Nov. 11, 1930. A. A. CRIQUI 1,781,165

CENTRIFUGAL FAN

Filed Oct. 18, 1928

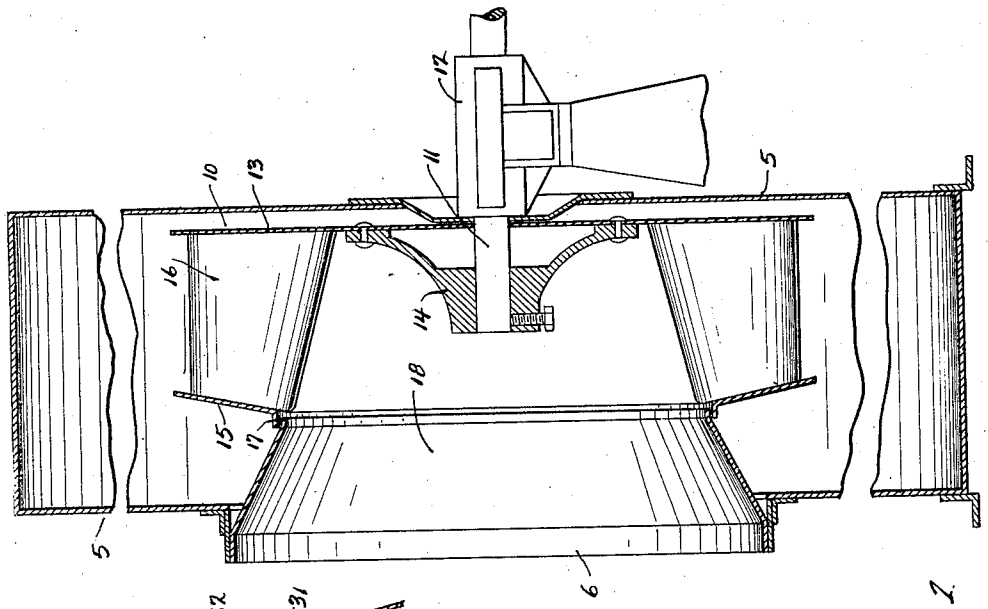


Fig. 1.

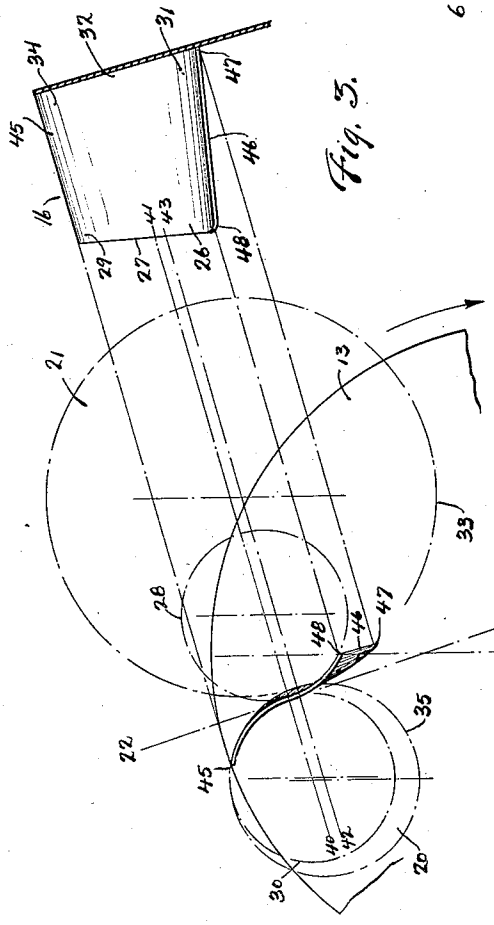


Fig. 3.

Fig. 2.

INVENTOR
Albert A. Criqui
By J. W. Ellis
ATTORNEY

Patented Nov. 11, 1930 1,781,165

UNITED STATES PATENT OFFICE

ALBERT A. CRIQUI, OF BUFFALO, NEW YORK, ASSIGNOR TO BUFFALO FORGE COMPANY, OF BUFFALO, NEW YORK, A CORPORATION OF NEW YORK

CENTRIFUGAL FAN

Application filed October 18, 1928. Serial No. 313,211.

My invention relates in general to multi-blade, centrifugal fans of the type in which a large number of blades are arranged in annular form around a central space open at one side for the entrance of air which is drawn in through the central opening and forced outwardly through the spaces between the blades by centrifugal force.

It is well known to those skilled in the art that in fans of this type, it has been the inventor's object to produce fans in which the velocity of the air leaving the wheel would be greater than the peripheral velocity of the wheel. Since air currents produced by this type of fan are usually delivered under a comparatively slow speed of rotation, it is necessary that large motors be employed in order to maintain the slow speed where the motor and fan are direct-connected.

The principal object of my invention has been to provide a fan in which the velocity of the air leaving the blades shall be less than the velocity of the periphery of the fan wheel, thus enabling the fan wheel to rotate at relatively high speed while still maintaining a relatively low velocity of pressure.

Another object has been to provide a fan having blades so formed that they shall withstand the pull of the centrifugal force due to high speed of rotation without distortion, or without the customary intermediate stiffening rings.

