Sept. 24, 1935. E. WITZEL 2,015,210

CENTRIFUGAL FAN

Filed Oct. 13, 1934

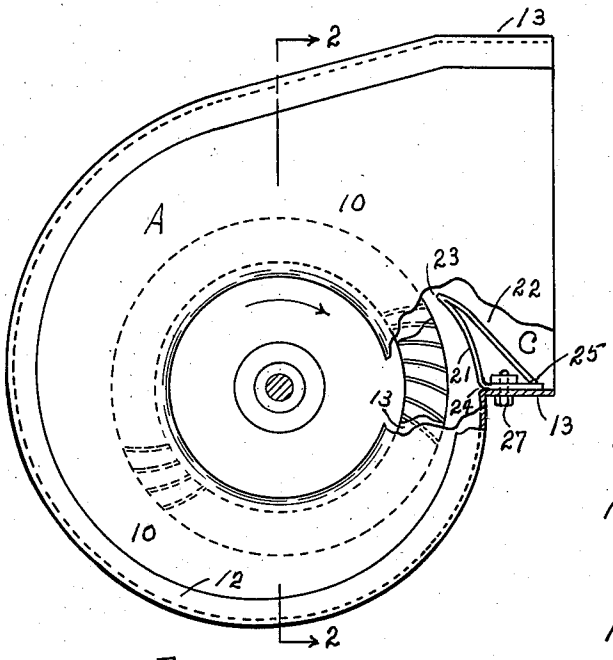


Fig. 1

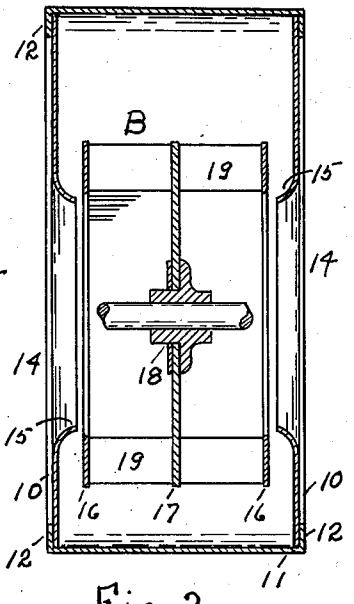


Fig. 2

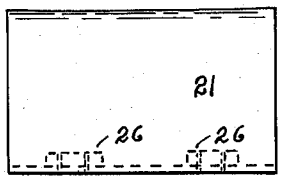


Fig. 3

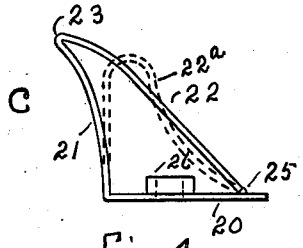


Fig. 4

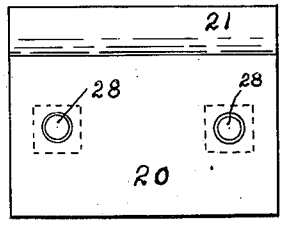


Fig. 5

Inventor
Ernst Witzel
By A. S. Kroth
Attorney

Patented Sept. 24, 1935 2,015,210

UNITED STATES PATENT OFFICE

2,015,210

CENTRIFUGAL FAN

Ernst Witzel, Racine, Wis., assignor to Young Radiator Company, Racine, Wis.

Application October 13, 1934, Serial No. 748,177

3 Claims. (Cl. 230—128)

My invention relates to improvements in blower fans of the centrifugal type, commonly used for moving air in heating, cooling and air conditioning equipments.

The object of my invention is to provide a removable cut-out in the outlet throat of the fan, to improve the efficiency of the device and provide means, whereby the rotor may be easily removed through the air outlet of the housing, thus making it possible to weld or otherwise permanently assemble the various members of the housing.

In conventional fans of the present type, the air outlet or throat adjacent the rotor is, for obvious reasons, less in depth than the diameter of the rotor. The air duct leading therefrom, however, frequently has a greater depth than the rotor diameter. Applicant provides a throat or outlet with a depth slightly greater than the diameter of the rotor. Applicant's cut-out, when removably positioned in the throat, therefore provides convenient means for removing the rotor.

The peripheral speed of a centrifugal fan rotor, is generally very high; therefore in order to secure the greatest efficiency, a suitably curved wedge shaped cut-out is necessary. Applicant's cut-out, at the point where it divides the air, is narrow, and from this point the cut-out is gradually wider or wedge shaped, comprising an inner surface that curves at first rapidly away from the rotor, the lower edge registering with the housing, which continues to curve at an ever increased radius and greater distance from the rotor.

The outer surface of the cut-out extends downward and outward to thereby ease the adjacent air current from the outlet into the air duct without undue friction. The air is thus suitably divided and permitted to continue its outward movement, but is diverted gradually in the direction it should travel, in a manner which will hereinafter appear and as indicated in the accompanying drawing in which:

Figure 1 is a side elevation of a conventional cage type centrifugal fan, having applicant's improved cut-out suitably positioned therein, a portion of the housing and a short section of the outer rotor ring being removed, to thus clearly illustrate the relative position of the essential parts.

