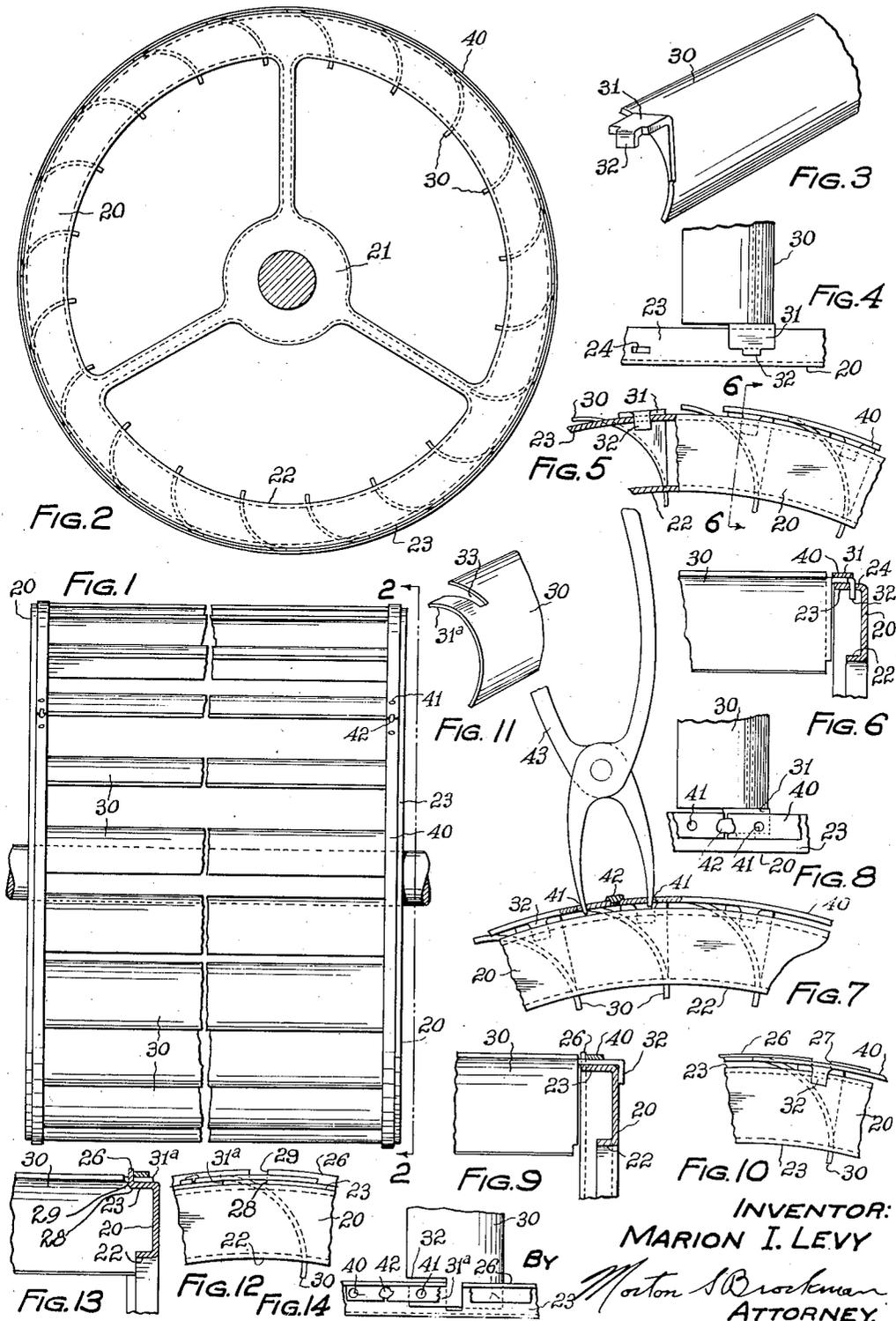


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ROTARY IMPELLER

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## ROTARY IMPELLER

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2 Claims. (Cl. 230—134)

This invention relates to blower wheels or centrifugal pumps or fans, and particularly to the rotor portion therein which is technically known as the impeller, and is an improvement over the Patent No. 2,115,367 which was granted on April 26, 1938.

