Nov. 14, 1972 A. D. GOETTL 3,702,741

ROTOR FOR A BLOWER STRUCTURE

Filed April 12, 1971 2 Sheets-Sheet 1

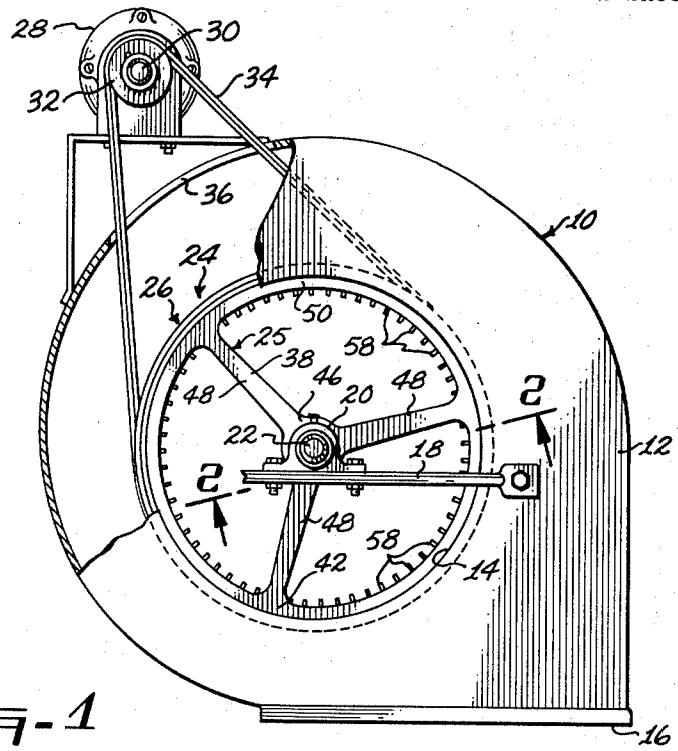


Fig-1

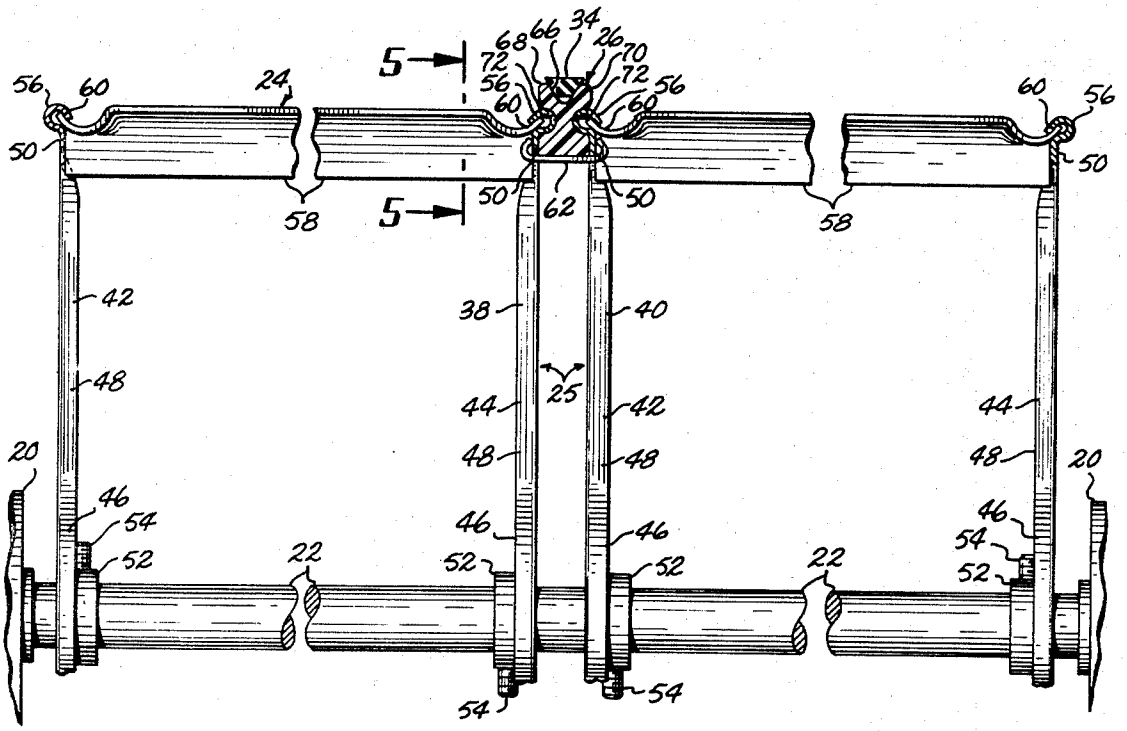


Fig-2

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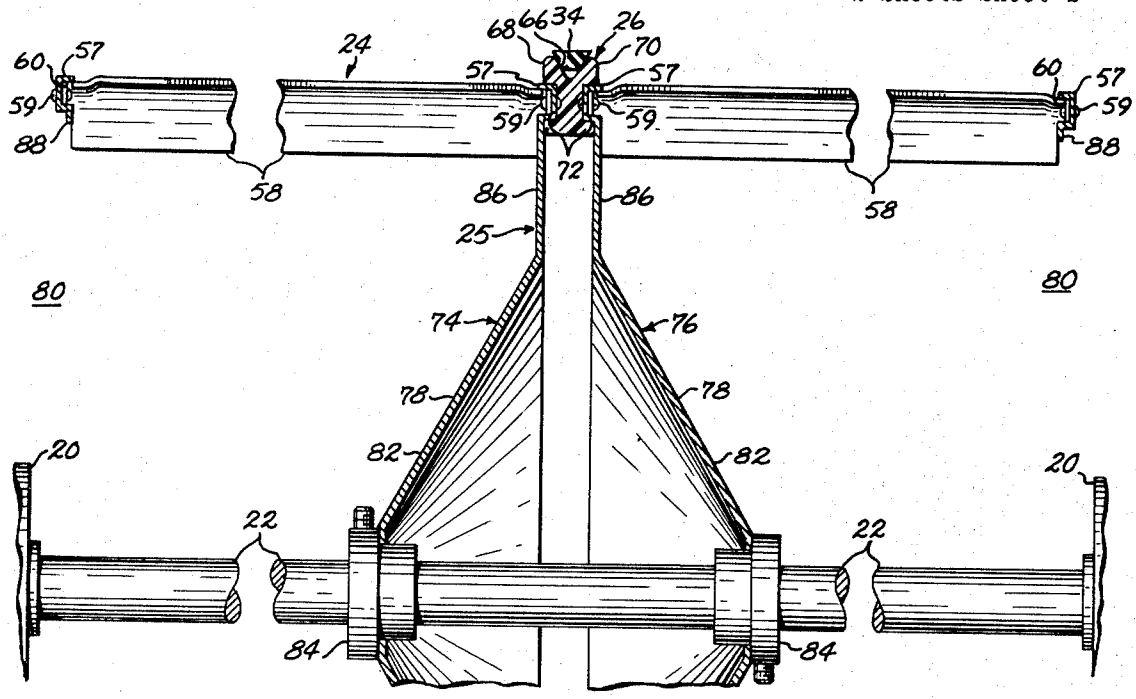


