

March 26, 1946.

C. P. JENKINS

2,397,170

FAN AND MOTOR UNIT

Filed Jan. 29, 1944

2 Sheets-Sheet 1

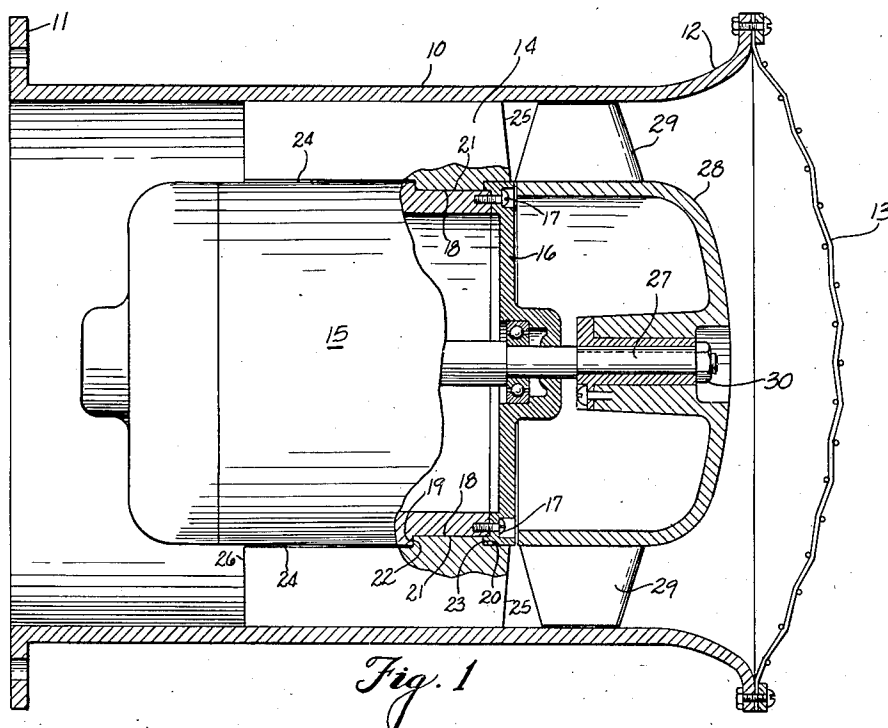


Fig. 1

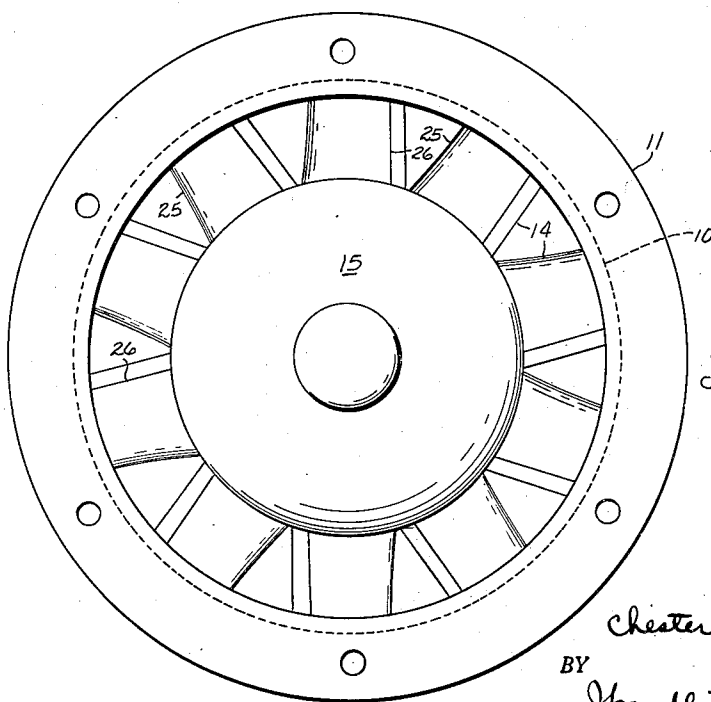


Fig. 2

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2 Sheets-Sheet 2

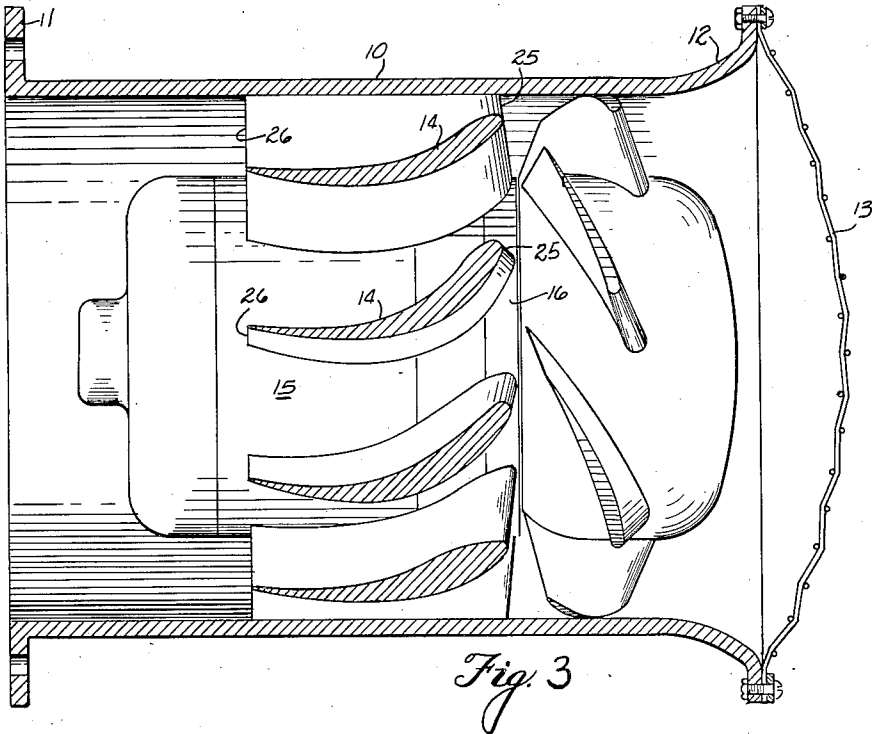


Fig. 3

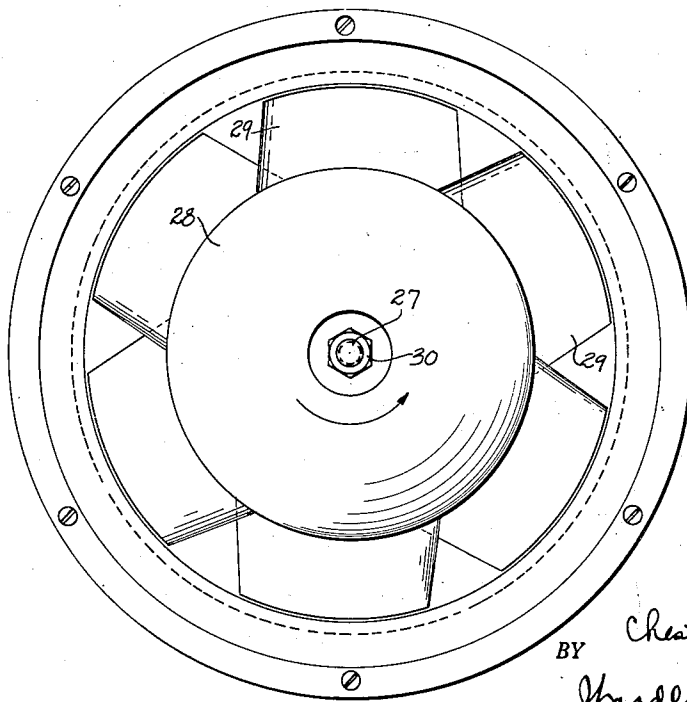


Fig. 4

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UNITED STATES PATENT OFFICE

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FAN AND MOTOR UNIT

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7 Claims. (Cl. 230-117)

The invention relates in general to a fan and motor housing and more particularly to a fan and motor housing for an axial flow fan.

An object of the invention is the provision of a fan and motor housing in which the motor and fan may be readily mounted and aligned within the housing.

Another object of the invention is the provision of an axial flow fan structure having an outer annular wall and a plurality of angularly spaced and inwardly extending vanes connected to the outer annular wall and supporting a motor at their inner ends substantially concentric within the outer annular wall.

Another object of the invention is the provision of a motor having an annular recess to fit within the inner ends of the plurality of vanes, in which the annular recess has side shoulders which engage side surfaces or edges of portions of the vanes to hold the motor against longitudinal movement.

Another object of the invention is the provision of at least one of the side shoulders of the recess being removable to facilitate the mounting of the motor within the stationary vanes.

Another object of the invention is the provision of a fan and motor housing in which the motor and fan are so mounted and aligned within the housing that the tip clearance between the fan and the housing may be maintained at a close minimum.

