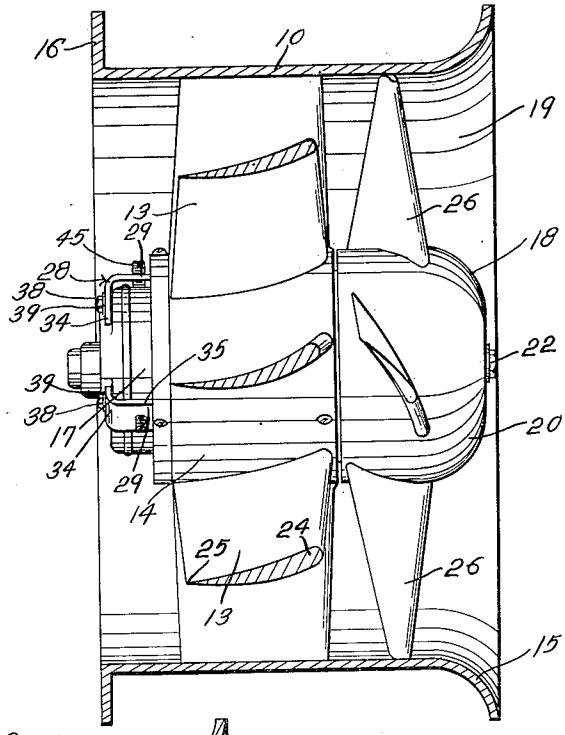
Dec. 16, 1952 H. F. MINNIS 2,621,849

AXIAL FLOW FAN WITH YIELDINGLY CENTERED FAN ELEMENT

Filed May 25, 1949 4 Sheets-Sheet 1

Fig. 1.



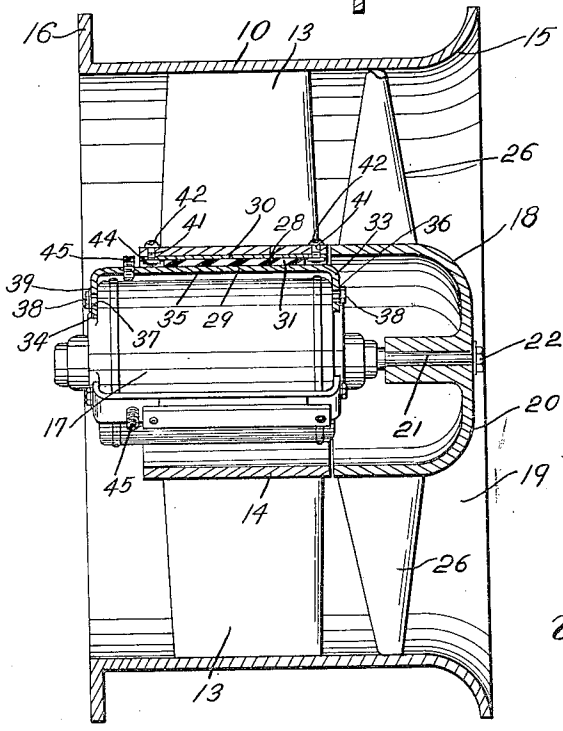


Fig. 2.

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AXIAL FLOW FAN WITH YIELDINGLY CENTERED FAN ELEMENT

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Fig. 3.

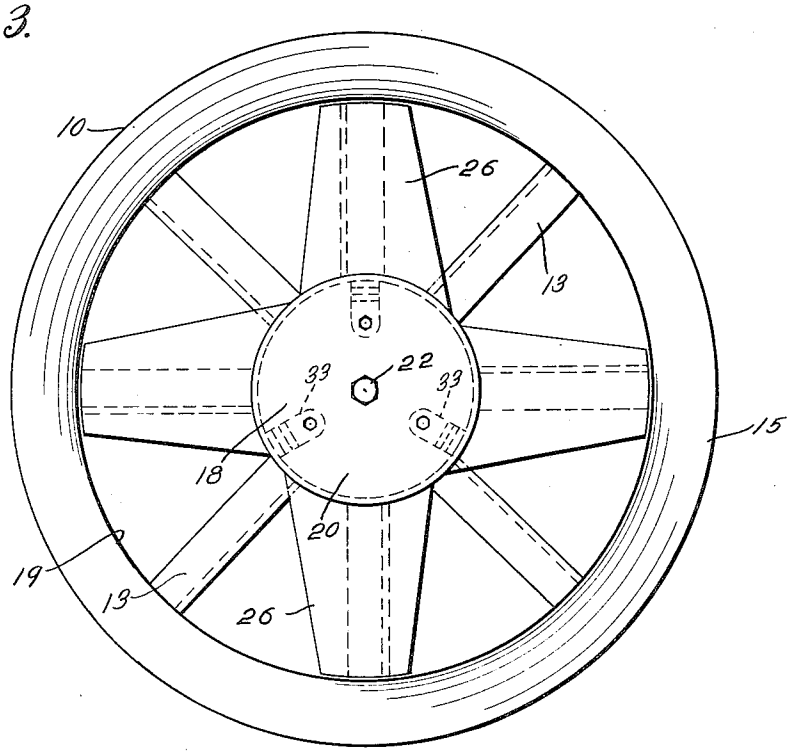
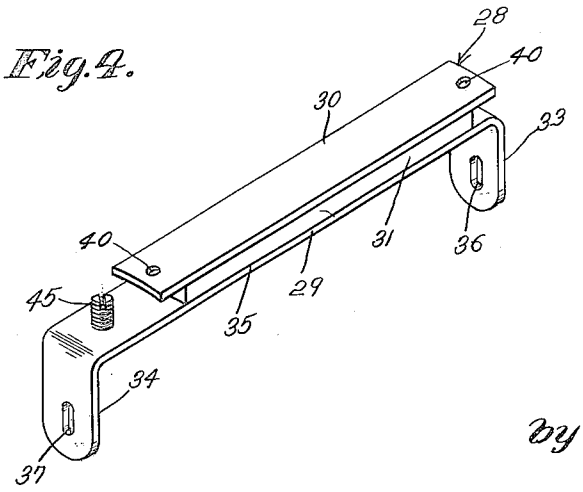


