

Nov. 25, 1947.

R. A. MAYNE

2,431,648

BLOWER

Filed Feb. 9, 1945

2 Sheets-Sheet 1

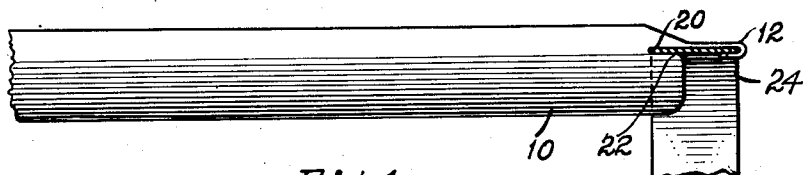


Fig. 1

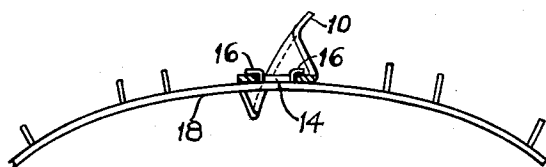


Fig. 2

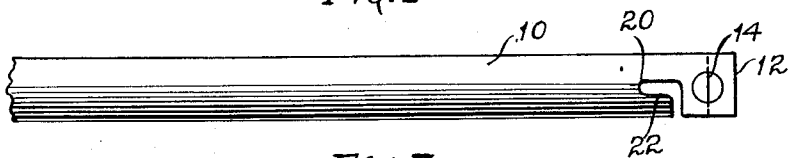


Fig. 3

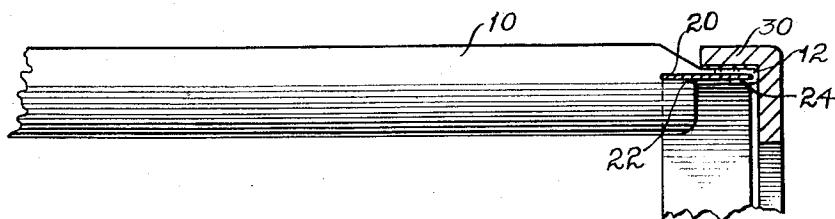


Fig. 4

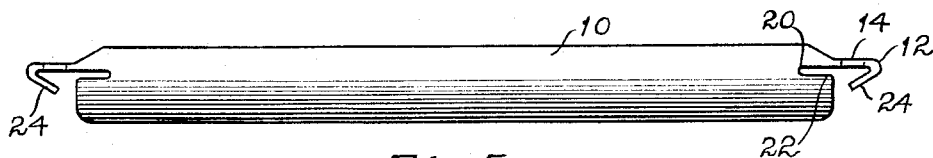


Fig. 5

Inventor  
Robert A. Mayne  
By Henry L. Dwyer  
His Attorney

Nov. 25, 1947.

