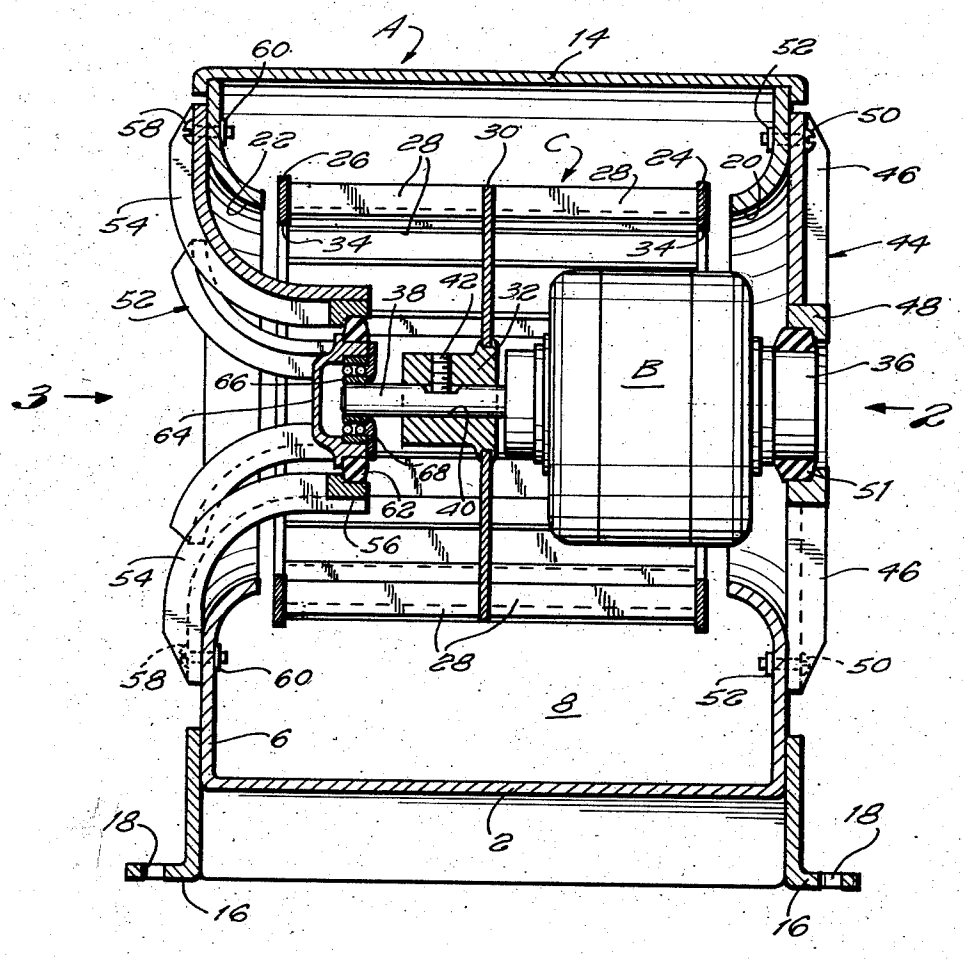
July 9, 1957 J. W. TWEEDY 2,798,659

DIRECT DRIVE BLOWER

Filed July 16, 1954 2 Sheets-Sheet 1

FIG. 1.



INVENTOR
JAMES W. TWEEDY
BY James and Franklin
ATTORNEYS

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Filed July 16, 1954 2 Sheets-Sheet 2

FIG. 2.