Fig. 4.



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AXIAL FLOW FAN WITH YIELDINGLY CENTERED FAN ELEMENT

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Fig. 5.

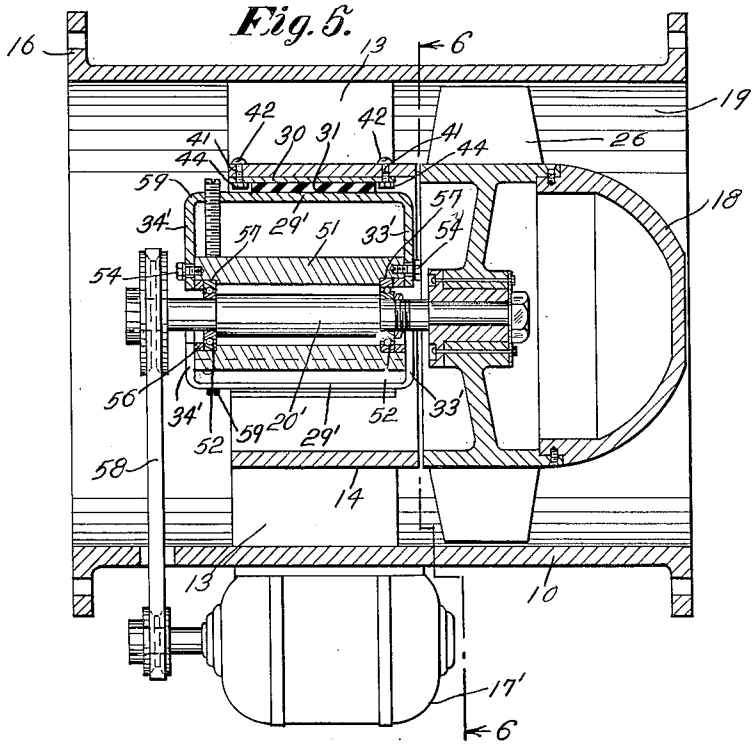
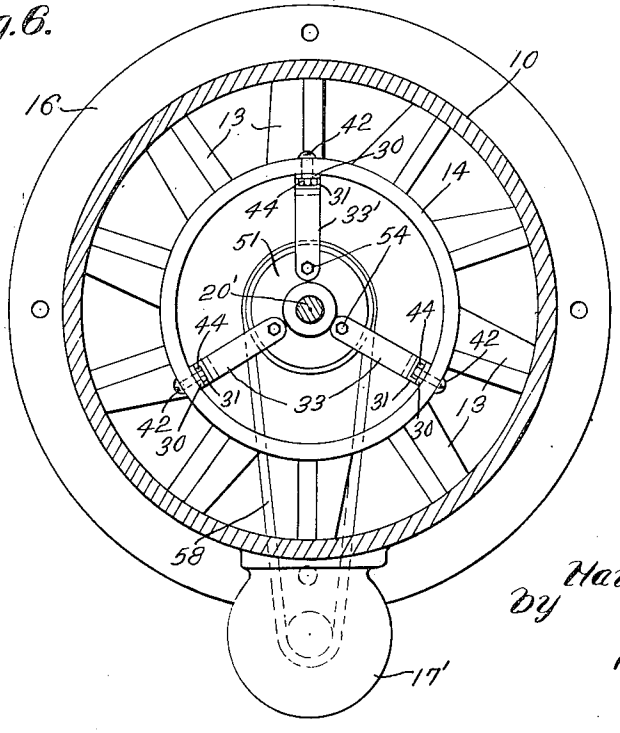


Fig. 6.



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AXIAL FLOW FAN WITH YIELDINGLY CENTERED FAN ELEMENT

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Fig. 7.