The principal object of this invention is to provide an economical and expeditious means and method of constructing rotary impellers.

Another object is to construct a blower wheel of a durable structure and which has an even dynamic balance.

A further object is to construct impellers of the type mentioned which utilize a novel and simple means for attaching the blades to the side rings thereof.

These and other objects and features of the invention will become apparent from a reading of the following description and claims together with the accompanying drawings in which like parts are designated by like reference characters and wherein:

Figure 1 is a front elevation of a rotary impeller embodying the instant invention;

Figure 2 is a side elevation of an impeller wheel taken along the lines 2—2 of the Figure 1;

Figure 3 is a perspective end view of an impeller blade member;

Figure 4 is a view of a portion of a blade member and wheel assembled;

Figure 5 is a vertical sectional view of a portion of the wheel and blades;

Figure 6 is a front sectional view of the wheel and blades in assembled relation taken along the lines 6—6 of the Figure 5;

Figure 7 is a view illustrating the method of electric welding the blade retaining band around the wheel;

Figure 8 is a view of a welded band around the impeller wheel;

Figure 9 is a modified form of the invention showing a slightly different construction of an impeller wheel and method of mounting a blade thereon;

Figure 10 is a top view of the modified form of the invention;

Figure 11 is a perspective view of a modified form of blade member which may be used with the invention;

Figure 12 is a side view of a portion of an assembled wheel showing a second modified form or assembly;

Figure 13 is a front view partly in section shown in the Figure 12; and

Figure 14 is a top view showing the assembly

of the form of the invention shown in the Figure 12.

The instant invention consists primarily of three elements; there is first the rings or wheel members 20, next the blade member 30, and third, the constricted band or retaining member 40. Each of these members will be described in detail hereinafter.

### Preferred form

In the preferred form of the invention, which is illustrated in the Figures 1—8 inclusive, there is shown a wheel 20 which is provided with a hub and spokes hereinafter referred to and designated as a shaft mounting means 21. The wheel 20 has a small inwardly turned flange 22 on the inside thereof which lends rigidity and strength thereto. The outer or larger flange 23 also projects inwardly of the wheel but is a little larger than the inner flange 22. At evenly spaced intervals around this flange 23 there are holes 24 which receive the blade members 30 hereinafter described. The rings or wheel members 20, together with the shaft retaining means 21, the flanges 22 and 23, and the holes 24 may all be very easily stamped out of suitable sheet metal in one operation. Inasmuch as the impeller may be made either as shown, namely with the shaft retaining means 21 directly connected to the rings 20, in which case the portions 20 are literally wheels; or in the manner well known to the art, which provides for the shaft retaining means 21 to be attached to the blades 30 between the rings and not directly thereto, in which case the portions 20 would be literally rings, it is to be understood that the terms "wheel" or "ring" are to be regarded as synonymous wherever either term is used in the instant application.

The blade members 30 are of the conventional type; that is, they are curved longitudinally between their ends as illustrated in the drawing. Each end of the blade 30 is provided with a small projecting tab 31 from which there depends a small lug 32. An impeller blade of this type is clearly illustrated in the Figure 3 and may be easily stamped out of suitable sheet metal in not more than two operations. In the construction of a blower, two wheel members 20 are properly spaced and set on an axial shaft and the lugs 32 of the blades are inserted in the holes 24 of each of the wheels as shown in the Figure 4. The lugs 32 may fit the holes rather snugly so that during this step of the assembly,

the blades are lightly held in place, even when in the inverted position.

