

July 26, 1966

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3,262,637

INDIVIDUAL BLADE MOUNTINGS IN A BLOWER WHEEL

Filed Nov. 4, 1964

2 Sheets-Sheet 1

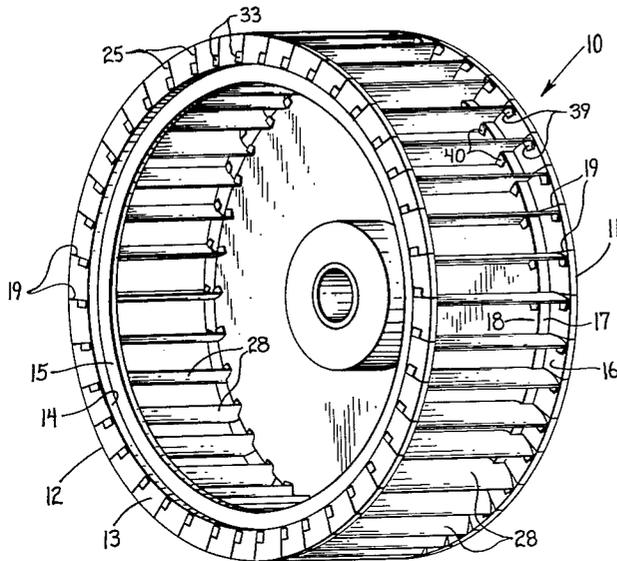


Fig. 1.

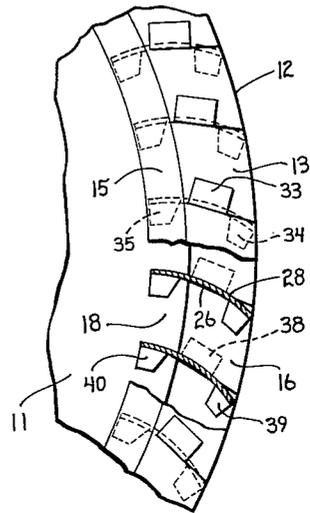


Fig. 2.

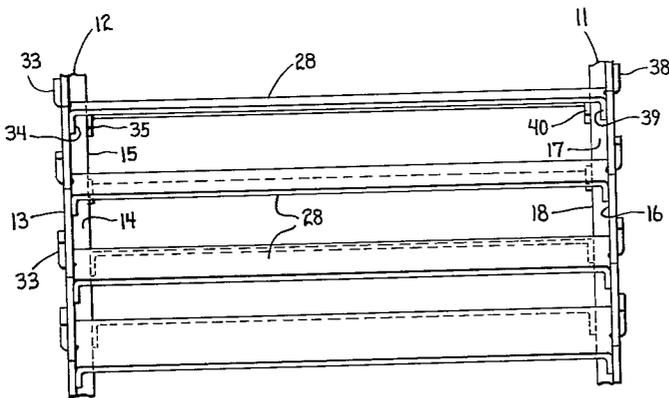


Fig. 3.

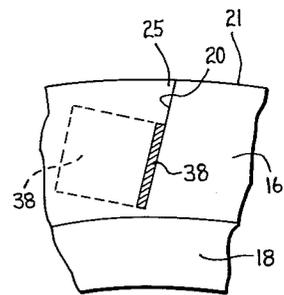


Fig. 4A.

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2 Sheets-Sheet 2

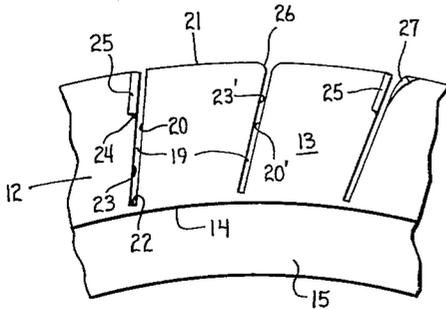


Fig. 4.

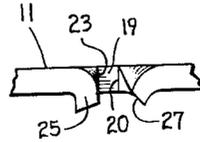


Fig. 5.

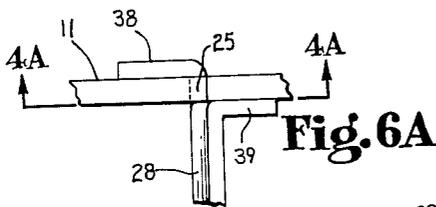


Fig. 6A

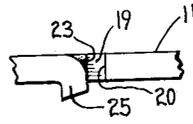


Fig. 6.

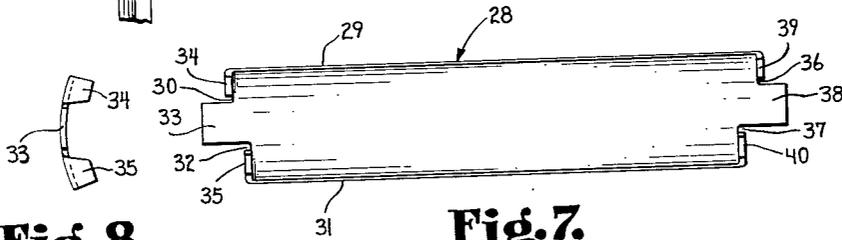


Fig. 7.