Fig. 3

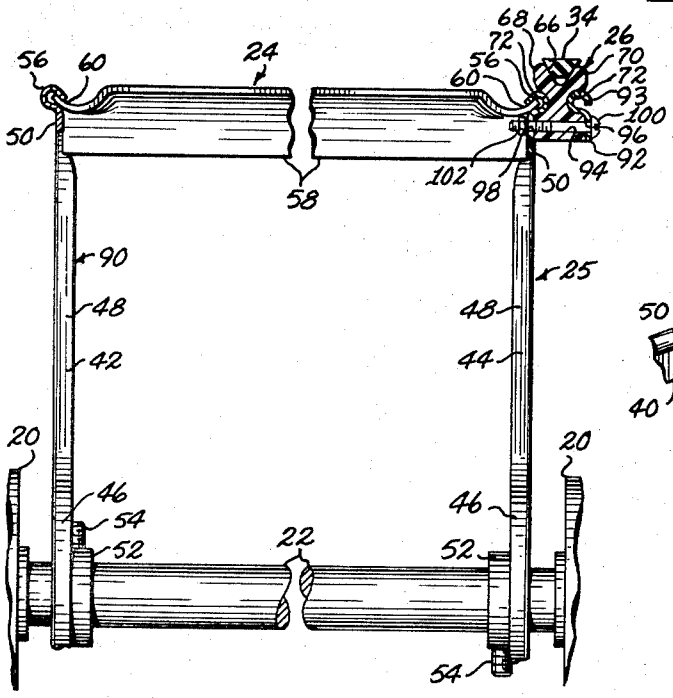


Fig. 4

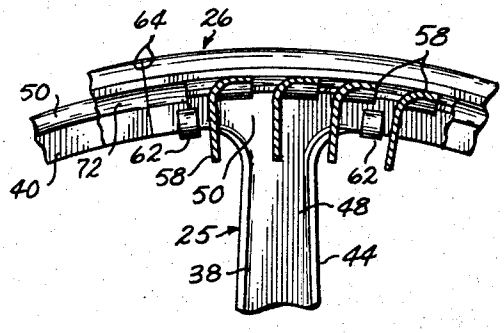


Fig. 5

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3,702,741

ROTOR FOR A BLOWER STRUCTURE

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Int. Cl. F16h 55/46
U.S. Cl. 416—187 5 Claims