R. A. MAYNE

2,431,648

BLOWER

Filed Feb. 9, 1945

2 Sheets-Sheet 2

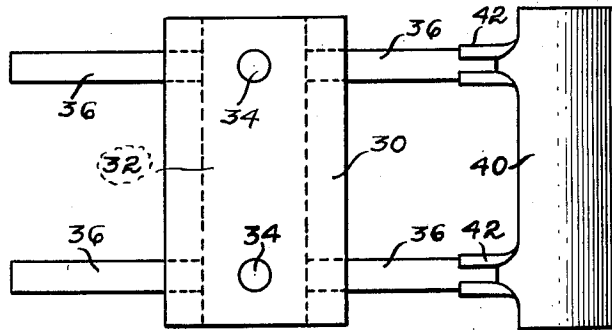


FIG. 6

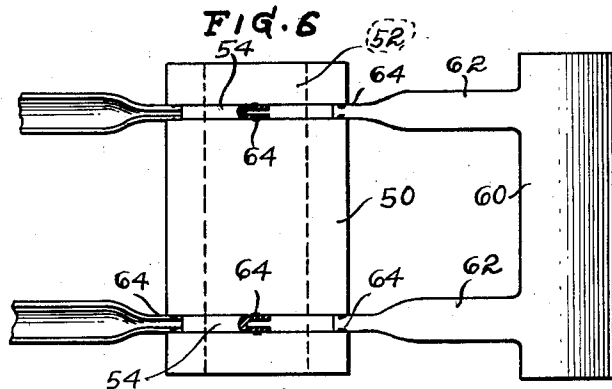


FIG. 7

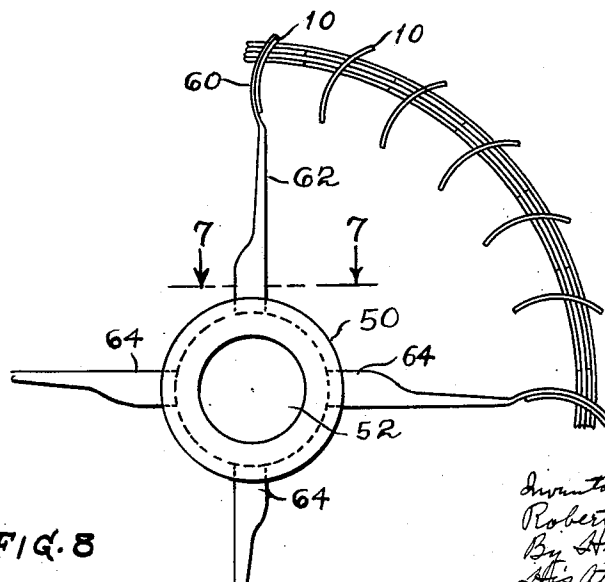


FIG. 8

Inventor  
Robert A. Mayne  
By *Amey S. Gilling*  
His Attorney

## UNITED STATES PATENT OFFICE

2,431,648

BLOWER

Robert A. Mayne, Dayton, Ohio

Application February 9, 1945, Serial No. 577,060

16 Claims. (Cl. 230-134)

1

This invention relates to a blower and more particularly to a blower of the centrifugal type.

In my copending application Serial No. 525,810 I disclose a method of spacing fan blades by using extensions on each blade, which extension is equal to the pitch of the blades.

An object of this invention is to provide spacer means for accurately spacing the blades on a support, which spacer means may be utilized to lock the blades in position.

Another object of this invention is to provide a fan blade that is provided with a shoulder abutting the retaining support adapted to absorb the centrifugal force exerted upon the fan blade as it rotates.

Another object of this invention is to produce a strong, dependable, light weight fan of the centrifugal type from light weight material and a small amount of labor, resulting in a cheap, efficient and economical blower.

Other objects and advantages result in the construction of parts, the combination thereof and the mode of operation, as will become more apparent from the following description.

Referring to the drawings,

Figure 1 discloses a fragmentary perspective view of a portion of a fan blade and a supporting ring.

Figure 2 is a fragmentary end view of a supporting ring with one blade mounted in position.

Figure 3 is a perspective top plan view of one end of a fan blade ready for assembly.

Figure 4 is a cross sectional view of a portion of an end ring and a shroud ring, together with a portion of a blade.

Figure 5 is a perspective side elevational view of a fan blade formed in readiness for assembly.

Figure 6 discloses a supporting assembly for the fan blades.

Figure 7 discloses a modification of the supporting assembly with parts broken away and other parts shown in cross section, taken substantially on the line 7-7 of Figure 8.

Figure 8 discloses an end view of a portion of the supporting assembly shown in Figure 7 with a part of the fan assembly.

In the drawings, the reference character 10 indicates a fan blade that is provided with an extension 12 on each end. The extension 12 is provided with a hole 14 adapted to receive a pair of tongues 16 struck out from a band 18 that forms an end ring for the fan when assembled. The fan blade is provided with an undercut notch or slot 20 forming a shoulder 22 abutting the inner periphery of the ring 18. The tongues 16

2

are bent into overlapping relation with respect to the edges of the hole 14, as clearly shown in Figure 2. The end 24 of the extension 12 is bent inwardly, so as to engage the inner side of the ring or band 18. The tongues 16, the end 24 and the shoulder 22 cooperate to hold the fan blade in fixed spaced relation with respect to the ring forming the support. The tongues 16, in addition to holding the fan blade in position, also provide spacers for accurately spacing the fan blades with respect to each other.

