

Nov. 26, 1940.

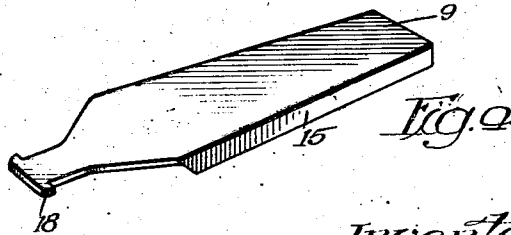
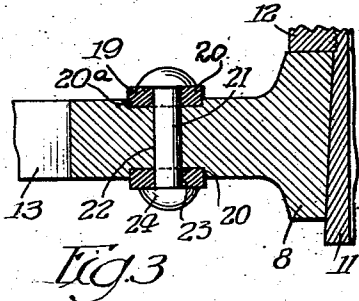
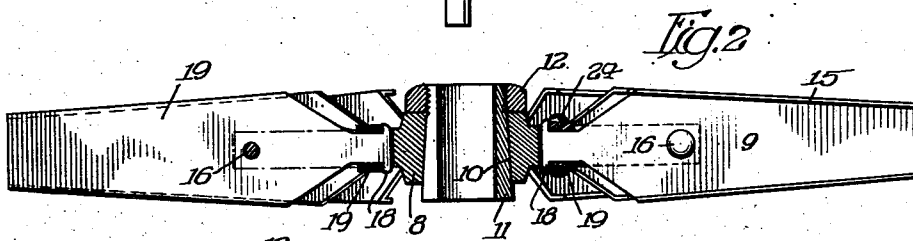
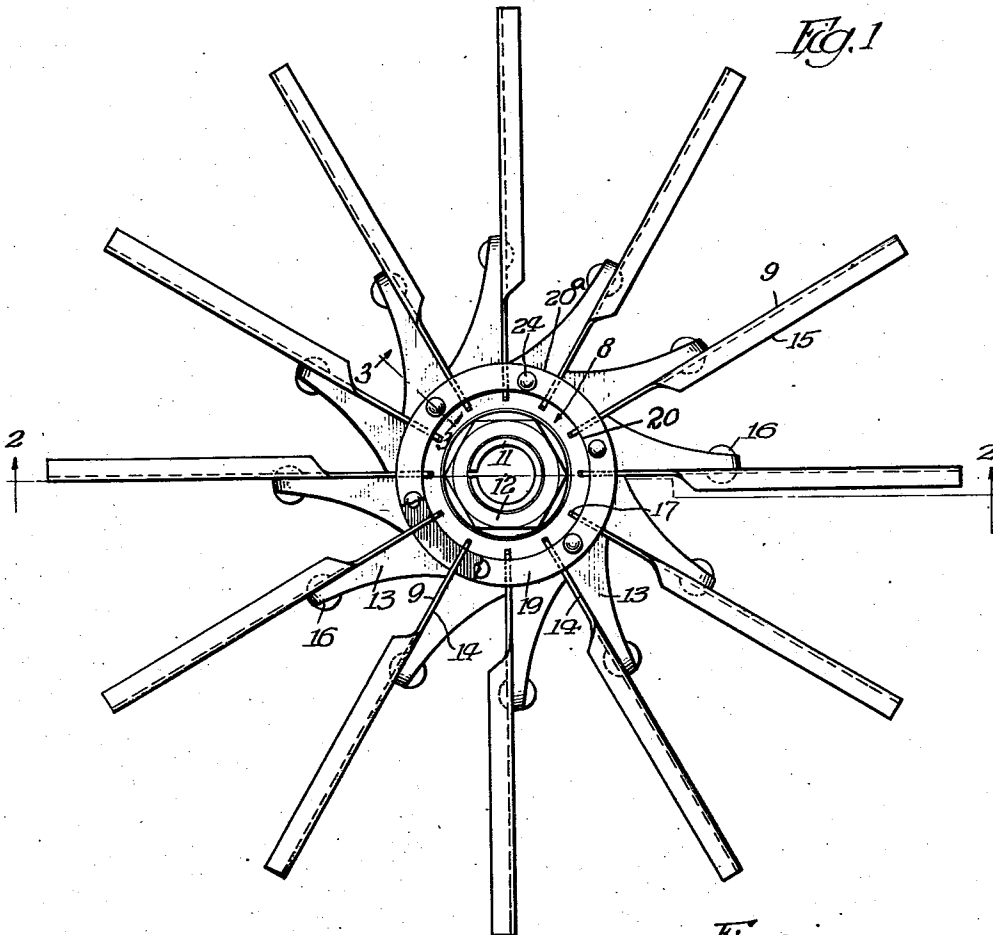
A. STADLER