ABSTRACT OF THE DISCLOSURE

A blower structure is disclosed in which the rotor thereof includes an impeller with a pulley means demountably attached to the periphery thereof.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates to blower structures and more particularly to a rotor for use therein.

Description of the prior art

For a clear understanding of the terminology employed throughout this specification, a rotor is defined as including an impeller and a pulley, the impeller includes at least one blower wheel, and the blower wheel is defined as the basic air or gas moving mechanism. Thus it should be understood that when the impeller is made up of a single blower wheel, the terms impeller and blower wheel are synonymous.

Various means have been employed for coupling rotary motion to the impellers of blower structures, the most common of such means is a pulley fixed to a rotatable shaft and outwardly disposed with respect to one of the opposed axial inlets formed in the blower housing with the impeller coaxially mounted on the shaft and positioned between the axial inlets. Such pulleys tend to disturb the inlet flow to the blower particularly when the pulleys are of large diameter, and in many instances the belts which drive these pulleys are subjected to the inlet flow to the blower which may have a deteriorating effect on the belts. Also, drive pulleys employed in this manner are costly and oftentimes require maintenance with respect to their connection to the shaft.

Several attempts have been made to form the drive pulley integral with the impeller, such integral pulleys are normally disposed on the periphery of the impellers. This method has several advantages over the previously described method of affixing a separate pulley to the rotatable shaft, such as moving the drive belt out of the inlet environment and eliminating the turbulance caused by the separate drive pulley.

Another important advantage of the pulley being formed on the periphery of the impeller is that such pulleys are inherently large which allows the use of high r.p.m. motors which provides for a more efficient cooling of the motor as well as economy in the procurement thereof.

Pulleys formed integral with the impellers have not reecived wide commercial acceptance due to the necessity of changing the traditional methods of fabricating the impellers, costs of tooling and the like.

Therefore, the need exists for a demountable drive pulley which may be mounted on the periphery of conventional impellers.

SUMMARY OF THE INVENTION

In accordance with the invention claimed a new and useful rotor is provided for a blower structure, the rotor comprises a conventional impeller with a demountable pulley means on the periphery thereof.

The pulley means for the present invention comprises an elongated member having a belt engaging groove formed therein, and is fabricated to conform to the annular end plate of the impeller. The pulley may be assembled on the end plate of a single blower wheel or may be mounted between adjacent end plates of two blower wheels coaxially mounted on a common shaft.

Accordingly, it is an object of the present invention to provide a new and useful rotor for a blower structure.

Another object of the present invention is to provide a new and useful rotor for a blower structure in which the rotor comprises an impeller having a demountable pulley means on the periphery thereof.

Another object of the present invention is to provide a new and useful pulley means which is adapted to be demountably attached to the periphery of an impeller in a blower structure.

The foregoing and other objects of this invention, the various features thereof as well as the invention itself may be more fully understood from the following description when read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a side elevation of a centrifugal blower mechanism, partially broken away and in section to illustrate the features of the invention;

FIG. 2 is a fragmentary sectional view taken on the line 2—2 of FIG. 1;

FIG. 3 is a fragmentary sectional view similar to FIG. 2 illustrating an alternate embodiment of the present invention;

FIG. 4 is a fragmentary sectional view similar to FIGS. 2 and 3 illustrating still another embodiment of the present invention;

FIG. 5 is a sectional view taken on the line 5—5 of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring more particularly to the drawings, FIG. 1 illustrates a centrifugal blower **10** of the type commonly employed in evaporative air coolers. It is not intended that the present invention be limited to this particular structure as the concepts of this invention may be applied to a wide range of blower applications.

The centrifugal blower **10** is provided with a housing **12** having the normal axially opposed inlets **14** (one shown), and a centrifugal outlet **16**. Each of the axial inlets **14** is provided with a cross member **18** which spans the inlet and is secured on its opposite ends in the conventional manner to the housing **12**. Intermediate the ends of each of the cross members **18** there is provided a pillow block **20** in which a shaft **22** is rotatably mounted.