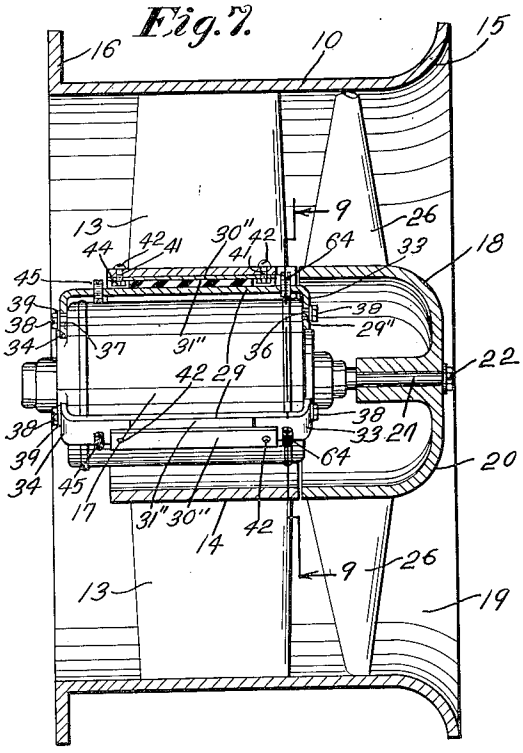


Fig. 10.

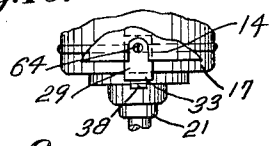


Fig. 9.

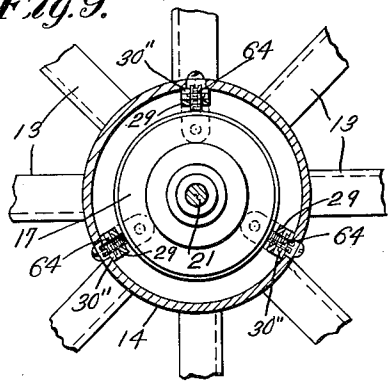
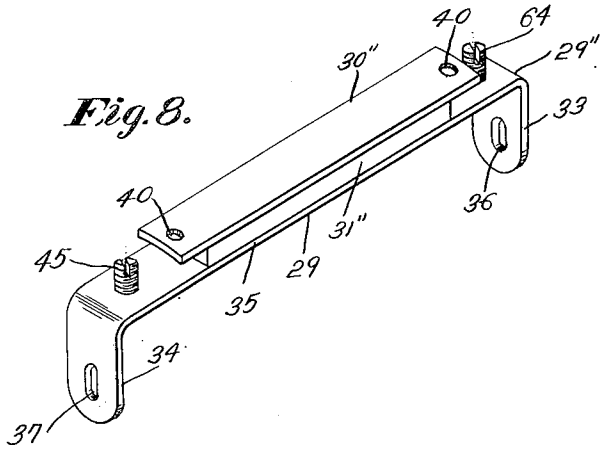


Fig. 8.



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Patented Dec. 16, 1952 2,621,849

UNITED STATES PATENT OFFICE

2,621,849

AXIAL FLOW FAN WITH YIELDINGLY CENTERED FAN ELEMENT

Harold F. Minnis, Claremont, N. H., assignor to Joy Manufacturing Company, Pittsburgh, Pa., a corporation of Pennsylvania

Application May 25, 1949, Serial No. 95,252

13 Claims. (Cl. 230—120)

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This invention relates in general to a fan and drive housing, and more particularly to a mounting arrangement for the motor or drive of an axial flow fan.

An object of the invention is the provision of a resilient mounting for a motor or drive, or other device having a rotating central shaft positioned within a housing, the motor or drive being aligned within the housing by adjusting the mounting device in respect to the motor or drive. The primary object of the invention is to provide a mounting for a drive of the fan of an axial flow fan device to absorb shock and produce a quiet running condition. Another object of the invention is the provision of a resilient mounting device for the electric motor or drive of an axial flow structure in which the motor or drive and the fan are mounted substantially concentrically within an outer annular wall. A further object of the invention is the provision for the disposition, in an improved manner, of a resilient rubberlike material between two substantially rigid or metal strips whereby one of the strips may be secured to a motor and whereby the motor, with its mounting device secured thereto, may be slipped into a housing with the second strip affording a hard smooth surface for sliding contact with the wall of the housing and permitting easy insertion within the housing. Still another object of the invention is the provision of an improved arrangement for mounting an electric motor or drive within a housing by securing a first mounting member to the motor or drive and a second mounting member to the housing, with a resilient rubberlike material between said mounting members and secured to them in such a manner as to oppose movement between them. Other objects and a fuller understanding of the invention may be had by referring to the full description and claims taken in conjunction with the accompanying drawings in which:

Fig. 1 is a longitudinal view, with certain parts shown in section, through an axial flow fan structure embodying the invention.

Fig. 2 is a central longitudinal sectional view through a fan and motor housing showing a motor positioned by means of a resilient mounting device embodying certain features of the invention.

Fig. 3 is a front view of the device shown in Figs. 1 and 2.

Fig. 4 is a perspective view of one form of the improved mounting device.

Fig. 5 is a longitudinal sectional view of a housing and fan drive shaft mounting with fan drive

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by power from an externally mounted motor, the fan drive shaft mounting being mounted by means of one form of my improved mounting device.

Fig. 6 is a transverse sectional view on the planes of the section line 6—6 of Fig. 5.

Fig. 7 is a longitudinal sectional view similar to Fig. 2 showing a fan driving motor mounted by means of another form of resilient mounting device embodying features of the invention.