2,222,787

CENTRIFUGAL BLOWER ROTOR

Filed Nov. 9, 1938

2 Sheets-Sheet 1



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Fig. 5

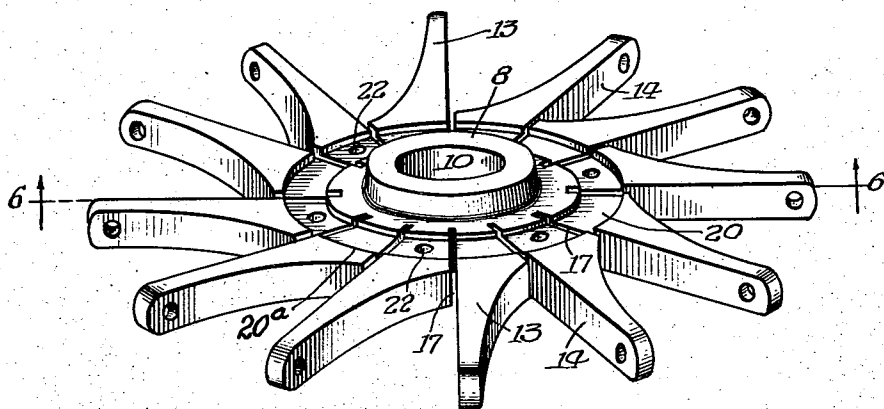


Fig. 6

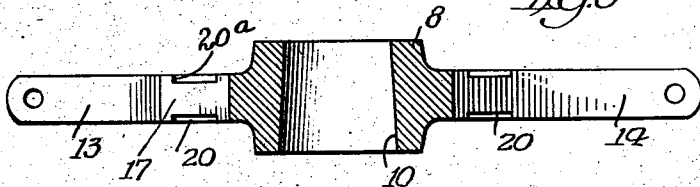
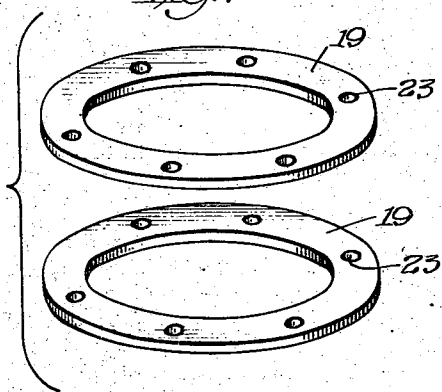


Fig. 7



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UNITED STATES PATENT OFFICE

2,222,787

CENTRIFUGAL BLOWER ROTOR

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Application November 9, 1938, Serial No. 239,599

2 Claims. (Cl. 230—134)

The present invention relates generally to blade equipped rotors. More particularly the invention relates to that type of rotor which together with a casing having an inlet opening in the side thereof and a peripheral outlet forms a centrifugal blower, consists of a hub with a shaft opening therethrough and an annular series of equidistantly spaced radial plate metal blades around the hub, and is adapted for high speed drive and to draw gas or air at either normal or high temperature through the inlet opening in the side of the casing and to discharge the gas or air under pressure from the casing by way of the peripheral outlet.

One object of the invention is to provide a centrifugal blower rotor of this type which is an improvement upon and is more durable and lasting than previously designed rotors of the same general character by reason of the fact that it includes means of special and novel design for fixedly securing or anchoring the inner ends of the blades to the hub.

Another object of the invention is to provide a blade equipped rotor of the type under consideration in which the inner extremities of the blades fit within radially extending ears in the hub and the means for securing or anchoring the blades in place comprises laterally extending lugs on the inner corners of the blades and in addition a pair of rings which fit against and are secured to the sides of the hub and surround and engage the ears.

Another object of the invention is to provide a blade equipped blower rotor of the last mentioned character in which the rings constituting a part of the blade securing or anchoring means fit and are confined within annular grooves in the sides of the hub with the result that they are effectively precluded or prevented from expanding as the result of the outward pull or thrust placed against them by the ears during high speed drive of the rotor.

A further object of the invention is to provide a blade equipped rotor of the character hereinbefore specified in which the hub is provided with an annular series of outwardly extending arms which correspond in number to, and fit respectively against the trailing faces of, the blades and form effective driving connections between the hubs and the blades whereby the blades in response to quick starting of the rotor are set into motion without bending or distortion.