The blades 10 may be assembled upon a pair of bands 18, one for each end, the tongues 16 bent into position, the ends 24 clamped against the inner side of the bands and then the bands may be placed in a suitable jig or fixture so as to form the bands and the blades into cylindrical formation. The ends of the bands 18 may be spot welded or otherwise secured together. This results in a blower that is easily assembled by inexperienced labor, requiring a very small degree of skill.

The fan blades when completely assembled, together with the rings, may be dipped into a galvanizing solution, which forms a protective coating and tends to bond the parts together.

If it is found necessary to reinforce the end rings or improve upon the appearance of the fan assembly, a pair of shroud rings 30, L-shaped in cross sectional area, may be press-fitted upon the end rings 18, the extensions 12 and the tongues 16. These shroud rings reinforce the ends of the assembly, so as to provide a rigid end assembly and at the same time conceal the extensions 12 and the tongues 16. Whenever the fan rotates, the shoulders 22 absorb the centrifugal force, so as to relieve the strain that tends to bend the extensions 12 and the tongues 16.

A suitable support for the fan assembly may be provided in any manner, so as to mount the fan assembly on any shaft transmitting power to the blower and providing an axis of rotation therefor. Two suitable supports for my fan assembly will now be described.

In Figure 6 is shown a hub assembly for supporting the fan. A tubular member 30 provided with a suitable aperture 32 is provided with a plurality of radially disposed pairs of holes 34, each adapted to receive a spoke-like member 36. These spoke-like members 36 are press-fitted into the holes 34. The spoke-like members 36 are arranged in two groups in such a manner that the spokes are paired. Two pairs of spoke-like members 36 have been shown. Each pair supports a transversely disposed blade-engaging

member 40 having inwardly directed extensions 42 fixedly attached to the ends of the spoke-like members 38. The main body portion of member 40 is juxtaposed upon one side of a fan blade and spot-welded thereto or secured thereto in any other suitable manner.

In Figures 7 and 8 a modified hub assembly has been shown. A tubular member 50 provided with a longitudinally disposed aperture 52, in which a drive shaft may be mounted, is provided with a pair of annular grooves 54, one in either end. Suitable supporting members 60, each provided with a pair of spoke-like arms 62 formed into V-shape and merging into folded portions 64 project into the annular grooves 54. The spoke-like arms 62 are welded to the hub 50 at 56, so as to form a rigid support for the fan assembly. The outer portion of member 60 is curved, so as to snugly engage one side of the fan blade 10, as best seen in Figure 8. Each of the modifications disclosed in Figures 6, 7 and 8 shows a suitable supporting assembly for the blower.

Although the preferred embodiment of the device has been described, it will be understood that within the purview of this invention various changes may be made in the form, details, proportion and arrangement of parts, the combination thereof and mode of operation, which generally stated consist in a device capable of carrying out the objects set forth, as disclosed and defined in the appended claims.

Having thus described my invention, I claim:

1. A fan assembly of the centrifugal type including a pair of end rings having tongues struck out from the body thereof and a plurality of blades, each of said blades having undercut notches forming shoulders between which the rings are seated, one shoulder of each blade engaging the inside of the ring, extensions on the blades overlapping the end rings, each extension being provided with an aperture receiving a tongue bent over so as to hold the extensions in position, the shoulders formed by the undercut notches absorbing centrifugal force exerted by the blades when the blower is rotated.

2. A fan assembly of the centrifugal type including a pair of end rings having a plurality of pairs of tongues struck out from the body thereof and a plurality of blades, each of said blades having undercut notches forming shoulders between which the rings are seated, one shoulder of each blade engaging the inside of the ring, extensions on the blades overlapping the end rings, each extension being provided with an aperture receiving a pair of tongues bent over so as to hold the extensions in position, the shoulders formed by the undercut notches absorbing centrifugal force exerted by the blades when the blower is rotated.