Fig. 8 is a perspective view of the resilient mounting device shown employed in Fig. 7.

Fig. 9 is a fragmentary transverse sectional view on the plane of the section line 9—9 of Fig. 7.

Fig. 10 is a detail fragmentary view showing the fan supporting end of the fan driving motor of Fig. 7 and showing details of the relation of the resilient mounting device to the motor and the motor casing.

In axial flow fans with motors or other drives mounted in the air stream it is very desirable to use resilient mountings for the motor or other drive in order to produce a quiet running operation. Heretofore this has been accomplished by providing a platform with a motor separated therefrom by resilient material. However, the platform type of mounting is objectionable because of the space occupied, because of the awkward appearance and expense involved, and because the smoothness of air flow is likely to be somewhat impeded.

The improved resilient mounting of my invention is adapted to hold the motor inside an inner housing of an axial flow fan in such a way as to present several advantages over prior types of mounting. It will be readily understood, of course, that the resilient mounting affords quiet operation and the reduction of vibration. However, a further important improvement is obtained by my mounting, namely, the ease and precision with which the motor shaft can be aligned with respect to the housing and to other external members. Furthermore, the particular arrangement of parts of my improved mounting provides a convenient and improved means of effecting the resilient mounting, and, in the several embodiments illustrated, the mountings are spaced circumferentially about the motor or other drive at intervals so that their presence does not interfere materially with the total heat dissipation area.

Referring to the drawings, the fan and motor housing preferably comprises a cast or other monobloc structure having an outer annular wall 19 and a plurality of air guide vanes 13 inte-

grally connected thereto. The air guide vanes 13 are stationary and are spaced circumferentially about the outer annular wall and extend inwardly towards the center or axis of the annular wall 10. The inner ends of the stationary vanes 13 are integrally connected to a motor casing 14 and support this casing substantially concentrically within the outer annular wall 10. The forward end of the outer annular wall 10 is provided with an outwardly flared portion 15 for receiving the incoming air. The rear end of the outer annular wall may be provided with a connecting flange 16 whereby the housing may be suitably fastened to conducting ducts or the like.

Referring first to Figs. 1, 2 and 3, it will be seen that a motor 17 is provided for driving a fan 18. This fan is arranged within a fan chamber 19 formed within the annular wall 10. As will appear when the embodiment of the invention shown in Figs. 5 and 6 is observed, instead of a motor 17, a suitable bearing member for a fan driving shaft may be mounted within the housing and the fan driving shaft may have a driving motor 17' arranged externally of the annular wall 10.

It will be appreciated that a bearing member having a shaft rotating therein and a motor are similar in the feature of having a shaft rotatable within an outer supporting member. In the case of a motor—an electric motor—electrical windings and other equipment are provided to cause the shaft to rotate, whereas, in the case of a bearing having a rotatable shaft journaled therein power must be provided from an external source. The motor 17 may be considered broadly as being a shaft supporting member, just as truly as the bearing illustrated in Figs. 5 and 6.

The fan 18 includes a noselike hub 20 which may be suitably fastened to a motor shaft 21 by a nut 22. The motor 17 may be of any standard design as received from the manufacturer, and is adapted to be slidably mounted or inserted within the annular housing 14. Although an annular housing 14 is illustrated, it is to be understood that any suitable frame or casing which will support the motor 17 may be used in place thereof. The vanes 13 which support and align the housing wall 14 may be of any suitable shape, and are illustrated as having a leading edge 24 and a trailing edge 25, and are appropriately curved to overcome the spiralling action of the air which is induced by the blades 26 of the fan 18. Referring particularly to Figs. 2 and 4, it will be noted that there has been illustrated a bracket or mounting device 28—or rather a plurality of them—for the purpose of resiliently mounting the motor 17 in such a position that the fan 18 shall have its axis disposed in the same straight line with the axis of the fan chamber 19. The mounting 28, as shown in Figs. 2 and 4, comprises a first or inner mounting member 29, a second or outer mounting member 30, and, between these members, resilient rubberlike material 31, this rubberlike material being bonded, in an appropriate manner, to the outside of the member 29 and to the inside of the member 30. In the structure shown, the first mounting member 29 comprises a substantially rigid strip of material such as metal having a first end portion 33, a second end portion 34, and a middle portion 35 between the end portions 33 and 34; and, as illustrated, the end portions 33 and 34 make substantially right angles with the middle portion 35 and are adapted to constitute anchoring flanges.

Noting particularly Fig. 4, it will be seen that the end portions 33 and 34 are provided with openings 36 and 37 therein, these openings being preferably elongated and consisting of slots in the structure shown. Referring to Fig. 2, it will be seen that individual bolts 38 are provided to secure the mounting member 29 to the motor 17, and lock washers 39 are provided to maintain the bolts 38 in place when tightened. However, an elongated motor bolt extending for the full length of the motor and also through the slots 36 and 37 may evidently be used if desired. By the provision of individual end bolts, however, the advantage is achieved of permitting one of the end portions 33 or 34 to be held substantially in a fixed position by tightening the bolt 38 associated therewith, while the opposite end may be adjustably moved in relation to the motor 17. Thus either or both ends of the member 29 may be adjusted relative to the motor 17 for the purpose of effecting adjustment of the motor within the housing wall 14 for the purpose of securing coaxiality of the shaft 20 and fan 18 within the outer annular wall 10.