Other objects and a fuller understanding of the invention may be had by referring to the following description and claims, taken in conjunction with the accompanying drawings, in which:

Figure 1 is a longitudinal cross-sectional view of the fan and motor housing embodying the features of the invention;

Figure 2 is a rear view of the device shown in Figure 1;

Figure 3 is a longitudinal cross-sectional view of the outside main air duct with the other parts shown in a side elevational view;

Figure 4 is a front view of the device shown in Figures 1 and 3.

With reference to the drawings, the fan and motor housing comprises a cast structure having an outer annular wall 10 and a plurality of air guide vanes 14 integrally connected thereto. The air guide vanes 14 are annularly spaced around the outer annular wall and extend inwardly toward the center of the housing. The inner ends of the vanes 14 receive the motor 15 which is mounted substantially concentric within the outer annular wall 10. The forward end of the

outer annular wall 10 is provided with an outwardly flared portion 12 to receive the incoming air. A screen 13 may be provided on the forward end of the flared portion 12. The flared portion 12 may be integrally constructed with the outer annular wall or may be constructed in a separate piece. The rear end of the outer annular wall may be provided with a connecting flange 11 whereby the housing may be suitably fastened to other conducting ducts which are not shown.

As illustrated, the motor is provided with a removable end wall 16 which may be suitably connected to the outer frame of the motor 15 by means of screws 17. The end wall 16 carries a bearing for the motor shaft 27 upon which is mounted a fan 29 having a nose-like hub 28 which may be suitably anchored to the shaft 27 by means of a nut 30. The outer annular surface of the motor 15 is substantially co-extensive with the nose-like hub 28 so that the fan driven air may flow rearwardly over the surface of the motor with a minimum of air turbulence.

The stationary vanes 14 which support the motor each have an inwardly projecting stepped portion with first and second side edges 22 and 23 and an end supporting surface 21 therebetween. As illustrated, the motor has external engagement means with first and second side shoulders 19 and 20 and an annular surface 18 therebetween. The projecting step portions of the vanes projects into the external engagement means with the said end supporting surfaces thereof engaging the said external surface of the engagement means, which thereby aligns the motor shaft and fan substantially concentric within the outer annular wall 10. The first and second side shoulders 19 and 20 of the external engagement means of the motor engage, respectively, the first and second side edges 22 and 23 of the projecting step portions of the vane to hold the motor against longitudinal movement. The side shoulder 20 is on the removable end wall 16 to facilitate the mounting of the motor within the vanes. The removable end wall 16 is recessed within the leading or forward edges 25 of the vane so that the rear end of the nose-like hub 28 of the fan fits relatively close to the leading or forward edges 25 of the vane. A small clearance 24 is provided between the outer surface of the frame of the motor 15 and the inner end of the stationary vanes so that the motor may be readily mounted within the vanes with sufficient clearance, the alignment of the motor within the vanes being effected by the engagement of the annular surface 18 of the external engagement means of the motor within the end support-

ing surfaces 21 of the projecting step portions of the vanes. The trailing edges 26 of the stationary vanes extend rearwardly to substantially include the major part of the outer annular surface of the motor.

The mounting herein illustrated is simple and requires a minimum of machining and yet will give accurate alignment of the motor shaft and fan within the outer annular housing.

Although I have described my invention with a certain degree of particularity, it is understood that the present disclosure has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

What is claimed is:

1. In an axial flow fan structure comprising an electric motor having a shaft with a fan including a hub and outwardly extending blades mounted on said shaft, the improvement of a fan and motor housing comprising a structure having an outer annular wall and a plurality of annularly spaced and inwardly extending vanes connected to the outer annular wall and supporting the motor substantially concentric within the outer annular wall, each of said vanes supporting the motor having an inwardly projecting step portion with first and second side edges and an end supporting surface therebetween, said motor having external engagement means with first and second side shoulders and an external surface therebetween, said projecting step portions of the vanes projecting into the external engagement means with the said end supporting surfaces thereof engaging the said external surface of the engagement means, for aligning the motor shaft and fan substantially concentric within the outer annular wall, said first and second side shoulders of the external engagement means of the motor engaging respectively the first and second side edges of the projecting step portions of the vanes to hold the motor against longitudinal movement.

2. In an axial flow fan structure comprising an electric motor having a shaft with a fan including a hub and outwardly extending blades mounted on said shaft, the improvement of a fan and motor housing comprising a structure having an outer annular wall and a plurality of annularly spaced and inwardly extending vanes connected to the outer annular wall and supporting the motor substantially concentric within the outer annular wall, each of said vanes supporting the motor having an inwardly projecting step portion with first and second side edges and an end supporting surface therebetween, said motor having external engagement means with first and second side shoulders and an external surface therebetween, said projecting step portions of the vanes projecting into the external engagement means with the said end supporting surfaces thereof engaging the said external surface of the engagement means, for aligning the motor shaft and fan substantially concentric within the outer annular wall, said first and second side shoulders of the external engagement means of the motor engaging respectively the first and second side edges of the projecting step portions of the vanes to hold the motor against longitudinal movement, said motor having a removably mounted member with a surface which includes said second side shoulder to facilitate the mounting of the motor within the vanes.