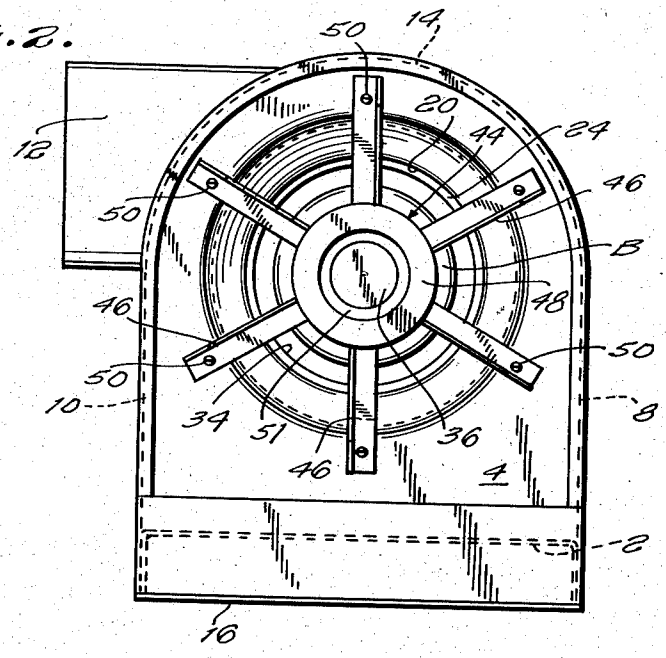
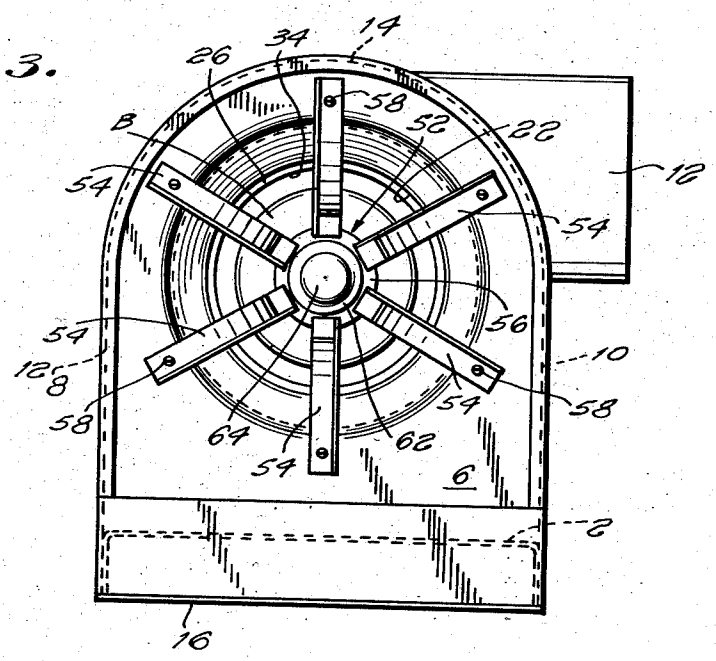


FIG. 3.



INVENTOR
JAMES W. TWEEDY
BY James and Franklin
ATTORNEYS

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DIRECT DRIVE BLOWER

James W. Tweedy, Owosso, Mich., assignor to Redmond Company, Inc., Owosso, Mich., a corporation of Michigan

Application July 16, 1954, Serial No. 443,801

4 Claims. (Cl. 230—117)

The present invention relates to the construction of a direct drive blower, and in particular to a novel mode of mounting both the blower wheel and the driving motor therefor.

As the use of blowers in various industrial applications expands, problems of space and expense become more and more critical. It is often the case that in vehicles or in aircraft the blower and its source of motive power, usually an electric motor, must be mounted in very restricted spaces and hence the overall size of the composite blower-motor combination must be minimized. Moreover, the places where these blowers are mounted are not always well ventilated, and consequently some means must be provided for cooling the motor if reliable operation over long periods of time is to be obtained. In addition, particularly when blowers are employed in passenger vehicles such as private automobiles, the mounting of the blower and the motor must be such that as little noise and vibration as possible will be produced by them. It goes without saying that simplification of structure, ease of assemblability and inexpensiveness are also extremely important factors, particularly in the case of highly competitive assemblies such as automobile heating systems.

According to the construction of the present invention a blower-motor combination unit is produced which takes up no more space than does the blower alone. The construction is such that only a single bearing external of the motor is required, and the motor is readily removable and replaceable in the event of failure thereof. The motor and blower wheel are mounted as a unit within the blower housing and are insulated from that housing by resilient mounting members, so that vibration and noise is kept to a minimum. The motor is so positioned that whenever the blower wheel is rotated fresh air will be drawn over the motor to cool it. The entire structure is exceedingly inexpensive, both from the point of view of the cost of parts and from the point of view of production and assembly costs.

