Jan. 27, 1959 W. A. GIDDINGS 2,870,959

BLOWER WHEEL

Filed Nov. 7, 1956

2 Sheets-Sheet 1

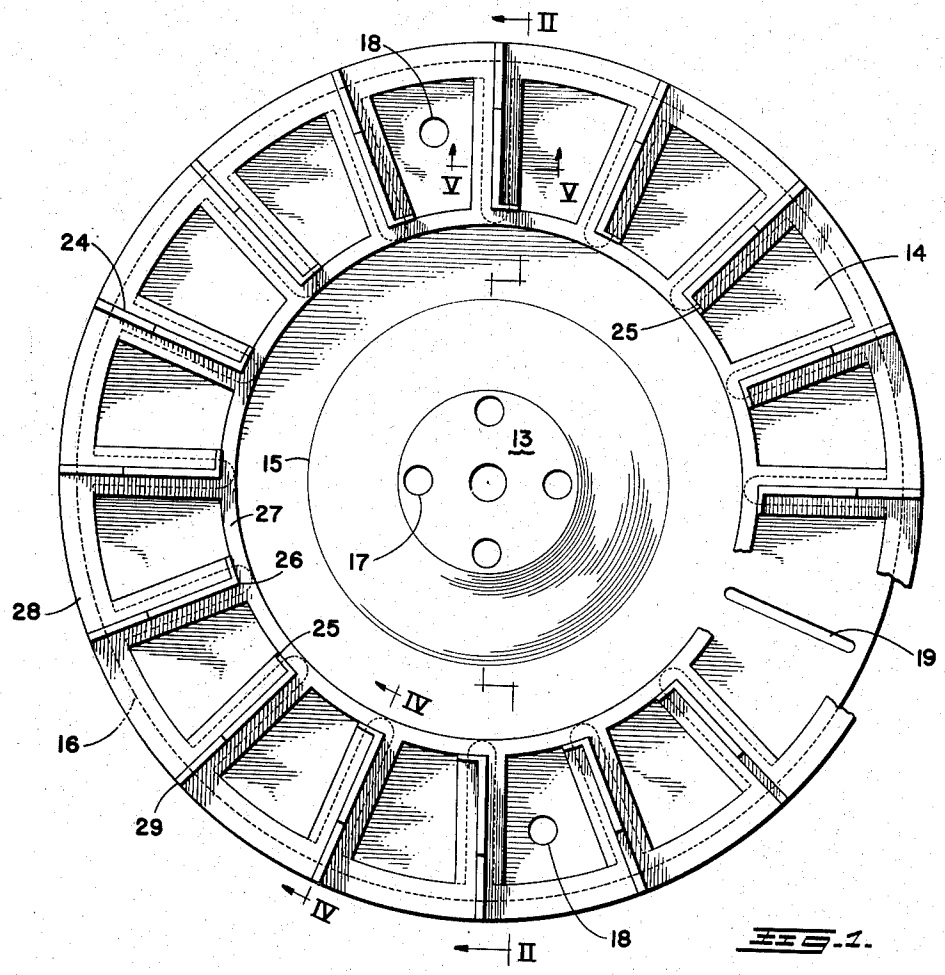


FIG. 1.

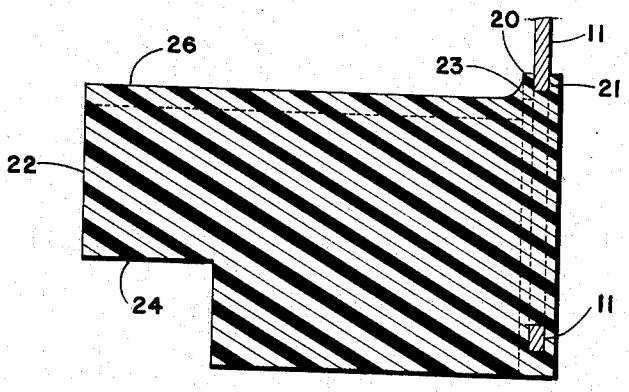


FIG. 4.