The second or outer mounting member 30 comprises a substantially rigid strip, preferably metal, and is adapted for attachment to the housing 14. Noting again Fig. 4, it will be seen that the mounting member 30 is provided with substantially round openings 40 at each end thereof. The openings 40 are disposed to register with suitable openings or slots 41 in the housing 14 whereby securing means, such as bolts 42, may be passed through the openings 41 and 40 and tightly clamp the second mounting member 30 to the inside periphery of the housing 14.

The resilient rubberlike material 31 may be natural rubber, synthetic rubber, or other material of a similar nature, and this material is fixed or bonded in place between the first and second mounting members 29 and 30 to provide a resilient motion-resistant binding between them. The material 31 is preferably bonded securely to the mutually facing surfaces of the mounting members 29 and 30. It will readily be understood that, by the described arrangement of mounting members with resilient material bonded between them, a small amount of lateral or rotational movement will be possible between the members 29 and 30, as well as a small amount of radial movement. However, all movement is actively opposed by the resilient material 31.

Two or more of the mounting brackets may be employed, but for the majority of purposes I consider three mounting brackets, as illustrated, to be preferable. Preferably, the mounting members 30 are curved to fit snugly the inside curvature of the housing or casing wall 14. The brackets may be adjusted into a predetermined fixed relation to the motor so that the mounting members 30 conform to portions of a circle of a diameter to fit snugly within the housing 14. Before insertion of the motor within the housing the diameter of the circle in which the central elements of the outer surfaces of the members 30 lie may slightly exceed the internal diameter of the housing 14. In any event, the motor 17 with the mounting brackets thereon may readily be inserted within the housing 14 and the shaft 20 properly aligned. The openings 40 of the mounting member 18 are brought into proper position to be attached to the housing 14. The bolts 42 may then be inserted through the openings 41 and 40 and have their associated nuts 44 tightened to secure the mounting members

30 securely to the inside of the housing 14. It will be understood that the ends 33 and 34 of the members 29 will have been tightly clamped by the bolts 38 to the ends of the motor 17 during the positioning of the motor 17 within the casing 14. A coaxial relation of the shaft 20 within the fan chamber 19 will be attained by the provision of a proper relation between the end portions 33 and the motor casing, but the bolts 38 at the rear end of the motor may be loosened somewhat after the motor 17 is inserted into the housing 14 to permit the adjustment of the rear end of the motor in the housing. Thereafter, there may be a shifting of the motor shaft within the housing to finely adjust the tip clearance. The front end portion 33 of the mounting member 17 which is tightly secured to the forward end of the motor 17 acts as a pivot point about which the motor 17 and shaft 20 may be shifted. Only a very slight shifting of the motor 17 with respect to the housing 14 is necessary in order to effect a very close alignment of the fan axis with the axis of the fan chamber 19, and I have accordingly provided, in the first illustrative embodiment of the invention, a set screw 45 at one end of the bracket, as illustrated, to contact the motor casing and afford a means of fine adjustment between the bracket and the motor 17. In the third illustrative embodiment of my invention, as will shortly appear, provision is made for adjustment at both ends of the bracket, and an extremely fine adjustment is thereby made possible. Of this, however, more will be said later. With further reference to the present embodiment of the invention being described, it is usually preferable to tighten the ends of the brackets closest to the fan 18, that is, the end portions 33 of the mounting member 29. Then the end of the motor opposite the fan may be brought into a reasonably close alignment and the bolts 28 tightened in the openings 37 to hold the motor in place. However, the bolts 28 in the openings 37 are not tightened so much but that the member 29 may still be adjusted relative to the motor 17 by suitably adjusting the several screws 45 to vary the distances between the portion 35 of the mounting member 29 and the motor. The set screws 45 are positioned, in this first embodiment of the invention, near the end portion 34, because the end of the motor opposite the fan 18 is the most easily accessible. After the parts are properly aligned, and the fine adjustments made by means of the screws 45 have been completed, the bolts 38 in the openings 37 may be drawn up to their tightest convenient degree to secure and maintain the motor 17 in its aligned position.

In Figs. 5 and 6 there is shown a fan and drive shaft housing 14 in which the drive shaft 20' is rotatably mounted on bearings 52 within a bushing 51. The bushing 51 with the drive shaft 20' mounted therein is mounted within the housing 14 in substantially the same manner as that described in connection with the motor 17. In this modification, the mounting brackets are secured to the end of the bushing 51 by means of bolts 54. The extreme tips of the end portions 33' and 34' of the mounting member 29' are used to hold the bearings 52 tightly in place within recesses 57 on the bushing 51, a washer or ring 56 being preferably interposed between the tips of the mounting members 29' and the bearings 52 to prevent the rotating part of the bearing from being engaged by the tips of the mounting members. The bushing 51 is concentrically mounted

within the housing 14 and thus fan blade clearance may be kept at a low minimum. The drive shaft 20' may be driven by a motor 17' mounted externally of the outer annular wall 10. Any suitable means may be employed to drive this shaft, such, for example, as a belt 58. A set screw 59 is provided on each of the mounting members 29' to engage the bushing 51 whereby a fine degree of adjustment may be provided between them by running the bolts 54 in moderately tight and then turning the set screws 59 to change the spacing between the bushing 51 and the mounting members 29'.