To this end the blower housing is provided with the usual apertures on the sides thereof through which air may enter the housing and pass into the hollow blower wheel. Mounting brackets, preferably in the form of spiders, are secured to the housing and extend over the apertures in the sides thereof, the driving motor being received within the housing preferably coaxially with the blower wheel, one end of the motor having a projection which is mounted in one of the brackets, the driving shaft extending from the other end of the motor and being received in the other bracket. The shaft passes through the blower wheel, the latter being secured thereto in any appropriate manner. It is preferred that both the projection on the motor and the bearing be mounted in their respective brackets via resilient cushioning elements so as to minimize vibration and noise. The opening in at least one side of the housing, that side nearest the motor, is large such that the motor can pass therethrough, and the bracket is removable in order to facilitate removal

and replacement of the motor in the event of necessity for such action.

To the accomplishment of the above, and to such other objects as may hereinafter appear, the present invention relates to the structure of a blower-motor combination unit, as defined in the appended claims and as described in this specification, taken together with the accompanying drawings, in which:

Fig. 1 is a central vertical cross sectional view of the combination unit of the present invention;

Fig. 2 is a side elevational view taken from the right hand side of Fig. 1; and

Fig. 3 is a side elevational view taken from the left hand side of Fig. 1.

The unit comprises a housing generally designated A, a motor generally designated B, and a blower wheel generally designated C. The housing is of conventional shape and comprises a bottom wall **2**, side walls **4** and **6**, end walls **8** and **10**, the latter having an outlet **12**, and a top wall **14**. While these walls have been separately designated, it will be understood that in many instances there may be no definite line of demarcation between them, the structural elements of which the walls are made often being curved so as to blend gradually from one type of wall to the other, all as is well known in the art of blower housings. The housing may be provided with feet **16** having apertures **18** so that the unit may be mounted in any appropriate place. Each of the side walls **4** and **6** is provided with a central aperture **20** and **22** respectively, preferably defined by inwardly flaring walls, air being adapted to enter the housing A through the apertures **20** and **22** and air being forced out from the housing A through the outlet **12** by the action of the blower wheel C.

The blower wheel C is substantially of conventional type and is defined by a pair of rings **24**, **26** at each end thereof between which properly oriented blades **28** are mounted. The wheel C of the present invention is also provided with a central disk **30** secured to a hub **32** coaxial with the wheel C. The wheel C is here specifically disclosed as formed of two wheels placed back to back.

The central openings **34** in the rings **24** and **26** at each end of the wheel C are sufficiently large so that the motor B can freely pass therethrough with appreciable clearance. The motor B is provided with a projecting part **36** at one end and with a driving shaft **38** extending from the other end thereof, the shaft **38** being adapted to pass through the bore **40** of the hub **32**, the latter being operatively secured to the shaft **38** by means of set screw **42**. The motor B is of a size such as to be completely received within the housing A and at least partially received within the blower wheel C to one side of the central disk **30** thereof. A bracket **44** defined by a plurality of radial arms **46** and a central ring support **48** is secured to the end wall **4** by means of bolts **50** and nuts **52** and extends over the aperture **20** in the housing wall **4**, air still being permitted to pass through the aperture **20** because of the space between the arms **46**. A resilient mounting ring **51** is received within the part **48**, and the projection **36** on the motor B is snugly mounted within the ring **51**, preferably in a position coaxial with the blower wheel C.

A bracket generally designated **52** is mounted on the housing side wall **6**, that bracket also preferably being in the form of a spider defined by radial arms **54** and a central ring-like part **56**, the ends of the arms being secured to the housing side wall **6** by means of bolts **58** and nuts **60** extending over the aperture **22** in the side wall **6**, air still being permitted to pass through the aperture 22 by means of the spaces between the radial arms **24**. It is preferred, as here illustrated, that the arms **54** be curved so as to extend into the housing A through the aperture

22 and into the blower wheel C via the central aperture 34 in the end ring 26 thereof, this construction being preferred in order to minimize the length of the driving shaft 38 to which the wheel C is operatively connected, thus minimizing vibration problems which might arise.