3. A fan assembly of the centrifugal type including a pair of end rings having tongues struck out from the body thereof and a plurality of blades, each of said blades having undercut notches in which the rings are seated, extensions on the blades overlapping the end rings, the ends of the extensions being bent inwardly so as to engage the under side of the ring, each extension being provided with an aperture receiving a tongue bent over so as to hold the extensions in position, the shoulders formed by the undercut notches absorbing centrifugal force exerted by the blades when the blower is rotated.

4. A fan assembly of the centrifugal type including a pair of end rings having a plurality of pairs of tongues struck out from the body thereof

and a plurality of blades, each of said blades having undercut notches in which the rings are seated, extensions on the blades overlapping the end rings, the ends of the extensions being bent inwardly so as to engage the under side of the ring, each extension being provided with an aperture receiving a pair of tongues bent over so as to hold the extensions in position, the shoulders formed by the undercut notches absorbing centrifugal force exerted by the blades when the blower is rotated.

5. A fan assembly of the centrifugal type including a pair of end rings having tongues struck out from the body thereof and a plurality of blades, each of said blades having undercut notches forming shoulders between which the rings are seated, one shoulder of each blade engaging the inside of the ring, extensions on the blades overlapping the end rings, each extension being provided with an aperture receiving a tongue bent over so as to hold the extensions in position, the shoulders formed by the undercut notches absorbing centrifugal force exerted by the blades when the blower is rotated, and a shroud ring press-fitted over the extensions and the portions of the tongues overlapping the extensions so as to conceal the extensions and the tongues, said shroud ring reinforcing the fan.

6. A fan assembly of the centrifugal type including a pair of end rings having a plurality of pairs of tongues struck out from the body thereof and a plurality of blades, each of said blades having undercut notches forming shoulders between which the rings are seated, one shoulder of each blade engaging the inside of the ring, extensions on the blades overlapping the end rings, each extension being provided with an aperture receiving a pair of tongues bent over so as to hold the extensions in position, the shoulders formed by the undercut notches absorbing centrifugal force exerted by the blades when the blower is rotated, and a shroud ring press-fitted over the extensions and the portions of the tongues overlapping the extensions so as to conceal the extensions and the tongues, said shroud ring reinforcing the fan.

7. A fan assembly of the centrifugal type including a pair of end rings having tongues struck out from the body thereof and a plurality of blades, each of said blades having undercut notches forming shoulders between which the rings are seated, one shoulder of each blade engaging the inside of the ring, extensions on the blades overlapping the end rings, the ends of the extensions being bent inwardly so as to engage the under side of the ring, each extension being provided with an aperture receiving a tongue bent over so as to hold the extensions in position, the shoulders formed by the undercut notches absorbing centrifugal force exerted by the blades when the blower is rotated, and a shroud ring press-fitted over the extensions and the portions of the tongues overlapping the extensions so as to conceal the extensions and the tongues, said shroud ring reinforcing the fan.

8. A fan assembly of the centrifugal type including a pair of end rings having a plurality of pairs of tongues struck out from the body thereof and a plurality of blades, each of said blades having undercut notches in which the rings are seated, extensions on the blades overlapping the end rings, the ends of the extensions being bent inwardly so as to engage the under side of the ring, each extension being provided with an aperture receiving a pair of tongues bent over

5

so as to hold the extensions in position, the shoulders formed by the undercut notches absorbing centrifugal force exerted by the blades when the blower is rotated, and a shroud ring press-fitted over the extensions and the portions of the tongues overlapping the extensions so as to conceal the extensions and the tongues, said shroud ring reinforcing the fan.

