

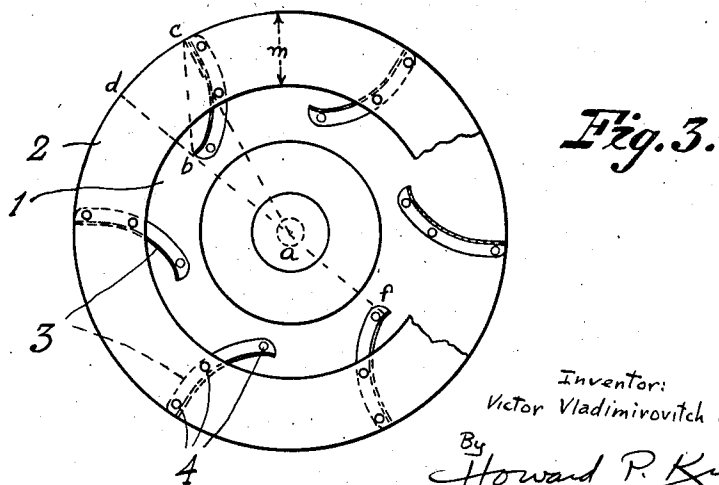
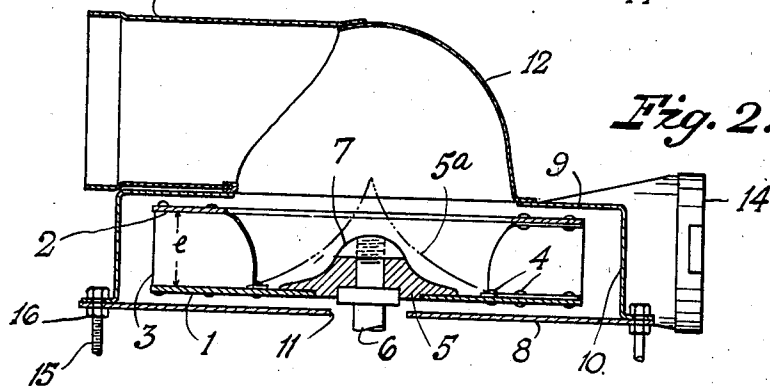
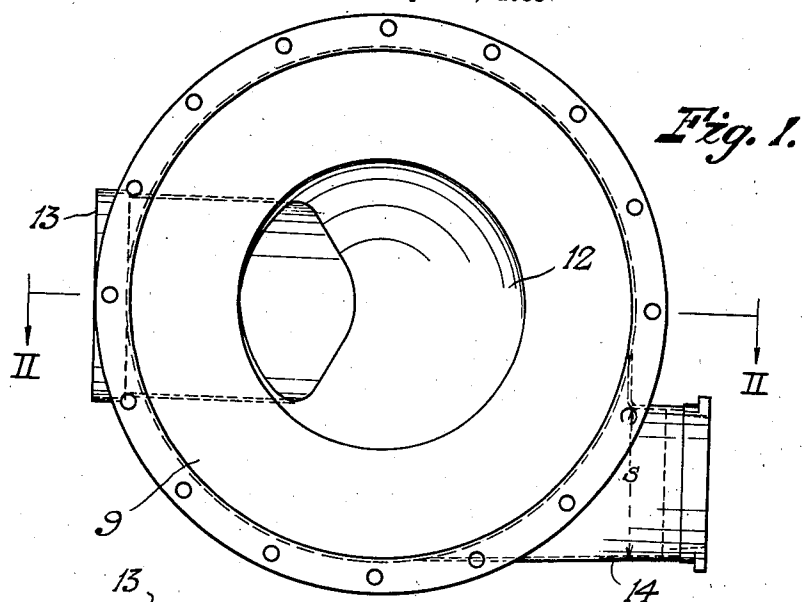
Nov. 25, 1941.

V. V. DIBOVSKY

2,264,071

ROTARY BLOWER AND EXHAUSTER

Filed Sept. 7, 1939



Inventor:
Victor Vladimirovitch Dibovsky.
By
Howard P. Kuma
Attorney.

UNITED STATES PATENT OFFICE

2,264,071

ROTARY BLOWER AND EXHAUSTER

Victor Vladimirovitch Dibovsky, London, England

Application September 7, 1939, Serial No. 293,674
In Great Britain July 19, 1938

2 Claims. (Cl. 230—127)

This invention relates to rotary blowers and exhausters for air or other elastic fluids of the kind having a rotor embodying an annulus occupied by a set of blades and a central part from which air is drawn.