A resilient mounting ring 62 is received within the part 6, a bearing cap 64 is snugly mounted therein, a self-aligning bearing 66 is mounted within the bearing cap 64, and the end of the driving shaft 38 is rotatably received within the bearing 66, the inner end of the bearing being sealed by means of member 68.

It will be apparent from the above description, and from an examination of the drawings, that both the motor B and blower wheel C are coaxially mounted within the housing A by means of the brackets 44 and 52, that the drive of the blower wheel C is direct and positive, that both units are resiliently insulated from the housing A by means of the rings 51 and 62 in order that noise and vibration should be minimized, that no more space is taken up by the entire unit than is necessarily taken up by the housing A alone, that only a single external bearing 66 is required for the entire assembly and that, as the blower wheel C is rotated, air will be sucked in by it over and through the motor B in order to cool the latter. If replacement of the motor B is required, it is merely necessary to unscrew the bracket 44 and remove it together with the motor B, first having released the set screw 42 through any appropriate orifice in the housing A. The shaft end 38 may merely be pulled out from the bearing 66 without disturbing the alignment of that bearing. The motor B is then readily removed from the bracket 44, a new motor may be placed therein, and the entire unit reassembled in a simple manner and without requiring any particular skill or any special equipment. If for any reason the bearing 66 should become defective, it can be replaced in a correspondingly simple manner. It is to be particularly noted that because of the direct connection between the blower wheel C and the shaft 38, those two elements are always properly aligned with one another, and that the brackets 44 and 52, when bolted in place, ensure proper alignment, within acceptable limits, between the blower wheel C and the housing A, and prevent radial vibration of the blower wheel C which might otherwise occur through whipping of the shaft 38 if its outer end were unsupported.

While but a single embodiment of the present invention has been here disclosed, it will be apparent that many variations may be made therein, all within the scope of the following claims.

I claim:

1. A blower-motor combination comprising a blower housing having side walls, a blower wheel within said housing between said side walls, a motor having a driving shaft extending from one end thereof, an end of said motor being mounted on one of said housing side walls, the body of said motor being at least partially received inside said wheel, a hub located intermediate the length of said wheel, said hub operatively connecting said wheel to said shaft so that the former is driven by the latter, the end of said shaft being located inside said wheel, said other side wall having an element connected thereto which extends into said wheel, and a bearing carried by said element within which said shaft end is rotatably received, said bearing and said mounting for said end of said motor comprising substantially the sole support for said blower wheel and motor within said housing, and said hub comprising substantially the sole support of said blower wheel on said motor.

2. The combination of claim 1, in which said bearing is of the self-aligning type.

3. A blower-motor combination comprising a blower housing, a blower wheel within said housing, said housing having side walls with air entry apertures in line with said wheel, a motor having a driving shaft extending from one end thereof, and a part projecting from the other end thereof, a spider extending over the aperture in one of said housing side walls in which spider said motor part is received and mounted, the body of said motor being at least partially received inside said wheel, a hub located intermediate the length of said wheel, said hub operatively connecting said wheel to said shaft so that the former is driven by the latter, the end of said shaft being located inside said wheel, a spider extending over the aperture in the other of said housing walls and terminating inside said wheel, and a bearing carried by said spider within which said shaft is rotatably received, said bearing and said spider comprising substantially the sole support for said blower wheel and motor within said housing, and said hub comprising substantially the sole support of said blower wheel on said motor.

4. The combination of claim 3, in which said bearing is of the self-aligning type.

References Cited in the file of this patent

UNITED STATES PATENTS

1,921,218	Colby	Aug. 8, 1933
1,935,538	Baumann	Nov. 14, 1933
2,297,049	Cotton et al.	Sept. 29, 1942
2,476,515	Stevens	July 19, 1949
2,482,847	Goodman	Sept. 27, 1949
2,661,894	Stevenson et al.	Dec. 8, 1953
2,686,630	Burrowes	Aug. 17, 1954