July 14, 1959 E. LUNDE ET AL 2,894,681

CENTRIFUGAL BLOWER WHEEL STRUCTURE

Filed April 15, 1955 3 Sheets-Sheet 1

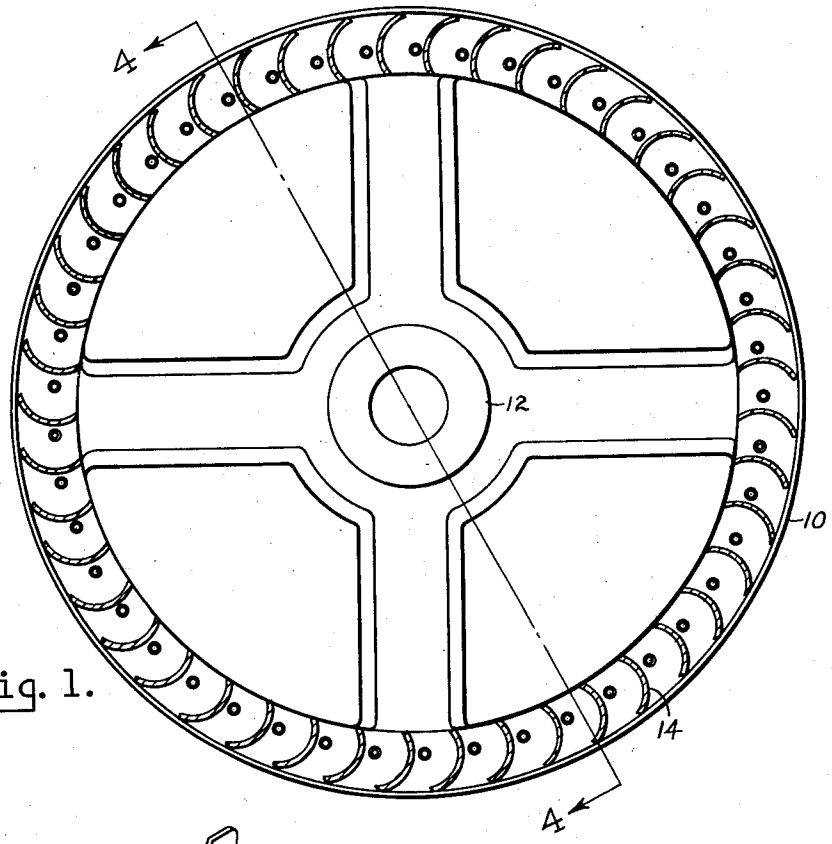
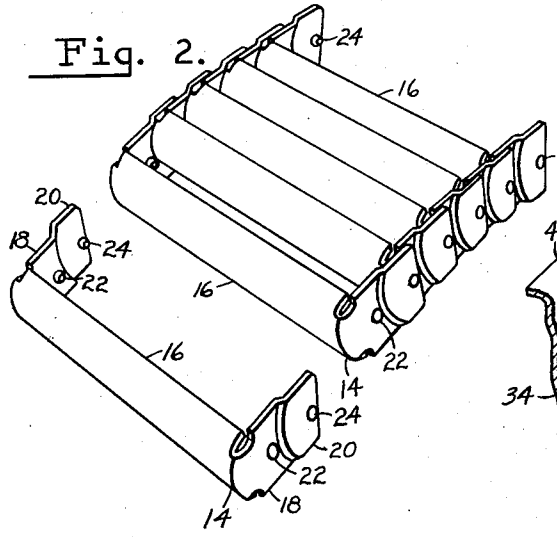


Fig. 1.

Fig. 2.



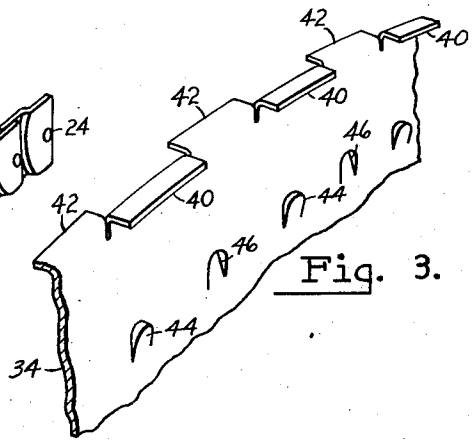


Fig. 3.