A still further object of the invention is to provide a blade equipped centrifugal blower rotor

which may be manufactured at an extremely low cost and effectively and efficiently fulfills its intended purpose.

Other objects of the invention and the various advantages and characteristics of the present blade equipped rotor will be apparent from a consideration of the following detailed description.

The invention consists in the several novel features which are hereinafter set forth and are more particularly defined by the claims at the conclusion hereof.

In the drawings which accompany and form a part of this specification or disclosure and in which like numerals of reference denote corresponding parts throughout the several views:

Figure 1 is a side view of a rotor embodying the invention;

Figure 2 is a sectional view taken on the line 2—2 of Figure 1 and illustrating in detail the manner in which the rings coast with the outwardly or laterally extending ears at the inner corners of the blades to secure or anchor the blades to the hub;

Figure 3 is an enlarged sectional view taken on the line 3—3 of Figure 1 and showing the design and location of the grooves in which the blade retaining rings are confined;

Figure 4 is a perspective view of one of the blades;

Figure 5 is a perspective of the hub of the rotor illustrating in detail the design and construction of the radially extending arms and showing the position, location and design of the slots in which the inner extremities of the blades fit;

Figure 6 is a sectional view on the line 6—6 of Figure 5; and

Figure 7 is a perspective view of the two rings which together with the laterally extending ears on the inner corners of the blades constitute the means for securing or anchoring the blades to the hub of the rotor.

The rotor which is shown in the drawings constitutes the preferred embodiment of the invention. It is designed in connection with a conventional or standard casing (not shown) having an inlet opening in the side thereof and a peripheral outlet to form a centrifugal blower and is adapted to be driven at a comparatively high speed and to draw gas or air at either normal or high temperature inwardly through the inlet opening in the side of the casing and to discharge the gas or air under pressure through the peripheral outlet. As its main parts the rotor

comprises a hub 8 and an annular series or set of blades 9 around the hub.

The hub 8 is formed of any suitable metal and has a centrally disposed opening 10 therein. This opening is tapered, as shown in Figures 2 and 3, and extends from one side of the hub to the other. A longitudinally split contractible sleeve 11 fits within the opening 10 in the central portion of the hub and in conjunction with a nut 12 serves to secure the hub in fixed relation with a drive shaft (not shown). The inner periphery of the sleeve 11 is cylindrical and the outer periphery is tapered in conformity with the taper of the opening 10. The nut 12 is mounted on an external screw thread at the small end of the sleeve and when tightened operates to draw the sleeve into clamped relation with the opening defining portion of the hub and the opposed peripheral portion of the aforementioned drive shaft. During such drawing movement the sleeve contracts and hence effects the desired clamping action as far as the drive shaft is concerned. The hub 8 is provided with an annular series of equidistantly spaced driving arms 13 for the blades 9. These arms are formed integrally with and project substantially radially from the hub and embody flat leading faces 14. The latter extend truly radially with respect to the axis of the hub and are adapted to bear directly against the inner portions of the trailing or rear faces of the blades 9.

The blades are in the form of plate metal stampings and correspond in number to, and are associated respectively with, the radially extending arms 13. The central portions and outer ends of the blades are substantially flat and operate during drive of the rotor to impel or place under pressure the gas or air which is sucked or drawn inwardly through the side opening of the blower casing with which the blower is associated. The central and outer end portions of the side margins of the blades are bent at right angles to form flanges 15. These flanges extend or project in the direction in which the rotor is adapted to be driven and serve to reinforce the outer ends of the blades against bending. They are outwardly convergent, and in addition to strengthening or reinforcing the outer ends of the blades, serve to direct outwardly the air which impinges against the leading or front faces of the blades during drive of the rotor. The inner ends of the blades are of reduced width, as shown in Figure 4, and fit flatly against the flat leading faces 14 of the arms 13. Rivets 16 extend through the outer ends of the arms 13 and the central portions of the blades and serve to hold said central portions of the blades in connected relation with the arms. The inner extremities of the blades fit within radially extending slots 17 in the hub. These slots are positioned in alignment with the flat leading faces 14 of the arms and are substantially the same in thickness as the blades so that the inner extremities of the blades fit snugly therein.