3. In an axial flow fan structure comprising

an electric motor having a shaft with a fan including a hub and outwardly extending blades mounted on said shaft, the improvement of a fan and motor housing comprising a structure having an outer annular wall and a plurality of annularly spaced and inwardly extending vanes connected to the outer annular wall and supporting the motor substantially concentric within the outer annular wall, each of said vanes supporting the motor having an inwardly projecting step portion with first and second side edges and an end supporting surface therebetween, said motor having external engagement means with first and second side shoulders and an external surface therebetween, said projecting step portions of the vanes projecting into the external engagement means with the said end supporting surface thereof engaging the said external surface of the engagement means, for aligning the motor shaft and fan substantially concentric within the outer annular wall, said first and second side shoulders of the external engagement means of the motor engaging respectively the first and second side edges of the projecting step portions of the vanes to hold the motor against longitudinal movement, said motor having a removably mounted end wall with a surface which includes said second side shoulder to facilitate the mounting of the motor within the vanes.

4. In an axial flow fan structure comprising an electric motor having a shaft with a fan including a hub and outwardly extending blades mounted on said shaft, the improvement of a fan and motor housing comprising a structure having an outer annular wall and a plurality of annularly spaced and inwardly extending vanes connected to the outer annular wall and supporting the motor substantially concentric within the outer annular wall, each of said vanes supporting the motor having first and second side edges and an end supporting surface therebetween, said motor having external engagement means with first and second side shoulders and an external surface therebetween, said end supporting surfaces of the vanes engaging the said external surface of the engagement means, for aligning the motor shaft and fan substantially concentric within the outer annular wall, said first and second side shoulders of the external recess of the motor engaging respectively the first and second side edges of the vanes to hold the motor against longitudinal movement.

5. In an axial flow fan structure comprising an electric motor having a shaft with a fan including a hub and outwardly extending blades mounted on said shaft, the improvement of a fan and motor housing comprising a structure having an outer annular wall and a plurality of annularly spaced and inwardly extending vanes connected to the outer annular wall and supporting the motor substantially concentric within the outer annular wall, each of said vanes supporting the motor having first and second side edges and an end supporting surface therebetween, said motor having external engagement means with first and second side shoulders and an annular surface therebetween, said end supporting surfaces of the vanes engaging the said external surface of the engagement means, for aligning the motor shaft and fan substantially concentric within the outer annular wall, said first and second side shoulders of the external recess of the motor engaging respectively the first and second side edges of the vanes to hold the motor against longitudinal movement, said motor having a re-

movably mounted member with a surface which includes said second side shoulder to facilitate the mounting of the motor within the vanes.

6. In an axial flow fan structure comprising an electric motor having a shaft with a fan including a hub and outwardly extending blades mounted on said shaft, the improvement of a fan and motor housing comprising a structure having an outer annular wall and a plurality of annularly spaced and inwardly extending vanes connected to the outer annular wall and supporting the motor substantially concentric within the outer annular wall, each of said vanes supporting the motor having first and second side edges and an end supporting surface therebetween, said motor having external engagement means with first and second side shoulders and an annular surface therebetween, said end supporting surfaces of the vanes engaging the said external surface of the engagement means, for aligning the motor shaft and fan substantially concentric within the outer annular wall, said first and second side shoulders of the external recess of the motor engaging respectively the first and second side edges of the vanes to hold the motor against longitudinal movement, one of said shoulders on the motor

being removably mounted to facilitate the mounting of the motor within the vanes.

7. The improvement of a motor support comprising a structure having an annular supporting wall and a plurality of annularly spaced and inwardly extending vanes connected to the annular supporting wall and supporting the motor substantially concentric within the annular supporting wall, each of said vanes supporting the motor having first and second side edges and an end supporting surface therebetween, said motor having first and second side shoulders and an annular surface therebetween, said motor end supporting surfaces of the vanes engaging said annular surface of the motor for aligning the motor substantially concentric within the annular supporting wall, said first and second side shoulders of the motor engaging respectively the first and second side edges of the vanes to hold the motor against longitudinal movement, said motor having a removably mounted member with a surface which includes said second side shoulder to facilitate the mounting of the motor within the vanes.

CHESTER P. JENKINS.