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CENTRIFUGAL BLOWER WHEEL STRUCTURE

Filed April 15, 1955 3 Sheets-Sheet 2

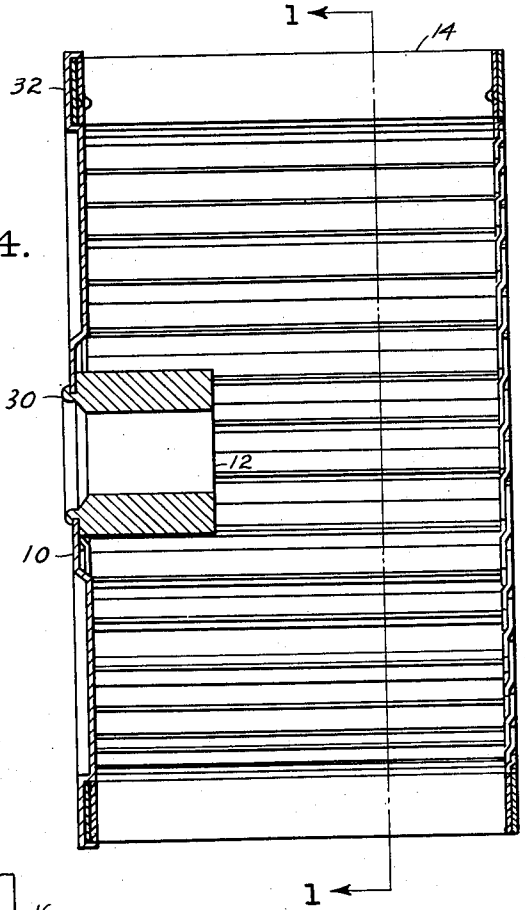


Fig. 4.

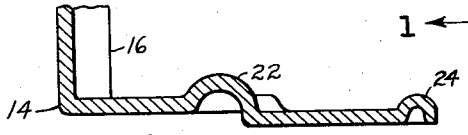


Fig. 5.

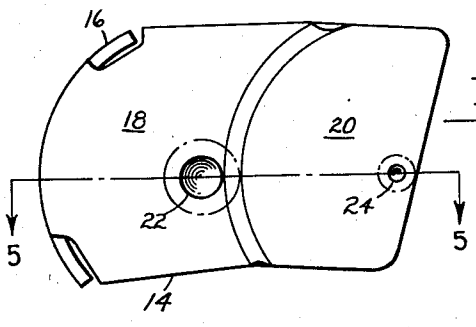


Fig. 6.

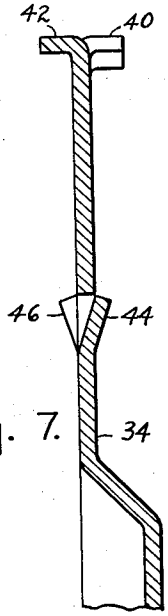


Fig. 7.

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CENTRIFUGAL BLOWER WHEEL STRUCTURE

Filed April 15, 1955 3 Sheets-Sheet 3

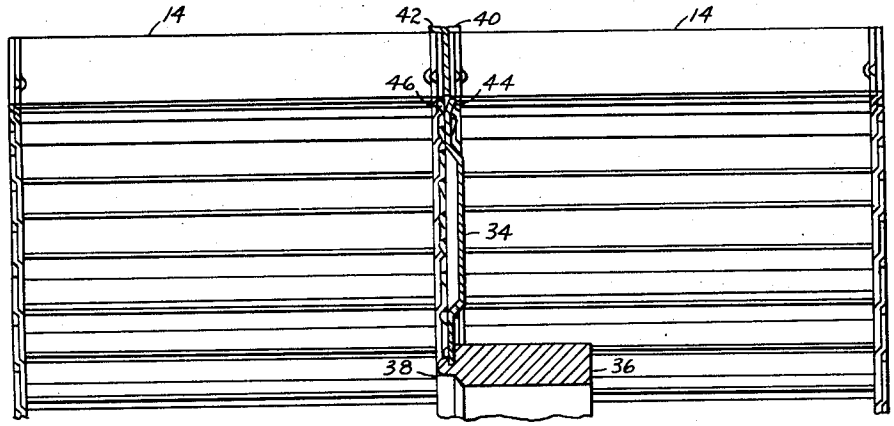


Fig. 8.

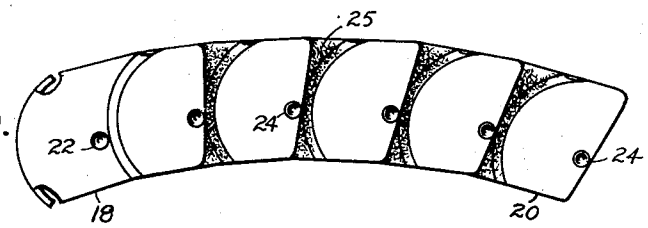


Fig. 9.