The band member 40 is then placed around all of the tabs 31 as shown in the Figure 5. The band members are simply narrow strips of metal, each end of which is provided with a small hole 41. The ends of the band are brought together by means of a pair of insulated pliers, the jaws of which engage the holes 41 in the band, as shown in the Figure 7. Each band, if made of a metal that can be stretched, is slightly shorter than the actual circumference of the wheel when all the tabs 31 are mounted thereon, so that it will be slightly stretched when the ends are brought together. When the ends are thus brought together, an electric current is passed through the ends of the band between the two holes 41 so that a weld 42 forms at the juncture thereof. The tightened or constricted ring or hoop thus formed will therefore, when the insulated pliers are removed, retain the blade members 30 in the desired position, rigidly and permanently. If a non-stretchable metal is used for the band member, its length should be exactly equal to the circumference of the assembled wheel member and it may be firmly attached to the wheel portion by two or three spot welds. These spot welds, however, are not shown in the drawing.

A particularly novel feature of this invention is that it permits the use of a shrunk metal hoop for holding the blades on the wheel member. The metal band members or hoops 40 may be made in advance and mounted on the assembled wheels and blades when in a heated and expanded condition so that when the hoops cool, they shrink and become extremely tight around the assembled members. This part of the method of manufacture is similar to the well-known process of mounting annular metal rims on wooden wagon wheels.

#### *First modified form*

The first modified form of the invention, which is shown in the Figures 9 and 10, is similar to the first type except that the flange 23 does not have holes therein. Instead, it has a bead 26 which has a series of evenly spaced notches 27 therein. This bead extends outwardly from the flange 23 and at right angles thereto. The lug 32, instead of engaging holes, as in the preferred form, extends downwardly over the outside of the wheel 20. The tab 31 on the blade 30 is held in proper position by the small slots or notches 27 into which they fit.

A band member 40 like the one heretofore described is similarly mounted on the wheel member and tabs to hold the blades in place.

#### *Second modified form*

In the second modified form which is illustrated in the Figures 11-14 inclusive, both the wheel and blade members are slightly different than those heretofore described. In this form the wheel member is provided with a flange and a bead, both of which are notched and slotted. In this third type of the invention, the flange 23 has a lateral slot 28 and the bead 26 has a radial slot or notch 29 which meets or opens into the

slot 28. This forms a substantially L shaped slot in the flange member.

The modified blade is clearly illustrated in the Figure 11 and may be made a little quicker and easier than the blades heretofore described. In forming this blade, a small slot 33 is cut into one side of the blade about one-quarter of an inch from each end so that a small tab 31a is formed. This tab is then bent inwardly a little so that it will lie smoothly on the outside of the flange 23 and abut the bead 26 of the wheel member. The edge of the blade formed by the slot 33 then fits into the L shaped slot. A band member 40 is then placed around the assembled wheel and notches 31a in the same manner and by the same method as heretofore described.

One of the advantages that this invention has over some of the earlier inventions is that it can be made more economically and may be assembled more rapidly than those devices of the prior art. Also, because of the fact that the essential parts are made of relatively simple stampings, their uniformity of weight and of size is easier to control with the ultimate result that a blower made in accordance with this invention will rotate smoother at high speed with less vibration than otherwise.

It will now be clear that there is provided by this invention a rotary impeller and method for making same which accomplishes the objects herein set forth. While the invention has been illustrated in its preferred form and while it has been described in certain specific terms and language, it is to be understood that the embodiment of the invention as illustrated and described is suggestive only and is not to be considered in a limiting sense. It should be further understood that there may be other forms or adaptations of the invention, and those modifications are also considered to be within the scope of this invention as no limitations upon it are intended other than those imposed thereon by the breadth of the appended claims.

I claim:

1. A rotary impeller, comprising in combination, spaced ring members, an inwardly turned angular flange member on each of the ring members, each of the said flange members having a plurality of evenly spaced holes therein, blade members having end portions engageable with the said flange members, lugs extending radially from the said end portions and engageable with the said holes, and annular band members constricted around the blade members retaining the said lugs in the said holes and retaining the said end portions in fixed engagement with the said flange members.

2. A rotary impeller, comprising in combination, spaced ring members, an annular flange member integral with each of the ring members, an annular bead member integral with the said flange member, the said flange and bead members having substantially L shaped slots therein, a plurality of blade members having notches therein forming tabs thereon, and a constriction means retaining the said tabs into and in close rigid engagement with the L shaped slots.

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