Moreover, because of the absence of stiffening rings or braces on the blades of my fan, the cost of manufacture, as well as the weight of the fan, is reduced, which in turn requires less power to drive, and, therefore, increases the resultant efficiency of the fan.

Furthermore, the blades of my fan are so formed that they have a general backward inclination, whereby the friction of the air passing through them shall be reduced to a minimum, and, also, the entering end of each blade is so formed that the shock or impact with the entering air is reduced to a minimum.

The above objects and advantages have been accomplished by the device shown in the accompanying drawings, of which:

Fig. 1 is a side, sectional elevation of my complete fan, showing, for clearness of illustration, only two fan blades.

Fig. 2 is an end view of a complete blade, and shows diametrically the manner in which the blade is formed.

Fig. 3 is a side elevation of the blade illustrated in Fig. 2, and it is a projection of the blade there shown.

My fan comprises a snail-shaped casing 5 having an inlet eye 6. The casing is, of course, provided with a tangentially arranged outlet opening, which for clearness of illustration is not shown.

The wheel of my device is represented at 10 and it is carried by a shaft 11 which is rotatably mounted in a suitable bearing 12. The wheel comprises a disc 13 which is secured to a hub 14. A ring 15 is provided opposite the disc 10, and the blades 16 are arranged between and secured to the disc and ring. The ring 15 is preferably provided with an outwardly turned flange 17 which is arranged over the inner end of an inlet cone 18. This inlet cone is carried by the inlet eye 6 of the casing, whereby the air is directed into the center of the wheel.

Referring to Figs. 2 and 3, it will be seen that each of the blades of my device is formed from the surfaces of two tangential truncated cones 20 and 21, the line of contact of the cones being an element of each cone. The cones, and, therefore, each blade is so positioned that a line 22—23 drawn tangent to both cones at any point along the line of contact and in a plane which is at right angles to the axis of the wheel is oblique to a plane drawn through the axis of the shaft and coincident with a point near the tip of the heel of the blade, said line intersecting said plane at a point between the axis of the wheel and the tip of the heel. The blades are thus so formed and positioned, with respect to the rotation of the wheel, that the working surface of each recedes from the heel to the tip thereof so that the air is expelled at a gradually increasing acceleration. Furthermore, the heel portion 26 of the forward end 27 of the blade is formed coincidently with the smaller diameter 28 of the cone 21, while the tip portion 29 of the forward end 27 of the blade is formed

from the smaller diameter 30 of the cone 20. The heel portion 31 of the rear edge 32 of the blade is formed coincidently with the larger diameter 33 of the cone 21, while the tip portion 34 of this end of the blade is formed from the larger diameter 35 of the cone 20. The cones 20 and 21 are preferably so arranged that a line 40—41, drawn through the centers of the smaller circles 28 and 30 thereof is parallel with a line 42—43 drawn through the centers of the larger circles 33 and 35, respectively, of the cones. The tip 45 of the blade is preferably coplaner, while the heel 46 thereof is preferably non-coplaner. The heel 46 is preferably so designed that the end 47 thereof which is farther from the inlet end of the wheel is in advance, in the direction of rotation, of the end 48 of the heel. It will be seen by reference to Fig. 2, that each blade has a forwardly curved heel 46 and a backwardly curved tip 45. In Fig. 2, 50 represents the center of the shaft 11, a portion of the disc 13 of the wheel being shown.

Obviously, some modifications of the details herein shown and described may be made without departing from the spirit of my invention or the scope of the appended claims, and I do not, therefore, wish to be limited to the exact embodiment herein shown and described, the form shown being merely a preferred embodiment thereof.

Having thus described my invention, what I claim is:

1. A centrifugal fan having a wheel provided with a plurality of blades, the surfaces of each blade being formed from portions of the surfaces of two cones, the cones being so positioned that their surfaces have substantial line contact, and each blade being so inclined that a line drawn tangent to both cone surfaces and in a plane at right angles to the axis of the wheel is oblique to a plane drawn through the axis of the wheel and coincident with a point near the tip of the heel of the blade, said line intersecting said plane at a point between the axis of the wheel and the tip of the heel.

2. A centrifugal fan having a wheel provided with a plurality of blades, the surfaces of each blade being formed from portions of the surfaces of two cones, the cones being so positioned that their surfaces have substantial line contact, each blade being so inclined that a line drawn tangent to both cone surfaces and in a plane at right angles to the axis of the wheel is oblique to a plane drawn through the axis of the wheel and coincident with a point near the tip of the heel of the blade, said line intersecting said plane at a point between the axis of the wheel and the tip of the heel, and the tip of each blade being substantially coplanar with the axis of the wheel and the heel of each blade being substantially non-coplaner with said axis.

3. A centrifugal fan having a wheel provided with a plurality of blades, the surfaces of each blade being formed from portions of the surfaces of two cones, the cones being so positioned that their surfaces have substantial line contact, each blade being so inclined that a line drawn tangent to both cone surfaces and in a plane at right angles to the axis of the wheel is oblique to a plane drawn through the axis of the wheel and coincident with a point near the tip of the heel of the blade, said line intersecting said plane at a point between the axis of the wheel and the tip of the heel, the tip of each blade being substantially coplaner with the axis of the wheel and the heel being substantially non-coplanar with said axis, and each blade having a forward and backward curve.

In testimony whereof, I have hereunto signed my name.

ALBERT A. CRIQUI.