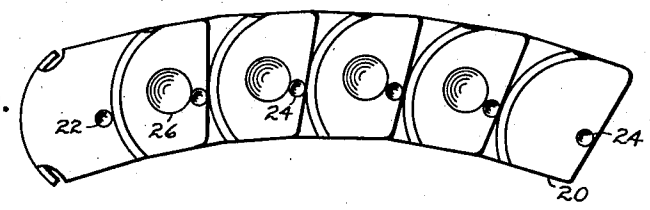


Fig. 10.

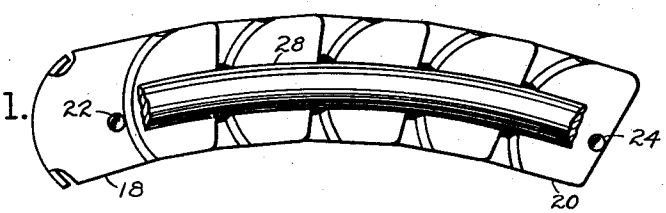


Fig. 11.

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CENTRIFUGAL BLOWER WHEEL STRUCTURE

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Application April 15, 1955, Serial No. 501,484

3 Claims. (Cl. 230—134)

This invention relates to improvements in centrifugal blower wheels and more particularly to an improved arrangement for assembling the cylindrical body structure of a blower wheel to an associated hub plate.

Heretofore in the manufacture of centrifugal blower wheels, the process of assembling the large number of parts required for the complete wheel has been a time consuming and expensive operation. The blade structure of this invention is such that the fan blades are assembled into a unitary flexible strip by the machine which forms the blades. By reason of this construction, the number of parts required for a complete wheel is reduced and the assembly of the wheel is simplified.

It is an object of this invention to provide a blade structure by which the blades are interlocked into a unitary flexible strip.

It is another object of the invention to provide a blade structure by which flanges on the blades form rim portions of the wheel.

It is another object to provide a blower wheel which has a maximum effective blade length with only a relatively small space at the ends for blade retention.

It is still another object of the invention to provide a centrifugal blower wheel in which the parts thereof can be assembled very rapidly so that the wheels can be manufactured in quantities with low cost for labor and material.

Other objects and advantages of the invention will become apparent as the specification proceeds to describe the invention with reference to the accompanying drawings in which:

Figure 1 is a sectional view of the blower wheel taken on line 1—1 of Figure 4;

Figure 2 is a perspective view of a portion of the blower wheel showing the blade structure;

Figure 3 is a perspective view of a part of the hub plate of a double width blower wheel;

Figure 4 is a sectional view taken on line 4—4 of Figure 1;

Figure 5 is a sectional view of the end of a blade taken on line 5—5 of Figure 6.

Figure 6 is an elevational end view of a blade.

Figure 7 is a sectional view of part of the hub plate of a double width wheel taken on a radial plane.

Figure 8 is a partial sectional view of a double width wheel taken on a radial plane.

Figure 9 is an elevational view of part of a wheel showing the welds securing the blades together.

Figure 10 is an elevational view of part of a wheel showing a modification of the invention in which the blades are spot welded to each other.

Figure 11 is an elevational view of part of a wheel showing another modification of the invention in which the blades are seam welded to each other.

Referring now to the drawings and particularly Figures 1 and 2, numeral 10 designates a hub plate to which is secured a hub 12 and blades 14. The blade 14 has a vane portion 16 which is curved in cross-section and a

flange base portion 18 at each end extending at right angles to the vane portion 16. Extending from the flange base portions 18 are flange end portions 20 offset outwardly from the flange base portions 18 so that the flange end portions 20 will receive therebetween the flange base portions 18 of the next adjacent blade.

The flange base portion 18 of each blade has an inwardly extending dimple 22 having its center substantially at the axis of curvature of the convex surface of the vane portion 16 of the blade. The flange end portion 20 of each blade has an inwardly extending dimple 24 which engages in the dimple 22 in the flange base portion of the next adjacent blade to hold the blades in the form of a flexible strip leaving the blade forming press. The dimple 24 may be formed prior to the assembly of the blade to the next adjacent blade. The resiliency of the flange portions 18 and 20 will permit the blade to be nested on the next adjacent blade and the dimple 24 will snap into place in the dimple 22. Alternatively the press can assemble the blade in nested position on the next adjacent blade and form the dimple 24 into the dimple 22.