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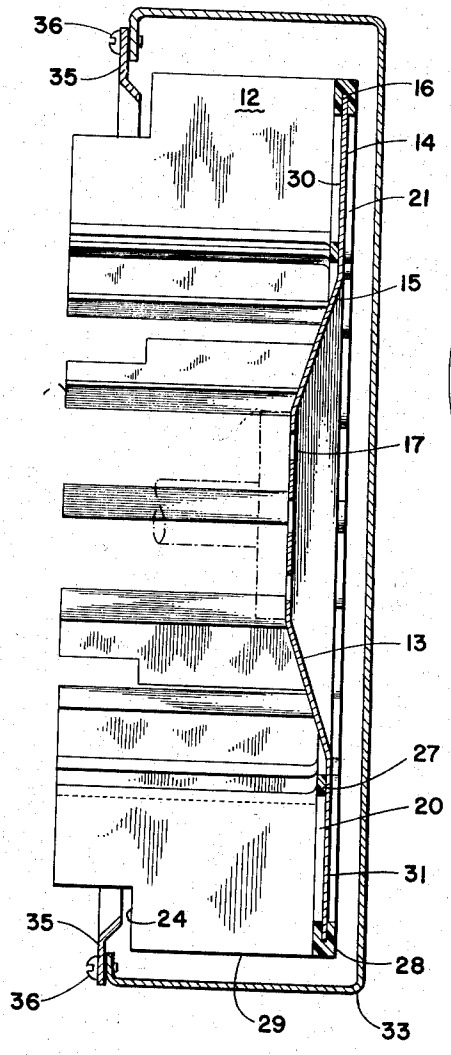


FIG. 2.

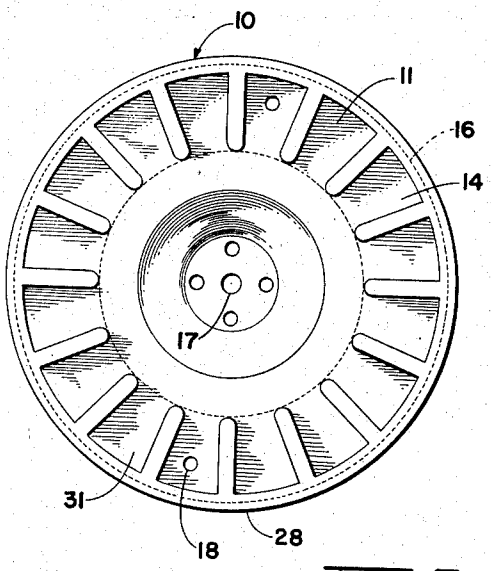


FIG. 3.

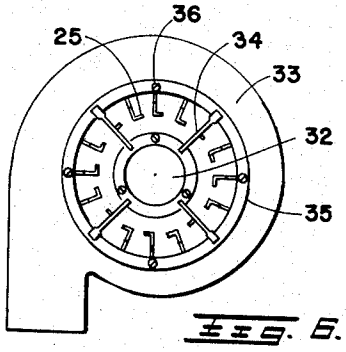


FIG. 6.

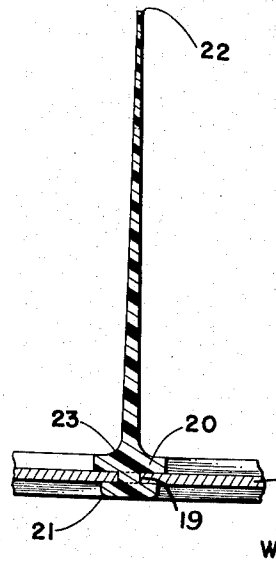


FIG. 5.

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BLOWER WHEEL

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Application November 7, 1956, Serial No. 620,885

3 Claims. (Cl. 230—134)

This invention generally relates to fans and more particularly to an improved type of centrifugal fan or blower wheel.