Fig. 8.

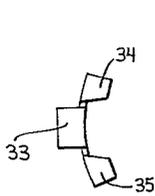


Fig. 10.

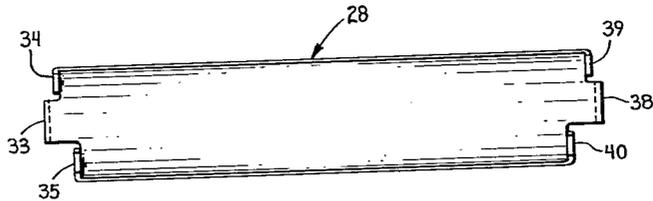


Fig. 9.

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3,262,637
**INDIVIDUAL BLADE MOUNTINGS IN A
 BLOWER WHEEL**

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 6 Claims. (Cl. 230-134)

The present invention relates to a blower wheel and to a novel method of fabricating the same from a backer disc, a forward ring and a plurality of individual, preformed blades. The primary object of the invention is to provide an effective blower wheel of the character suggested, embodying a maximum number of blades within a given peripheral dimension, the blades being rigidly and solidly supported in the wheel without welding, soldering or rivetting.

A further object of the invention is to provide a method of assembling such a wheel which lends itself to semi-automatic machine performance.

Still further objects of the invention will appear as the description proceeds.

To the accomplishment of the above and related objects, our invention may be embodied in the forms illustrated in the accompanying drawings, attention being called to the fact, however, that the drawings are illustrative only, and that change may be made in the specific constructions illustrated and described, or in the specific steps stated, so long as the scope of the appended claims is not violated.

FIG. 1 is a perspective view of a blower wheel constructed in accordance with the present invention;

FIG. 2 is a fragmentary, enlarged elevation, taken from the front of FIG. 1, with a part of the forward ring broken away and certain of the blades shown in transverse section;

FIG. 3 is a fragmentary side elevation of the wheel;

FIG. 4 is a further enlarged, fragmentary front elevation of the forward ring, showing various forms of slots ready for insertion of blade tabs therein;

FIG. 4A is a fragmentary sectional view taken substantially on the line 4A-4A of FIG. 6A;

FIG. 5 is a still further enlarged, fragmentary edge view of a portion of the backer disc, showing one form of slot mouth ready for insertion of a blade tab;

FIG. 6 is a similar view of another form of slot mouth;

FIG. 6A is a similar view, showing the slot mouth closed after insertion of a blade tab;

FIG. 7 is an elevation of a blade ready for insertion between a backer disc and a forward ring;

FIG. 8 is an end view thereof taken from the left of FIG. 7;

FIG. 9 is a view similar to FIG. 7 but showing the blade ready for insertion between a backer disc and a forward ring in a different condition; and

FIG. 10 is an end view thereof taken from the left of FIG. 9.

Referring more particularly to the drawings, it will be seen that the reference numeral 10 indicates generally a blower wheel comprising a backer disc 11 and a forward ring 12 arranged in spaced, coaxial relation. The outer, annular region 13 of the ring is disposed in a transaxial plane substantially perpendicular to the axis of the wheel, and it merges, through a cylindrical web 14, with an inner annular region 15 which is offset axially rearwardly from the plane of the region 13. Similarly, the backer disc 11 is provided with an outer, annular region 16 merging, through a cylindrical web 17, with an inner region 18 which is offset axially forwardly, preferably by a dimension equal to the offset of the region 15. The regions 13 and 16 of the members 12 and 11 are respec-

tively formed with series of correspondingly peripherally spaced, substantially radially elongated slots 19.

Each slot 19 of each of these members is formed to provide one wall 20, herein illustrated as the leading wall, extending from the outer periphery 21 of the region 13 or 16, to a base 22 adjacent the web 14 or 17, and another, parallel wall 23, herein shown as the trailing wall, extending from the base 22 outwardly to a selected point 24 radially inwardly spaced from the periphery 21 of the member. Thus, there is defined a tongue 25, integral with the region 13 or 16 and closing the outer end of the slot 19. In preparation for assembly of the blower wheel, these tongues 25 are bent out of the plane of the region 13 or 16 to open the outer ends of the slots 19 for a purpose which will appear.

In an alternative form of our invention, both walls 20' and 23' may extend to the outer periphery 21 of the member, in which case the corners of the slot mouth will preferably be rounded as indicated at 26 in FIG. 4. As a still further alternative, that corner of the slot mouth opposite the tongue 25 may be rolled out of the plane of the region 13 or 17 in the manner indicated at 27 in FIGS. 4 and 5.

Each blade, indicated generally by the reference numeral 28, at a point near its outer edge 29 may be slashed at one end as at 30 to a predetermined depth; and, at a point near its inner edge 31, may be slashed at the same end as at 32 to a greater depth. The difference in depth between the slashes 30 and 32 will be substantially equal to the axial length of the web 14 or 17.