A strip having the required number of blades 14 for a given wheel is then removed from the continuous strip produced by the press. After removal this strip is held in annular form and the first blade is nested in the last blade with the dimples of the blades in engagement. The blades 14 are then secured to each other by welding. Various forms of welding may be used.

Figure 9 shows a brazing weld which is produced by placing brazing material in contact with the flange portions 18 and 20 of the blade and then heating the blade assembly by torch or in a furnace to cause the brazing material to flow between adjacent surfaces of the flange portions of the blades to form the welds 25.

Another form of weld is shown in Figure 10 in which the flange end portion of each blade is electrically spot welded at 26 to the flange base portion of the adjacent blade.

Still another form of weld is shown in Figure 11 in which a seam weld 28 is produced between the flanges of the blades by an electric or gas welding process.

The hub plate 10 has a hub 12 secured thereto in any suitable manner as by swaging the flange 30 against the hub plate 10. The hub plate 10 has a peripheral channel 32 which receives one end of the blade assembly as shown in Figure 4.

The hub plate 10 is then secured to the blade assembly by welding or riveting at the peripheral channel 32. We prefer to electrically spot weld the blade assembly to the hub plate at several spaced points. If desired the brazing procedure described with reference to Figure 9 can be used to simultaneously braze the hub plate 10 and the assembled blades into a unitary structure.

As shown in Figure 8 a double width blower wheel comprises a hub plate 34 with a blade assembly secured to each side of the hub plate at the periphery. Hub plate 34 has a hub 36 secured thereto in any suitable manner as by swaging the flange 38 against the hub plate 34. The hub plate 34 has peripheral flanges 40 extending at right angles from the hub side of the hub plate and peripheral flanges 42 extending at right angles from the other side of the hub plate. Hub plate 34 has a plurality of projections 44 extending from one side and a plurality of projections 46 extending from the other side. One blade assembly is positioned and supported by flanges 40 and projections 44, the other blade assembly is positioned and supported by flanges 42 and projections 46. The blade assemblies are secured to the hub plate 34 by welding or riveting. We prefer to electrically spot weld the blade assemblies to the hub plate 34 at several spaced points. If desired, the brazing procedure de-

scribed with reference to Figure 9 can be used to simultaneously braze the hub plate and the assembled blades on both sides of the hub plate into a unitary structure.

While we have described the foregoing preferred embodiments of our invention, we contemplate that many changes may be made without departing from the scope or spirit of our invention and we desire to be limited only by the claims.

We claim:

1. An assembly for incorporation in a centrifugal blower wheel comprising a plurality of blades, each of said blades having a vane portion and flanges extending from each end of the vane portion and lying in planes which are substantially at right angles to said vane portion, each of said flanges having a base portion and an outwardly offset end portion, said base portions and said outwardly offset end portions having substantially circular indentations, the outwardly offset end portions of the flanges of a blade receiving therebetween the base portions of the flanges of the next adjacent blade, with the substantially circular indentations of the end portions extending into the substantially circular indentations of the base portions.

2. In a centrifugal blower wheel the combination of a plurality of elongated blades, each of said blades having a vane portion of curved cross-section and flanges extending from each end of the vane portion and lying in planes which are substantially at right angles to said vane portion, each of said flanges having a base portion, an outwardly offset end portion, and a shoulder portion between said base portion and said end portion, said shoulder portion having a curvature substantially the same as the curvature of said vane portion, said outwardly offset end portions of the flanges of a blade receiving therebetween the base portions of the flanges of the next blade, the base portions and the end portions of said flanges having nesting substantially circular indentations connecting said base portions of the flanges of one blade with the end portions of the flanges of the next blade and a continuous annular welding bead welded to said flanges at their outwardly facing sides.

3. An assembly for incorporation in a centrifugal blower wheel comprising a plurality of elongated blades, each of said blades having a vane portion of curved cross-section and flanges extending from each end of the vane portion and lying in planes which are substantially at right angles to said vane portion, each of said flanges having a base portion, an outwardly offset end portion, and a shoulder portion between said base portion and said end portion, said shoulder portion having a curvature substantially the same as the curvature of said vane portion, said outwardly offset end portions of the flanges of a blade receiving therebetween the base portions of the flanges of the next blade, the base portions and the outwardly offset end portions of said flanges having nesting substantially circular indentations and providing a means pivotally connecting said base portions of the flanges of one blade with the outwardly offset end portions of the flanges of the next blade.

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