Figure 2 is a sectional view taken on line 2—2, of Figure 1.

Figure 3 is an enlarged side elevation of applicant's cut-out, as viewed from the rotor.

Figure 4 is an enlarged end view of the device as shown in Figure 1.

Figure 5 is a bottom view of applicant's cut-out as shown in Figure 1.

As thus illustrated the reference character A is used to designate the fan housing in its entirety. This housing is preferably made from sheet steel comprising side members 10—10 and a cover 11, the edges of which are preferably folded as at 12—12 so as to provide a surface suitable for spot welding, riveting or otherwise securely and permanently fastening these members together. I provide the usual air inlets 14—14, having inturned edges as at 15.

The cover 11 is provided with suitably positioned extensions 13—13, the side members 10 being extended similarly, to thereby form a suitable air outlet, the lower surface of which is preferably on a radius with the center of the rotor, which is designated in its entirety by reference character B.

The rotor B comprises the usual annular blade supporting members 16—16, a central disk 17 having a hub 18. I provide suitably shaped, positioned, and spaced blades 19. I have thus described and illustrated a conventional double cage rotor and housing therefor.

It will be understood, however, that I have shown a conventional double cage centrifugal fan as a suitable design with which to most conveniently illustrate my improvement, which obviously may be applied to any type of centrifugal fan or to a centrifugal liquid pump.

The peripheral speed of a centrifugal fan is necessarily high and since one of the objects of this invention is to provide an air outlet large enough through which the rotor may be removed, I provide a detachable cut-out which is shaped and positioned in the outlet to thereby increase the efficiency of the fan and also provide the means for removing the rotor through the outlet.

Reference character C is used to designate applicant's cut-out in its entirety. This cut-out C is preferably formed from a single piece of sheet steel, providing a base 20, an inner wall 21 and an outer wall 22. Wall 21 at its base registers with the cover 11 as at 24 and continues upward for a short distance, at about the same curvature, after which it curves inwardly more rapidly as indicated, terminating, as at 23, in close proximity to the rotor. The outer wall 22 extends from 23, preferably for a short distance in a downward curve as indicated, continuing preferably in a straight line to a point as at 25, where it may be welded to the base 20. Screw

threaded blocks or nuts **26** may be welded to the base **20**, through which registering holes are provided whereby the cut-out C may be detachably held to member **13** by means of bolts **27** as indicated in Figure 1.

Applicant does not wish to be limited to the specific shape of cut-out C as shown, because variously designed fans may require differently shaped cut-outs, for example, a cut-out, as shown by dotted lines in Fig. 4 and designated by **22***a*, may, in some fans, be desirable.

Applicant's objects are to provide for any style device of the class, a permanent outlet, large enough whereby the rotor may be removed therethrough, and to provide a detachable cut-out in this outlet which will divide the flow of air with the least possible loss of power.

Applicant's cut-out C will permit the air or liquid, as it rushes from between the blades, to be divided at **23**, but the air or liquid will not be abruptly checked in this outward and downward movement. As the blades pass the cut-out the air or liquid is divided but permitted to flow outwardly and downwardly on opposite sides of the wedge without sudden distortion or speed change.

It will be understood that the preferred form of the invention has been illustrated and described. Many modifications may obviously be made within the scope of the appended claims.

Having thus described my invention what I claim is:

1. A centrifugal device of the class described, comprising a rotor, a housing and an outlet therefor, having a slightly greater depth and width than the diameter and length of said rotor the side in direction of rotation, forming a ledge, a cut-out positioned on said ledge and adapted to divide and direct the air or liquid into diverging paths, said cut-out having means to be removably attached to said outlet whereby when removed, said rotor may be removed from said housing through said outlet.

2. A centrifugal fan of the class, comprising a rotor, a housing having an air outlet with a greater length and a greater depth than the length and diameter of said rotor, the side in direction of rotor travel forming a ledge, a wedge shaped cut-out positioned on said ledge, having an inner surface which registers with the housing cover, and an outer surface forming a wedge, the apex of which is adapted to split the air current and form outwardly and downwardly extending paths therefor, said cut out being removably attached, whereby when removed said rotor may be removed through said air outlet.

3. A centrifugal device of the class, comprising a housing, a rotor and a cut-out, said housing having an outlet of a size whereby said rotor may be removed therethrough, said cut-out removably attached to one wall of said outlet and occupying part of the depth thereof whereby when removed said rotor may be removed from said housing through said outlet, the inner wall of said cut out registering with the intersecting point between said opening and the cover wall of said housing and continuing for a short distance the contour thereof, the outer wall forming a wedge, the apex of which is adapted to split wedge like, the air or liquid current as it leaves said rotor and before reaching the approach side of said outlet.

ERNST WITZEL.