The invention is based upon the discovery that such blowers and exhausters depend for efficiency upon a proper correlation of the volume of the annular space swept by the blades and that of the central part from which the air or other elastic fluid is drawn and upon the cross-section of the annular space and that, furthermore such blowers can be made capable of delivery at extremely high velocity if the blades are of suitable design and arrangement.

According to the present invention, in a rotary blower comprising a rotor embodying an annulus occupied by a set of blades and a central part from which the air or other elastic fluid is drawn, the volume of the space swept out by the blades is substantially equal to that of said central part, and the axial length of said annulus is substantially equal to the radial depth thereof.

Preferably the curvature of the rotor blades in end view decreases with distance from the axis of the rotor; thus the blades may be most suitably of parabolic curvature. For highest efficiency, as when extremely high velocity delivery is desired, the blades should be arranged so that the chords of the blades lie at an angle of not more than 35°, say between 20 and 35°, to radii drawn from the rotor axis to the outer ends of the blades, while the angle between the chords of the blade and radii to the inner i. e. the leading, ends of the blades, which will naturally be larger, should not be substantially greater than 65°.

It has been found that the number of blades employed has an important bearing upon the efficiency of the blower and that optimum results are obtained regardless of the size of the rotor by employing six blades. While the blades may in general be of uniform thickness they may if desired be of aerofoil cross-section, the latter form of blade being especially suitable for relatively large rotors.

The rotor may comprise a disc and an annular plate between which the blades are secured, the disc being provided at its centre with means for securing it to the shaft of a driving motor. Preferably the disc is also provided at its centre and on its blade-carrying face with a cusp shaped deflector, the concave face of which deflects air entering the centre portion on to the rotor blades.

In order that the air or other elastic fluid de-

livered by the blower may be utilised the rotor may be mounted within a casing comprising a disc having a central bore for the passage of the shaft of the driving motor, an annular plate and a side wall extending between the outer periphery of the annular plate and that of the disc and provided with an outlet. This side wall may be of spiral form so that its continuation after encircling the rotor forms one wall of the outlet referred to, but preferably is substantially cylindrical and co-axial with the rotor, the outlet being arranged tangentially, since by this means higher pressures may be obtained at the outlet. The disc and annular plate may be arranged quite close to the disc and annular plate respectively of the rotor and the side wall quite close to the periphery of the rotor, but such an arrangement tends to make the blower noisy in operation, a high pitched whistle developing with high rates of revolution of the rotor. Preferably, therefore, the casing is spaced somewhat from the rotor and it is especially desirable that the side wall should be situated away from the periphery of the rotor. The volume of the space between the periphery of the rotor and the side wall of the casing naturally depends upon the relative sizes of the casing and rotor and it is in general unnecessary for this volume to exceed that of the space swept by the blades, and it may be desirable, especially when the blower is intended for a high velocity delivery rather than high quantitative output, that the volume should be considerably less than this, e. g. it may be about one half of the volume of the space swept by the blades.

The cross-sectional area of the outlet from the casing at its nearest point to the rotor is preferably at least equal to that of the annular space swept by the rotor blades. The orifice in the annular plate of the casing is preferably of substantially the same diameter as that in the annular plate of the rotor so that the air or other elastic fluid entering the space at the centre of the rotor is not obstructed. This orifice may lead to an intake pipe so that the blower can be connected to a particular source of air or other elastic fluid.

The invention has been described more particularly in connection with a rotary blower and the invention is of especial importance in this connection, since it enables a blower capable of delivery at extremely high velocity to be constructed; indeed it is possible to construct a blower in accordance with the invention in which the velocity of the air or other elastic fluid as it

leaves the blades is substantially twice the peripheral speed of the rotor. However, as previously indicated, such a blower may be employed for suction purposes, i. e. as an exhaustor, with equal efficiency, and when thus employed the casing described may be omitted or may be simplified, e. g. an air intake may be arranged close to the orifice in the rotor and connected to the point at which it is desired to apply suction.

In the accompanying drawing, which illustrates an embodiment of the invention, Fig. 1 is an underneath plan view of the blower casing.

Fig. 2 is a sectional view of the assembled rotor and casing, two rotor blades being omitted for clarity, and

Fig. 3 is a plan view of the rotor.