In the construction of such items as freezers and refrigerators in which the machine compartment is included within a single cabinet it is not uncommon to be limited in the overall dimension of the unit to the extent that sufficient space for air flow and a means to effect the heat transfer to the exterior of the unit becomes a problem. This is particularly true for built-in freezers and built-in refrigerators. When the heat transfer surface is comparatively small it is necessary to have increased air flow to carry the heat to the exterior of the unit. In this effort to conserve space and to provide a sufficient amount of air flow over the heat transfer surface, the blower wheel disclosed in this application was invented.

This blower wheel is constructed to provide a maximum amount of air flow in comparison to its size and the amount of space which it occupies. The blower wheel is light, rigid yet resilient, so that it is easy to assemble and needs no later adjustment because of bent blades or fins. It is so light in comparison to the power source that vibration is not a problem and the blower wheel does not need to be balanced to provide a smooth performance. It patentably departs from the conventional, is unique, and incorporates many desirable features and characteristics over the prior art. Many factors were considered among which were the ease of manufacture, the cost of materials, shipping costs, assembly cost, ease of assembly, and reduction in service costs at a later date.

It is therefore an object of the present invention to provide a blower wheel which has increased efficiency in the movement of air and also in the reduction of noise caused by air flow.

Another object of this invention is to provide a blower wheel which is of light weight in comparison to its power source to the extent that vibrations are minimized or non-existent because of the relative differences in the masses of the blower wheel and power source.

Yet another object is to provide a blower wheel which is easily and simply manufactured.

Still another object of this invention is to provide a blower wheel constructed of two dissimilar materials thereby providing a rigid yet a resilient construction.

Yet another object is to provide a fluid impeller in which the rotating blades extend both within and without a stationary scroll.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein the preferred form of the invention is clearly shown for purposes of illustration only.

In the drawings:

Figure 1 is a front elevation of my invention with a portion partially broken away;

Figure 2 is a sectional view taken on line II—II of Figure 1;

Figure 3 is a rear elevation of the blower wheel;

Figure 4 is a cross-section of a blade taken on line IV—IV of Figure 1;

Figure 5 is a sectional view of a blade taken on line V—V of Figure 1;

Figure 6 is a front elevation of my fluid impeller including the scroll and the power source.

As shown in the drawings:

The blower wheel **10** comprises a substantially flat planar disc or base **11** and a series of fins or blades **12** extending perpendicularly therefrom. The base **11** is of circular configuration and is made of aluminum or other suitable light material. There is an embossment **13** in the center of the base **11** and a circumferential flat annulus **14** between the periphery **15** of the embossment and the outer periphery **16** of the base **11**. There are five holes **17** in the center of the base for mounting purposes and two additional holes **18** in the annulus **14** which are utilized in positioning the base **11** in the mold during the manufacturing process. There are also a number of equally spaced radial slots **19** in the annulus **14** which are in spaced relation to the outer periphery **16**.

Each fin or blade **12** coincides with a radial slot and extends through it with reinforcing flanges **20** and **21** on either side of the base **11**. Each blade **12** extends perpendicularly from the plane of the annulus **14** and as best shown in Figure 5 is tapered, becoming narrower at the tip **22** and is provided with fillets **23** adjacent the reinforcing flange **20**. This construction provides for maximum strength with a minimum amount of weight and mass. In the area of greatest dimension each blade is substantially rectangular with a rectangular cutout **24** as shown in Figure 4. There is a reinforcing rib **25** longitudinally along the inside edge **26** of each blade **12**. Two reinforcing rings **27** and **28** are integral with both the inside edge **26** and the outside edge **29** of all the blades **12**. The reinforcing ring **27** is only on the top **30** of the base **11** and the outside reinforcing ring **28** completely encompasses the outer periphery **16**. It completely surrounds the annulus **14** and protrudes on both sides of it. The blades **12**, the reinforcing rings **27** and **28**, the reinforcing flanges **20** and **21**, the fillets **23**, and the reinforcing rib **25** are all integral and are molded to the base **11** in the manufacturing process. This blade and reinforcing structure is preferably made of a synthetic material which is rigid, yet self-supporting, and is sufficiently resilient to absorb shock. In addition, it should also have good characteristics in the resistance to heat. One of the reasons for not having the entire fan manufactured from a synthetic material is because of the danger of the plastic material melting should the motor be in a locked rotor condition. The heat from the power source is much better dissipated through a metal base **11**.