A rotor **24** comprising impeller means **25** and demountable pulley means **26** is mounted on the shaft **22** and is rotatable about the axis of the shaft.

Rotary motion is supplied to the rotor **24** by a motor **28** having an output shaft **30** on which is keyed a pulley **32**. A V-belt **34** of conventional design passes around the pulley **32** and enters through a slot **36** into the interior of the housing **12** where it drivingly engages pulley means **26**.

FIG. 2 illustrates the rotor **24** of the present invention which comprises the impeller means **25** with the pulley **26** mounted thereon in a manner to be hereinafter described in detail. The impeller **25** in this embodiment includes two identical blower wheels **38** and **40** coaxially mounted on the shaft **22**.

Since the blower wheels **38** and **40** are identical the following description of blower wheel **38** also applies to blower wheel **40**.

The blower wheel **38** is provided with two identical disk shaped end plates **42** and **44**. As best seen in FIG. 1, wherein end plate **42** is shown, the plate comprises a central hub **46** from which a plurality of integrally formed spokes **48** or struts radially extend. The spokes **48** terminate at their outermost ends in an integrally formed annular ring **50**.

As seen in FIG. 2, the hub **46** of each end plate **42** and **44** is provided with a collar **52** welded, staked or otherwise attached thereto. Each collar is provided with a set screw **54** which attaches the blower wheel to the shaft **22** in the normal manner, and also allows the wheels to be longitudinally positioned along the length of the shaft.

The annular rings **50** of the end plates **42** and **44** are each provided with a peripheral edge **56** which may be rolled or otherwise formed thereon. The edge **56** is shown as opening inwardly for engaging and retaining a plurality of blades **58**. The blades **58** extend between the spaced apart end plates and are positioned in spaced intervals to form a cylindrical configuration which when mounted on the shaft **22** is concentric therewith.

Each of the blades **58** are formed with a pair of tabs **60**, one extending from each end of the blade. Blades fabricated in this manner may be assembled by inserting the opposite tabs **60** of each blade in the opposed openings of the edges **56** and crimping the edge or otherwise affixing the tabs therein.

The two blower wheels **38** and **40** are coaxially mounted on the shaft and are longitudinally positionable thereon as hereinbefore described. Therefore, the pulley **26** may be inserted between the adjacent end plates **42** and **44** of the blower wheels. The pulley **26** is positioned between the adjacent edges **56** of the adjacent annular rings **50** and is maintained in this position by longitudinally sliding at least one of the blower wheels **38** or **40** to sandwich the pulley **26** therebetween. Additional means for securing the pulley **26** in this position may be employed such as providing a plurality of spring clips **62**, or other connector devices, at spaced intervals around the rings **50** (FIGS. 2 and 5).

The pulley **26** may be formed of various materials such as neoprene, or selected ones of the synthetic materials called plastics, and the like. The pulley material however should be flexible enough to assume the geometric shape of the periphery of the blower wheels and should also resist cold flow. The pulley **26** may be molded, extruded or otherwise formed into the desired configuration and may be fabricated in any desired length which is trimmed to the proper size to provide abutting ends **64** (FIG. 5).

The pulley **26** is provided with the usual V-shape, in cross section, channel **66** formed in one surface thereof to engage and be driven by the V-belt **34**. The opposite side surfaces **68** and **70** of the pulley may be provided with recesses **72** or gripping means formed along the length thereof into which the edges **56** of the adjacent annular rings **50** are inserted. This method of mounting the pulley **26** prevents radial displacement thereof which may be caused by belt tension or centrifugal force.

It should be understood that the hereinbefore described construction details of the blower wheels **38** and **40** are merely exemplary of one method of fabricating such wheels. Therefore, the edges **56**, shown and described with relation to wheels **38** and **40**, may vary in size, cross sectional configuration and the like in wheels fabricated by other methods. These differences will not effect the basic concepts of the present invention as the recesses **72**, or gripping means may be formed in the pulley **26** to suit a particular wheel structure.

FIG. 3 illustrates a fragmentary sectional view of another type of impeller structure sometimes referred to as a center suspended blower.

In this technique the impeller means **25** is fabricated of two identical cantilevered blower wheels **74** and **76**. Each wheel **74** and **76** is fabricated with a single end plate **78** which is a solid structure from which blades **58** are cantilevered, thus forming a single inlet **80** to each wheel. The wheels **74** and **76** are mounted on the shaft so that the end plates are positioned substantially in the center of the blower housing **12** and are adjacent to each other which positions the opposed inlets **80** in close proximity to the opposed axial inlets **14** of the housing **12**.