9. A fan assembly of the centrifugal type including a pair of end rings having tongues struck out from the body thereof, a plurality of blades, each of said blades having undercut notches forming shoulders between which the rings are seated, one shoulder of each blade engaging the inside of the ring, extensions on the blades overlapping the end rings, each extension being provided with an aperture receiving a tongue bent over so as to hold the extensions in position, the shoulders formed by the undercut notches absorbing centrifugal force exerted by the blades when the blower is rotated, and a support for the blades, said support including a hub, a plurality of pairs of spoke-like members fixedly attached to the hub, each of said pairs of spoke-like members being joined by a blade-engaging member juxtaposed upon one side of a selected blade and spot welded thereto.

10. In a fan assembly of the centrifugal type including a plurality of blades, a support for the blades, said support including a hub, a plurality of pairs of spoke-like members fixedly attached to the hub, said spoke-like members being arranged in spaced parallel relation and blade-engaging means having a length greater than the distance between the spoke-like members, said blade-engaging means having inwardly directed projections fixedly attached to the ends of the spoke-like members so as to provide a support for the blades.

11. In a fan assembly of the centrifugal type including a plurality of blades and a support for the blades, said support including a hub, a pair of annular grooves in the periphery of the hub, spoke-like members projecting into said grooves, said spoke-like members being arranged in spaced parallel relation and means for interconnecting the spoke-like members, said means including a sheet metal member having a curvature corresponding to the curvature of the blades and juxtaposed upon selected blades to support the blades with respect to the hub.

12. In a fan assembly of the centrifugal type including a plurality of blades, each of the blades terminating in laterally disposed extensions, a pair of supporting rings for the blades, said rings being provided with seats engaging the extensions for spacing the blades, and a shroud ring clamping the extensions between the supporting ring and the shroud ring so as to hold the blades in position.

13. In a fan assembly of the centrifugal type including a plurality of blades each terminating in a pair of laterally disposed extensions, each of

6

said extensions being provided with apertures, a pair of supporting rings for the blades, said supporting rings being provided with projections engaging the apertures in the extensions of the blades for spacing the blades, the ends of the blades being folded about the edges of the supporting rings to clamp the blades in position.

14. In a fan assembly of the centrifugal type including a plurality of blades, each of said blades being provided with a pair of laterally disposed extensions, one extension on each end, a pair of supporting rings, said supporting rings being provided with shoulders engaging portions of the extensions for spacing the blades, the end of each extension being folded around the margin of a ring so as to hold the blades in fixed relation with respect to the rings, and shroud rings overlapping the extensions for clamping the extensions between the shroud rings and the supporting rings so as to hold the blades in a unitary structure.

15. In a fan assembly of the centrifugal type including a plurality of blades, each of the blades being provided with a pair of laterally disposed extensions, the extensions of the blades cooperating to form a cylindrical surface, each of the extensions being provided with an aperture, a pair of supporting rings mounted in engagement with the extensions, and means extending through the apertures for holding the blades in a relatively fixed spaced relation with respect to each other, said last mentioned means being bent over so as to rigidly hold the extensions of the blades.

16. In a fan assembly of the centrifugal type including a plurality of blades, each of the blades being provided with a pair of laterally disposed extensions, the extensions of the blades cooperating to form a cylindrical surface, each of the extensions being provided with an aperture, a pair of supporting rings mounted in engagement with the extensions, and means extending through the apertures for holding the blades in a relatively fixed spaced relation with respect to each other, said means overlapping a portion of the extensions so as to reenforce the same.

ROBERT A. MAYNE.

#### REFERENCES CITED

The following references are of record in the file of this patent:

#### UNITED STATES PATENTS

| Number    | Name     | Date           |
|-----------|----------|----------------|
| 1,062,006 | Hessling | May 20, 1913   |
| 1,333,294 | Denton   | Mar. 9, 1920   |
| 1,637,652 | Ness     | Aug. 2, 1927   |
| 1,876,518 | Mathis   | Sept. 6, 1932  |
| 1,876,871 | Doman    | Sept. 13, 1932 |
| 2,157,441 | Sullivan | May 9, 1939    |
| 2,231,063 | Evans    | Feb. 11, 1941  |
| 2,240,238 | Baker    | Apr. 29, 1941  |
| 2,293,512 | Levy     | Aug. 18, 1942  |