In Figs. 7 to 10, inclusive, an arrangement more closely resembling that of Figs. 1 to 4 is illustrated. The essential difference resides in the provision of adjusting screws 64 corresponding to the screws 45 at the fan ends of the bracket members 29''. In order that room may be provided for these screws 64, the members 30'' may be slightly shortened and the length of the resilient material 31'' may also be appropriately shortened if it be not desired to make other suitable changes to provide the necessary room for the adjusting screws 64. It will be readily appreciated that, with this arrangement, there may be effected quickly precise adjustments of the axis of the motor casing and of the motor shaft with respect to the housing or casing wall 14, and that fine adjustment of the fan 18 within the fan chamber 19 may be accomplished both by adjustments of the rearward end of the motor casing and by adjustments of the forward end. The brackets of the structure shown in Fig. 8 may of course be used also with appropriate modifications for the centering of a drive of the character shown in Figs. 5 and 6.

As will be understood from the foregoing description, my improved mounting devices afford an exceedingly fine degree of radial adjustment for aligning the fan 18 in each of the illustrative embodiments of the invention within the outer annular wall 10. By loosening the appropriate bolts 38 or 54 and allowing others to remain firmly set or tight, extremely fine adjustments can be obtained by turning the set screws inwardly on the mounting brackets 29, 29' or 29'' which are connected to the loosened bolt. This adjustment, if the set screw be turned inwardly, increases the distance between the mounting member 29, 29' or 29'' and the motor 17 or bearing mounting 51 and imposes a compressing force on the resilient material associated with that particular mounting device. However, the force placed upon the resilient material of that particular bracket is not all absorbed therein, but is evenly distributed by a balance of forces among the various mounting brackets whereby the resilient material strips in all of the brackets are substantially compressed an even amount. Nevertheless, it will readily be understood that the motor 17 or the bushing 51 will have been shifted a small amount by virtue of the increase in the distance between the motor or bushing and the inner mounting member of the particular mounting bracket on which the adjustment was made. In contrast, in mechanical devices in which the resilient material is not present, a movement of any amount, say ten thousandths of an inch, of one of the set screws would require loosening of one or more of the other set screws on the brackets at the other side of the motor, and the total shifting of the motor axis would be, in this example, ten thousandths of an inch, whereas, with the described mounting, the motor would be

shifted ten thousandths of an inch with respect to the mounting member 29 (29' or 29'') of the one mounting device, but the total net shifting of the motor in relation to the housing or casing 14 would be substantially less.

The motors and the bushing or bearing constitute shaft supporting members having a rotating shaft therein, and in all the embodiments of my invention, the mounting brackets 16 are adapted to receive and support the shaft supporting member, including the motors or the bushing or bearing, whereby a close tip clearance may be maintained. The housing arrangement moreover, enable me to use a certain size housing for a large number of different diameters of motors, bushings or bearings for the shaft which is driven by the motor. This application is a continuation-in-part of my application Serial No. 586,355, filed April 3, 1945, now abandoned.

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 I claim as new and desire to secure by Letters Patent is:

1. In combination, a fan housing, a shaft supporting member, a shaft rotatably supported by said shaft supporting member, and mounting means for supporting said shaft supporting member within said housing with said shaft coaxial with said housing, said mounting means comprising a plurality of mounting devices positioned between said shaft supporting member and said housing, said devices each comprising first and second mounting members with resilient rubberlike material bonded therebetween, said first mounting members being adapted to be adjustably secured to said shaft supporting member, cooperating means to adjustably attach said first mounting members and said shaft supporting member, said second mounting members being adapted to be fixedly secured to said housing, means to fixedly secure said second mounting members to said housing, said shaft supporting member being positioned in said housing with said shaft coaxial with the latter by adjusting said first mounting members relative to said shaft supporting member, said resilient rubberlike material yielding and providing continuous connection between the first and second mounting members of each device and expanding or contracting radially under vibration impulses to dampen such vibration.

2. In anaxial flow fan device comprising an outer annular wall and an inner annular wall with said inner annular wall supported substantially concentrically within the outer annular wall and said walls defining an annular space therebetween through which fan-driven air may flow, the improvement of means to mount and align a shaft supporting member within said inner annular wall, said shaft supporting member having a rotatable shaft extending therethrough and a fan having outwardly extending blades mounted upon the shaft and driven thereby, said improved mounting means comprising at least three mounting devices each including at least a first mounting member adapted for adjustable attachment to said shaft supporting member, at least a second mounting member adapted for fixed attachment to said inner annular wall, and resilient means positioned between said first and second mounting members and resisting lateral movement therebetween, said improved mounting means being operatable by adjustment of said first mounting members relative to said shaft supporting member to align the shaft supporting member and the shaft and fan substantially concentrically within the outer annular wall.