When the fan is manufactured the base **11** is prefabricated and is positioned in a mold by means of the two holes **18** previously mentioned. The mold is gated at four places and the synthetic material introduced under sufficient temperature and pressure to cause flow and filling of all cavities. In addition to the reinforcing advantages of the rings **27** and **28** and the flanges **20** and **21** their mold cavities also serve as conduits for the even flow and distribution of synthetic material within the mold. As the molten plastic is cooled both the reinforcing rings **27** and **28** contract, thus snugging the entire vane structure radially toward the center of the disc **11**. This same effect also takes place in the reinforcing flanges **20** and **21** and they snug closely in the cooling process against the top **30** and bottom **31** of the

base **11**. Thus, the vanes or blades **12** are molded and maintained in a fixed position in each individual slot and integral throughout. It is also to be noted that in addition to the structural advantage of a tapered blade and fillet **23** this feature also expedites the ejection of the completed blower wheel from the mold.

In assembly for operation the blower wheel **10** is attached to a power source **32** and is placed within a scroll **33**. As shown in Figure 6 the power source **32**, the blower wheel **10** and a combination spider leg motor mount **34** and inlet eye **35** are previously assembled before attaching to the scroll **33**. When completely assembled the unit is inserted into scroll **33** and secured therein by means of screws **36**. This construction is further illustrated in Figure 2 where it is readily seen that the blower wheel **10**, having a smaller diameter, may be taken from the scroll **33** when the inlet eye **35** is removed. Also as shown in Figure 2 the fins **12** extend partially beyond the scroll **33** and are radially positioned around the power source **32**. In addition to cooling the power source, this also provides for an increased amount of air flow which is essential in removing the heat to the exterior of a refrigerating unit when only a limited heat transfer surface is used.

Although the invention has been described with considerable particularity in connection with the illustrated embodiment, it is to be understood that the invention is not limited to the details of construction or to the specific relations of parts described, as many modifications will readily occur to those skilled in the art, and all such modifications as come within the scope of the appended claims and their equivalents are to be considered as being within the invention.

I claim as my invention:

1. In a blower wheel, a circular metallic base plate provided with circumferentially spaced radial slots, and a molded integral blade structure mounted on said base plate comprising blades disposed radially of said plate and having base portions extending through said slots with base flanges engaging the opposite faces of said plate, said blades projecting upwardly from said plate substantially parallel with the axis thereof and tapering in thickness upward, a continuous outer reinforcing ring connecting the bases of all of said blades and enclosing the outer circumferential portion of said plate, and a continuous inner ring connecting the bases of all of said blades at the upper face of said plate.

2. In a blower wheel, a circular metallic base plate provided with circumferentially spaced radial slots, and a molded integral blade structure mounted on said base plate comprising blades disposed radially of said plate and having base portions extending through said slots with base flanges engaging the opposite faces of said plate, said blades projecting upwardly from said plate substantially parallel with the axis thereof and tapering in thickness upward, said blades having at their radially inner edges angularly disposed lengthwise reinforcing ribs, a continuous outer reinforcing ring connecting the bases of all of said blades and enclosing the outer circumferential portion of said plate, and a continuous inner ring connecting the bases of all of said blades at the upper face of said plate.

3. In a blower wheel, a circular metallic base plate provided with circumferentialy spaced radial slots, and a molded integral blade structure mounted on said base plate comprising blades disposed radially of said plate and having base portions extending through said slots with base flanges engaging the opposite faces of said plate, said blades projecting upwardly from said plate substantially parallel with the axis thereof and tapering in thickness upward, said blades having at their radially inner edges angularly disposed lengthwise reinforcing ribs and being provided at their radially outer edges with substantially rectangular cutouts extending from their upper ends, a continuous outer reinforcing ring connecting the bases of all of said blades and enclosing the outer circumferential portion of said plate, and a continuous inner ring connecting the bases of all of said blades at the upper face of said plate.

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