These slashes define a major tab 33 flanked by minor tabs 34 and 35; and when said tabs 34 and 35 are bent through approximately 90° in a common direction, they define distally-facing shoulders on either side of the longitudinally extending tab 33.

At its opposite end, each blade is similarly slashed at 36 and 37 to define a similar, longitudinally extending major tab 38 flanked by minor tabs 39 and 40 which, when similarly bent, define distally-facing shoulders on either side of the tab 38.

With the mouths of the slots 19 in open condition, the backer disc 11 and the forward ring 12 are arranged in axially-spaced, coaxial relation with their inner, offset regions facing each other and with their respective slots 19 in spaced registry. Now, the tab 33 of a blade is entered in one of the slots 19 of the ring 12 and the tab 38 of the same blade is entered in one of the slots 19 of the backer disc 11. The parts are so proportioned and arranged that the tab 34 bears against the inner surface of the region 13 and the tab 35 bears against the inner surface of the region 15, while the tab 39 bears against the inner surface of the region 16 and the tab 40 bears against the inner surface of the region 18. The two members 11 and 12 may be slowly turned about their common axis while the tabs 33 and 38 of successive blades are successively so entered in the slots 19 of the two members. Either successively or in a single operation, the tongue means 25 (and 27 if the form of FIG. 5 is used) will be rebent into the planes of the regions 13 and 16, respectively, thus closing the peripheral ends of the slots. Preferably, as shown in FIG. 4A, the tongue means will bear upon the radially-outer edges of the blade tabs 33 and 38 to retain said blades against radial movement within the slots.

Either successively or in a single operation, and either before, after or during the tongue-rebending operation, the distal end regions of the tabs 33 and 38 which project beyond the outer surfaces of the regions 13 and 16 will be bent, preferably in a direction opposite to the direction in which the tabs 34, 35, 39 and 40 have been bent, into clamping engagement with the outer surfaces of the regions 13 and 16.

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It is found that the resulting blower wheel is rigid, rugged and satisfactorily permanent in its assembly, without the use of soldering, brazing, welding or rivetting.

While the above procedure is considered optimum, we find that it is possible, as suggested in FIGS. 9 and 10, to prebend the tabs 33 and 38 and to insert the blades in the member slots after such bending, so that the two minor tabs at each end of the blade bear upon the inner surfaces of the circular members and the major tabs bear upon the outer surfaces of said members with very slight clearance. After assembly of the blades with said circular members according to this plan, clamping pressure is applied to the major tabs, whereby the regions 13 and 16 will be clamped, at each blade, between the major tabs and the shoulders defined by the minor tabs.

While the stepped construction defined by the offset regions 15 and 18 is considered to be optimum, we find that it is not absolutely essential to the production of reasonably satisfactory blower wheels which are not to be subjected to heavy stress.

We claim:

1. A blower wheel comprising a pair of axially-spaced, concentric circular members, each formed to provide an outer region disposed in a transaxial plane and an inner region disposed in a transaxial plane offset toward the other circular member, each circular member further being formed with a series of correspondingly peripherally spaced slots traversing its outer region, and a series of blades, each blade being formed at each end with a tab, said tabs being received respectively in corresponding slots in said respective circular members and bearing against the remote surfaces of the outer regions of said respective circular members, each blade further being formed to provide at each end two distally facing shoulders flanking said tab, said shoulders bearing against the adjacent surfaces of said respective circular members, one shoulder at each blade end engaging the outer region of

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its associated circular member and the other shoulder at each blade end engaging the inner region of its associated circular member.

2. The blower wheel of claim 1 in which each of said slots has a width substantially equal to the thickness of a blade tab.

3. The blower wheel of claim 2 in which each of said slots has a widened mouth opening through the outer periphery of its circular member.

4. The blower wheel of claim 1 in which said blades are formed of ductile metal and said tabs are integral with their blades and are bent to bear against said remote surfaces of said circular members.

5. The blower wheel of claim 4 in which said shoulders are defined by further tabs integral with their blades and bent to bear against the adjacent surfaces of said circular members.

6. The blower wheel of claim 1 including tongue means integral with each of said circular members and substantially closing the peripheral ends of said slots to confine said major tabs therein.

References Cited by the Examiner

UNITED STATES PATENTS

| | | | |
|-----------|---------|-----------|----------|
| 1,876,518 | 9/1932 | Mathis | 29—156.8 |
| 2,419,411 | 4/1947 | Mayne | 230—134 |
| 2,496,179 | 1/1950 | Schwarz | 230—134 |
| 2,592,851 | 4/1952 | Beranek | 29—156.8 |
| 2,852,182 | 9/1958 | Wilken | 230—134 |
| 3,010,187 | 11/1961 | Glasson | 29—156.8 |
| 3,136,035 | 6/1964 | Goettl | 29—156.8 |
| 3,156,408 | 11/1964 | Whitenack | 230—134 |
| 3,181,778 | 5/1965 | Mayne | 230—134 |

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