefer to use the form first described, by which a more perfect result may be accomplished.

Although I have shown and described certain embodiments of the invention for purposes of illustration, it will be understood that it may be constructed in various different forms without departing from the scope of the invention as defined in the appended claims.

What I claim is:

1. The combination with a hub of blades mounted thereon and radiating therefrom, the projection of each unit of length of each blade on a plane containing the axis of rotation of said hub and the center line

of the blade being inversely proportional to the distane of said unit from said axis.

2. The combination with a hub, of blades mounted thereon and radiating therefrom, said blades decreasing in width from the center of the fan outwardly and being curved rearwardly away from a plane passing through the central portions of said blades, said blades being further provided with a torsional twist, whereby the projection of each unit of length of each blade on a plane containing the axis of rotation of said hub and the center line of the blade is inversely proportional to the distance of said unit from said axis.

In testimony whereof, I have subscribed my name.

DESIDER STANYO.

Witnesses:
LASARA KARP,
FRED ESAU, Jr.