Referring to the drawing the rotor comprises a disc 1 and an annular plate 2 between which blades 3 of substantially parabolic curvature are secured by means of rivets 4. The blades 3 are arranged so that their curvature in end view decreases with distance from the rotor axis and so that the chord *bc* of each blade lies at an angle *cab* of somewhat less than 30° to a radius *ac* drawn from the rotor axis to the outer end of the blade and at an angle *cbd* of somewhat less than 60° to a radius *ad* drawn from the rotor axis to the inner end of the blade.

The volume of the space swept out by the blades 3 comprises the annular space encompassed by the axial length *l* between the annular plate 2 and the disc 1 and the radial depth *bd* of the blades 3. This volume is substantially equal to that of the central part of the rotor from which air is drawn and encompassed by the axial length *l* and the distance *bf* between the inner edges of the blades 3.

The disc 1 is provided with a central cusp shaped deflector member 5 bored centrally to receive the shouldered shaft 6 of the driving motor (not shown), the shaft 6 being threaded at its end to receive a nut 7 domed to continue the curvature of the deflector member 5.

The rotor is mounted within a casing comprising a disc 8, an annular plate 9 and an encircling side wall 10. The disc 8 has an aperture 11 for the passage of the shaft 6 while the annular plate 9 is provided over its aperture with a dome shaped closure 12 leading to the inlet pipe 13. The encircling wall 10 is of cylindrical form and is co-axial with the rotor and is provided with a tangential outlet pipe 14 the cross sectional area of which at *s* being at least equal to the volume of the space swept by the blades 3. The disc 8 of the casing is secured to the encircling side wall 10 by means of bolts 15 and nuts 16 and the casing itself is secured to the motor housing (not shown) or brackets carried thereby, e. g. by means of the same bolts 15.

In Fig. 2 there is shown in dotted outline a deflector member 5a which may be employed instead of the deflector 5. The member 5a is of parabolic curvature and occupies a large part of the central area of the disc and is especially suitable for use with relatively large motors.

I claim:

1. A rotary blower or exhaustor for air or other elastic fluids comprising a rotor embodying an annulus, a set of curved blades occupying said annulus and surrounding a central part from which air or other elastic fluid is drawn, said curvature in end view decreasing with the distance from the axis of the rotor, said blades being so arranged that the chords of the blades lie at an angle of between 20° and 35° to radii drawn from the rotor axis to the outer ends of the blades, while the angle between the chords of the blades and radii drawn to the inner ends of the blades is not substantially greater than 65°, the inner edges of said blades forming the leading edges and the concave faces of said blades forming the leading faces, a cusp shaped deflector adapted to deflect the air or other elastic fluid entering the central part on the blades, and a casing for said rotary blower having a side wall provided with an outlet, the cross-sectional area of which at its nearest point to the rotor is substantially equal to that of the annular space swept by the rotor blades, said side wall being of cylindrical form and co-axial with the rotor, and said outlets being arranged tangentially to said rotor annulus, and the volume of the space swept by the blades being substantially equal to the volume of the central part from which air or other fluid is drawn, the axial length of the annulus being substantially equal to the radial depth thereof.

2. A rotary blower or exhaustor for air or other elastic fluids comprising a rotor embodying an annulus, a set of six blades occupying said annulus and surrounding a central part from which air or other elastic fluid is drawn, said rotor blades being of parabolic curvature, said curvature in end view decreasing with the distance from the axis of the rotor, said blades being so arranged that the chords of the blades lie at an angle of between 20° and 35° to radii drawn from the rotor axis to the outer ends of the blades, while the angle between the chords of the blades and radii drawn to the inner ends of the blades is not substantially greater than 65°, the inner edges of said blades forming the leading edges and the concave faces of said blades forming the leading faces, a cusp shaped deflector adapted to deflect the air or other elastic fluid entering the central part on to the blades, and a casing for said rotary blower having a side wall provided with an outlet, the cross-sectional area of which at its nearest point to the rotor is substantially equal to that of the annular space swept by the rotor blades, said side wall being of cylindrical form and co-axial with the rotor, and said outlet being arranged tangentially to said rotor annulus, and the volume of the space swept by the blades being substantially equal to the volume of the central part from which air or other fluid is drawn, the axial length of the annulus being substantially equal to the radial depth thereof.

VICTOR VLADIMIROVITCH DIBOVSKY.