In addition to the hub 8 and the blades 9, the rotor comprises simple and novel means for anchoring the inner ends of the blades to the hub. This means comprises pairs of laterally extending ears 18 on the inner corners of the blades and a pair of ear surrounding rings 19. The ears are formed as integral parts of the blades and project outwardly beyond the sides of the hub 8, as shown in Figure 2. The rings 19 fit snugly within a pair of annular grooves 20 in the sides of the hub and have truly cylindrical outer

peripheries. The grooves 20 correspond in radial width to the rings and are defined at their outer extremities by inwardly facing truly cylindrical shoulders 20a. The outer peripheries of the rings abut directly against these shoulders as shown in Figure 3. Due to the fact that the shoulders 20a and the outer peripheries of the rings are truly cylindrical, as distinguished from tapered, there is no likelihood of the rings separating by forces which result from centrifugal action and tend to expand them in connection with high speed drive of the rotor. The rings 19 engage directly the ears 18 and coact with the latter effectively and efficiently to anchor the inner ends of the blades to the hub. Rivets 21 extend through holes 22 in the hub and serve to secure the rings 19 within the grooves 20. The ends of the rivets extend through aligned holes 23 in the rings and are riveted or beaded over to form ring engaging heads 24. When the rotor is in operation the blades due to centrifugal force exert through the medium of the laterally extending ears certain forces on the rings. Since these forces are distributed uniformly around the rings there is no tendency for the rings to move transversely with respect to the axis of the hub. By reason of the fact that the rings are located or positioned in the grooves 20, they cannot expand or place any strain upon the rivets 21 as the result of the outward pull of the blades. When the motor is driven at high speed the rings and ears effectively prevent any outward movement of the blades with respect to the hub and thus maintain the rotor as a whole in balanced relation and prevent the setting up of strains or stresses which would cause vibration and resultant crystallization of parts. By reason of the fact that the hub includes the radially extending arms 13 there is no tendency of the blades to buckle or bend during quick starting of the rotor.

The rotor is assembled by placing the trailing faces of the blades against the flat leading faces 14 of the ears 13 of the hub and then sliding the blades inwardly in order to bring the inner extremities thereof within the slots 17. After this operation or step the rings 19 are placed within the annular grooves 20 wherein they surround and abut against the laterally extending ears 18 at the inner corners of the blades. After proper mounting of the rings the rivets 21 are inserted through the holes 23 and 22 and then beaded or riveted over in order rigidly and substantially permanently to secure the rings 19 in place. After mounting of the rings the rivets 16 are applied to the arms 13 and the blades 9 in order to hold them in connected relation.

The herein described centrifugal blower rotor may be manufactured at a low and reasonable cost due to the design and construction of the parts thereof. In addition it is extremely durable because of the specific type or form of anchoring means for the blades, and always stays in balanced relation even though subjected to extremely high speed drive. Because of the specific form of anchoring means no buckling or bending of the blades takes place in the event of expansion of the parts due to high temperature.

The invention is not to be restricted to the specific details set forth, since these may be modified within the scope of the appended claims, without departing from the spirit and scope of the invention.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent is:

1. A centrifugal blower rotor comprising a hub adapted to be connected to and driven by a shaft and having an annular series of outwardly extending arms connected thereto and extending therearound and also having concentrically disposed annular grooves in the sides thereof inwardly of the arms and an annular series of slots corresponding in number to and leading inwardly from the arms and intersecting and projecting slightly inwardly of the grooves, an annular series of outwardly extending blades corresponding in number to and associated respectively with the arms and having the inner ends thereof fitting against and secured to the arms and their inner extremities projecting into said slots and provided at the corners with laterally extending ears projecting beyond the hub sides and disposed immediately inwardly of the grooves, a pair of rings fitting within the grooves respectively and arranged so that they surround and engage the ears and coact with the latter to hold the blades in anchored relation with the hub, and fastening elements extending through aligned holes in the rings and the hub for holding the rings in fixed relation with said hub.

2. A centrifugal blower rotor comprising a hub adapted to be connected to and driven by a shaft

and having an annular series of outwardly extending arms connected thereto and extending therearound and also having a pair of concentrically arranged annular grooves formed in the sides thereof inwardly of the arms and defined at the outer extremities thereof by truly cylindrical inwardly facing shoulders and in addition an annular series of slots corresponding in number to and leading inwardly from the arms and intersecting and projecting slightly inwardly of the grooves, an annular series of outwardly extending blades corresponding in number to and associated respectively with the arms and having the inner ends thereof fitting against the leading faces of the arms and their inner extremities projecting into said slots and provided at their corners with laterally extending ears disposed immediately inwardly of the grooves, a pair of rings with truly cylindrical outer peripheries fitting snugly within the grooves respectively and arranged so that they surround and engage the ears and coact with the latter to hold the blades in anchored relation with the hub, and fastening elements extending through aligned holes in the rings and the hub for holding the rings in fixed relation with said hub.

ALBERT STADLER.