The end plates **78** of the cantilevered wheels **74** and **76** are each fabricated with a conical hub **82** and have a collar **84** suitably attached thereto. The collars **84** attach the wheels **74** and **76** to the shaft **22** and allow longitudinal positioning of the wheels in a manner similar to that previously described with reference to wheels **38** and **40**. Each of the conical hubs **82** terminate in an integrally formed disk portion **86** which radially extends from the hub in a plane perpendicular to the shaft **22**.

The disk portions **86** of the end plates **78** are the functional equivalents of the annular rings **50** of wheels **38** and **40** and are shown with a different type of peripheral edge **57** in which the blades **58** may be secured by rivets **59**, welding or the like. The blades **58** are supported on the ends extending toward the inlets **80** by an annular retainer ring **88**.

With the cantilevered blower wheels **74** and **76** fabricated and assembled on the shaft **22** in this manner the pulley means **26** may be mounted therebetween in the same fashion as hereinbefore described.

FIG. 4 illustrates another common type of impeller structure formed of a single blower wheel **90**.

The blower wheel **90** is fabricated in the same manner as wheels **38** and **40** therefore the structural elements are identified by the same reference numerals and the descriptive details of the elements need not be repeated.

Since the pulley means **26** cannot be mounted between adjacent blower wheels as was the case with wheels **38** and **40**, **74** and **76**, an annular support ring **92** is provided. The support ring **92** is provided with a peripheral edge **93** similar to the previously described edge **56**, and the ring **92** is positioned adjacent to the outwardly disposed surface of either one of the annular rings **50** to hold the pulley **26** therebetween. The pulley **26** is formed with transverse holes **94** provided in spaced increments along the length thereof which when assembled align with spaced holes **96** formed in support ring **92**, and with holes **98** formed in annular ring **50**. Suitable connector means such as screw **100** and nut **102** are employed to assemble the pulley and support ring to the wheel.

While the principles of the invention have now been made clear in the preferred embodiments, there will be immediately obvious to those skilled in the art many modifications in structure, arrangements, proportions, the elements and the materials used in practice of the invention, and otherwise which are particularly adapted to specific environments and operating requirements without departing from those principles. The appended claims are therefore intended to cover and embrace such modifications within the limits only of the true scope of the invention.

I claim:

1. A rotor for a blower structure of the type having a shaft coaxially mounted within a pair of opposed axial inlets formed in a blower housing, the blower structure also having a drive mechanism for providing rotary motion to said rotor, said rotor comprising:

(a) impeller means having at least one end plate and mounted for rotation about the axis of the shaft;

(b) pulley means demountably attached to the periphery of the end plate of said impeller means for transmitting rotary motion from the drive mechanism to said impeller means, said pulley means comprising:

an elongated body adapted to assume the geometric shape of the periphery of the end plate of said impeller means;

a V-shaped in cross section channel in one surface of said body for receiving a V-belt therein; and

gripping means formed in the opposite side edges

of said body along the length thereof for engaging the periphery of the end plate of said impeller means.

2. A rotor as claimed in claim 1 wherein said impeller means comprises:

(a) a blower wheel having a pair of spaced apart disk shaped end plates, each of the end plates having a hub with a plurality of spokes radially extending therefrom which terminate in an annular ring;

(b) a support ring positioned adjacent to the outwardly disposed surface of the annular ring of one of the end plates for supporting said pulley means therebetween; and

(c) connector means on said blower wheel for holding said pulley means between said support ring and the adjacent annular ring.

3. A rotor as claimed in claim 1 wherein said impeller means comprises a pair of blower wheels each having a pair of spaced apart disk shaped end plates, each of the end plates having a hub with a plurality of spokes radially extending therefrom which terminate in an annular ring, at least one of said blower wheels being longitudinally positionable along the length of the shaft for positioning the inwardly disposed end plates of said pair of blower wheels adjacent to each other for holding said pulley means between the adjacent annular rings thereof.

4. A rotor as claimed in claim 3 wherein said impeller means further comprises a connector means on said impeller means for holding said pulley means between the adjacent annular rings of said blower wheels.

5. A rotor as claimed in claim 1 wherein said impeller comprises a pair of cantilevered blower wheels mounted on the shaft to provide opposed inlets and adjacent end plates, at least one of said blower wheels being longitudinally positionable along the length of the shaft to provide an adjustable space between the adjacent end plates into the periphery of which said pulley means is inserted and held.

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U.S. Cl. X.R.

74—230.11; 416—178