3. In combination, a fan housing, a shaft supporting member disposed within said housing, a shaft supported thereby, and means including a plurality of mounting devices for supporting said shaft supporting member within said housing with said shaft coaxial with said housing, said mounting devices comprising a first mounting member and a second mounting member with resilient rubberlike material therebetween, said first mounting members being attached to said shaft supporting member, said second mounting members being attached to said housing, said resilient rubberlike material being bonded to said first and second mounting means and resisting relative movement therebetween, and means to adjust one of said mounting members of said device relative to the other with the resilient rubberlike material yielding and providing continuous connection therebetween, whereby said shaft may be centered in said housing.

4. In combination, a fan housing, a shaft supporting member, a shaft rotatably supported by said member, and means for mounting, supporting and adjusting said shaft supporting member within said housing to center said shaft, said means including a plurality of mounting devices each comprising a first and second metal mounting member having resilient rubberlike material bonded therebetween, one of said mounting members of each device being adjustably attached to the said shaft supporting member, the other of said mounting members being fixedly attached to the inside of said housing each of said devices being mounted upon said shaft supporting member and the shaft supporting member and mounting device thereafter being inserted within said housing, said adjustable attachment of one of the mounting members of each device to the shaft supporting member serving as means to radially shift the latter within the housing, whereby said shaft is centered within said housing.

5. In combination, a fan housing, a shaft supporting member disposed within said housing, a shaft rotatably supported by said member, and means to support and adjust said shaft supporting member to center said shaft within said housing, said mounting means including a plurality of mounting devices each comprising a first mounting member and a second mounting member with resilient rubberlike material therebetween, said first mounting members each comprising a metal strip adjustably attached to said shaft supporting member longitudinally thereof, cooperating means between said first mounting means and said shaft supporting member to adjust said first mounting member metal strip relative to said shaft supporting member, said second mounting member comprising a metal strip adapted to be fixedly attached to said housing and extending substantially parallel to said first mounting means, said resilient rubberlike material being bonded to said first and second mounting means and resisting relative lateral movement therebetween, whereby said shaft support-

ing member is adapted to be mounted and adjusted in said housing, to center said shaft within said housing by adjusting the first mounting member metal strips relative to the shaft supporting member, and the resilient rubberlike material yielding and providing continuous connection between the first and second mounting members.

6. In combination, a fan housing, a shaft supporting member disposed within said housing, a shaft rotatably supported by said member, and means to support and align said shaft supporting member within said housing including a plurality of mounting devices, each of said mounting devices comprising a first mounting member and a second mounting member with resilient rubberlike material therebetween, said first mounting members each comprising a substantially rigid strip with a first and a second end portion and a central portion, said first and second end portions being bent at an angle to said central portion, said end portions being adapted for attachment to said shaft supporting member with at least one of said end portions being adjustable relative to said shaft supporting member, cooperating means at longitudinally spaced positions adapted to attach said first mounting members to said shaft supporting member, said second mounting members each comprising a substantially rigid strip adapted for attachment to said housing, said resilient rubberlike material being bonded between said first and second mounting members to resist lateral movement therebetween, said shaft supporting member being adjustable within said housing to position and align the longitudinal axis of said shaft relative to said housing by adjustably moving at least one of said end portions of said first mounting members with respect to said shaft supporting member.

7. In an axial flow fan structure comprising a housing positioned substantially concentrically within an outer annular wall and disposed to support a shaft support member and fan device therein with the fan blades of the fan device adapted to rotate in a position surrounded by said outer annular wall, the provision of an improved mounting means for axially positioning said fan device relative to said housing to adjust said fan blades within said outer annular wall, said mounting means comprising three equally spaced mounting devices each including a first mounting member adapted for attachment to said shaft support member, a second mounting member adapted for attachment to said housing, and resilient rubberlike material held between said mounting members, means for adjusting the first mounting member relative to said shaft support member to shift said shaft support member radially within said housing and center said fan within said outer annular wall, adjustment of said first mounting members relative to the shaft support member causing a relative adjustment of the first mounting members relative to said second mounting members, said resilient material yielding and providing continuous connection between the first and second members as the first members are adjusted and thereby maintaining the resilient support regardless of relative position therebetween.

8. In combination, in an axial flow fan, a fan housing having an outer annular wall, a centrally disposed support and a plurality of vanes for connecting said support to said outer annular wall, said outer annular wall having a first and a second annular portion, said plurality of vanes connecting said centrally disposed support to said first annular portion and said second annular portion having an internal surface of revolution providing a wall for a fan chamber and said centrally disposed support having an opening therein surrounded by a wall surface, a fan in said fan chamber, supporting and driving means for said fan including a shaft and a casing having bearing means supporting said shaft, and means for yieldingly mounting said casing in the opening of said centrally disposed support with said fan in and coaxial with said fan chamber and said casing spaced inwardly of said wall surface, including a plurality of yielding mounting means each including a pair of relatively inner and outer mounting members with resilient rubberlike material between the same and bonded to each of the same, means for securing said outer mounting members to said centrally disposed support, and means for adjustably securing said inner mounting members to said casing in positions relative thereto to place said rubberlike material under compression.

9. In combination, in an axial flow fan, a fan housing having an outer annular wall, a centrally disposed support and a plurality of vanes for connecting said support to said outer annular wall, said outer annular wall having a first and a second annular portion, said plurality of vanes connecting said centrally disposed support to said first annular portion and said second annular portion having an internal surface of revolution providing a wall for a fan chamber and said centrally disposed support having an opening therein surrounded by a wall surface, a fan in said fan chamber, supporting and driving means for said fan including a shaft and a casing having bearing means supporting said shaft, and means for yieldingly mounting said casing in the opening of said centrally disposed support with said fan in and coaxial with said fan chamber and said casing spaced inwardly of said wall surface, including a plurality of yielding mounting means each including a pair of relatively inner and outer mounting members with resilient rubberlike material between the same and bonded to each of the same, means for securing said outer mounting members to said centrally disposed support, means for adjustably securing said inner mounting members to said casing in positions relative thereto to place said rubberlike material under compression, and means acting between said inner mounting members and said casing and coacting with the latter at its end more remote from said fan to adjust the former relative to the latter.

10. In combination, in an axial flow fan, a fan housing having an outer annular wall, a centrally disposed support and a plurality of vanes for connecting said support to said outer annular wall, said outer annular wall having a first and a second annular portion, said plurality of vanes connecting said centrally disposed support to said first annular portion, and said second annular portion having an internal surface of revolution providing a wall for a fan chamber, and said centrally disposed support having an opening therein surrounded by a wall surface, a fan in said fan chamber, supporting and driving means for said fan including a shaft and a casing having bearing means supporting said shaft, and

means for yieldingly mounting said casing in the opening of said centrally disposed support with said fan coaxial with said fan chamber including a plurality of yielding mounting means each engaging the wall surface of said support opening and each secured to said casing, each of said yielding mounting means including a radially outer element fastened to said support against said wall surface, a radially inner element fastened to said casing, and rubberlike material between and bonded to said elements, said radially inner elements having leg portions adjustably secured to said casing to vary the compression of said rubberlike material and to effect centering of said fan in said fan chamber.

11. In combination, in an axial flow fan, a fan housing having an outer annular wall, a centrally disposed support and a plurality of vanes for connecting said support to said outer annular wall, said outer annular wall having a first and second annular portion, said plurality of vanes connecting said centrally disposed support to said first annular portion, and said second annular portion having an internal surface of revolution providing a wall for a fan chamber, and said centrally disposed support having an opening therein surrounded by a wall surface, a fan in said fan chamber, supporting and driving means for said fan including a shaft and a casing having bearing means supporting said shaft, and means for yieldingly mounting said casing in the opening of said centrally disposed support with said fan in and coaxial with said fan chamber and said casing spaced inwardly of said wall surface, including a plurality of yielding mounting means each engaging the wall surface of said support opening and each secured to said casing, each of said yielding mounting means including a radially outer element fastened to said support against said wall surface, a radially inner element fastened to said casing, and rubberlike material between and bonded to said elements, said radially inner elements adjustable relative to said casing, and adjusting screws for changing the relation of said inner elements to said casing.

12. In combination, in an axial flow fan, a fan housing having an outer annular wall, a centrally disposed support and a plurality of vanes for connecting said support to said outer annular wall, said outer annular wall having a first and second annular portion, said plurality of vanes connecting said centrally disposed support to said first annular portion, and said second annular portion having an internal surface of revolution providing a wall for a fan chamber, and said centrally disposed support having an opening therein surrounded by a wall surface, a fan in said fan chamber, supporting and driving means for said fan including a shaft and a casing having bearing means supporting said shaft, and means for yieldingly mounting said casing in the opening of said centrally disposed support with said fan in and coaxial with said fan chamber and said casing spaced inwardly of said wall surface, including a plurality of yielding mounting means each engaging the wall surface of said support opening and each secured to said casing, each of said yielding mounting means including a radially outer element fastened to said support against said wall surface, a radially inner element fastened to said casing, and rubberlike material between and bonded to said elements, said radially inner elements adjustable relative to said casing, and adjusting screws adjacent the opposite ends of each of said inner elements for changing the relation of said inner elements to said casing.

13. In combination, in an axial flow fan, a fan housing having an outer annular wall, a centrally disposed support and a plurality of vanes for connecting said support to said outer annular wall, said outer annular wall having a first and a second annular portion, said plurality of vanes connecting said centrally disposed support to said first annular portion, and said second annular portion having an internal surface of revolution providing a wall for a fan chamber, and said centrally disposed support having an opening therein surrounded by a wall surface, a fan in said fan chamber, supporting and driving means for said fan including a shaft and a casing having bearing means supporting said shaft, and means for yieldingly mounting said casing in the opening of said centrally disposed support with said fan in and coaxial with said fan chamber and said casing spaced inwardly of said wall surface, including a plurality of yielding mounting means each engaging the wall surface of said support opening and each secured to said casing, each of said yielding mounting means including a radially outer element fastened to said support against said wall surface, a radially inner element fastened to said casing, and rubberlike material between and bonded to said elements, said radially inner elements adjustable relative to said casing, and adjusting screws adjacent only the ends of said inner elements remote from the fan for changing the relation of said inner elements to said casing.

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