MEANS TO SUPPORT A MOTOR DRIVEN FAN FROM A CARRYING PANEL

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

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MEANS TO SUPPORT A MOTOR DRIVEN FAN FROM A CARRYING PANEL

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This invention relates to ventilating fans of the direct electric motor driven type, and has reference, more particularly, to novel means for both supporting the fan driving motor and the fan guard structure.

In the use of ventilating fan installations it is highly desirable that substantially silent operation thereof be attained. The main sources of noise emanating from a direct motor driven fan during operation thereof is that caused by vibration due to torque and other pulsations of the motor which, by transmission to the carrying panel or frame of the installation, produces objectionable noise that will be radiated from the panel or frame surfaces, and will frequently be amplified by reason of the fact that the panel or frame surfaces produce a sounding board effect.

An object of this invention is to provide novel means, including vibration absorbing elements, for so supporting a ventilating fan driving motor from and in connection with a carrying panel or frame as to assure substantially silent operation of the ventilating fan installation, which means may also additionally serve as support for a fan guard structure.

For the purpose of illustration, the invention is shown in the accompanying drawings as applied to a ventilating fan of the kind adapted for installation in a window; it must be understood, however, that the invention can well be applied to other types of ventilating fan and blower installations.

The above stated and other objects will be understood from a reading of the following detailed description of my invention in connection with the accompanying drawings in which:

Fig. 1 is a rear face elevation view of a ventilating fan for window installation, as equipped with novel means according to this invention for supporting the fan motor and fan guard structure.

Fig. 2 is a fragmentary cross-sectional view, taken on line 2—2 in Fig. 1, but drawn on an enlarged scale.

Fig. 3 is a fragmentary elevation view of a vibration absorbing connection between a motor and guard structure supporting arm and the carrying panel or frame of the ventilating fan installation, viewed in the direction of the arrow X in Fig. 2, but drawn on a further enlarged scale; Fig. 4 is a horizontal sectional view, taken on line 4—4 in Fig. 3; and Fig. 5 is a vertical longitudinal sectional view, taken on line 5—5 in Fig. 4.

Referring to the drawings, in which corresponding characters of reference are employed to indicate corresponding parts, the reference character 10 indicates the carrying panel or frame of the ventilating fan structure as adapted to be mounted within and across a window opening. Ordinarily such window opening is compatible with a carrying panel or frame provided with adjustably laterally extensible means (not shown), at one or both sides thereof, whereby to fit the panel or frame in bridging relation to and across a window opening, in manner already well known to the art. The panel or frame 10 is provided with a central opening defined by an outwardly or forwardly projecting annular flange 11, thus forming a through chamber or air passage 12 within which the ventilating fan 13 operates.

The reference character 14 indicates an electric motor by which the ventilating fan 13 is driven. Said motor 14 is rearwardly offset from and in axial alignment with the air passage 12 of the panel or frame 10. The armature shaft 15 of the motor projects forwardly into the air passage 12, and the fan 13 is fixed on said armature shaft so as to be directly driven thereby within said air passage 12.

The means for supporting the motor 14, and the ventilating fan 13 driven thereby, from the carrying panel or frame 10, and in operative relation to the air passage 12 thereof comprises a plurality of circumferentially spaced, radial supporting arms 16 disposed to extend in rearwardly and inwardly inclined relation to and from the carrying panel or frame 10 to the motor 14.

To assure desired rigidity of said supporting arms 16, the main body of each thereof is of suitable hollow cross-sectional shape, preferably being of inverted substantially V-shape in cross-section, with the apex edge thereof rearwardly presented.

Each said supporting arm 16 is formed at its inward end with a forwardly and inwardly inclined flattened extension 17, which terminates in a perforate supporting ear 18 extending parallel to the axis of the motor 14, and being adapted to engage the external surface of the motor casing. Said supporting ear 18 is secured to the motor casing in supporting relation thereto by a fastening bolt 19 or other suitable fastening means. Each supporting arm 16 is formed at its outer end with a forwardly and angularly projecting flattened foot piece 20, disposed to extend perpendicular to the plane of the carrying panel or frame 10.

At locations where respective supporting arms 16 are to be affixedly joined to the carrying panel or frame 10, the latter is provided with elongated openings 21. Mounted through each such opening 21 is a vibration absorbing or dampening element made of suitable resilient material, such as natural or synthetic rubber or equivalent resilient material. Each such element is formed to provide cushioning body 22 of substantial thickness having an encircling groove 23 indenting its periphery, which groove is adapted to receive marginal portions of an opening 21 with which the carrying panel or frame 10 is provided, whereby said body 22 embraces said marginal portions and thus affixes the body to the carrying panel or frame 10, so that opposite side or face portions of the former project from opposite faces of the latter to lie in planes parallel thereto. The body 22 of each vibration absorbing or dampening element is provided with a central longitudinal slot 24 which extends transversely therethrough from face to face thereof, and which corresponds in length to the width of a foot piece 20 of a supporting arm 16.

To join a supporting arm 16 in attached relation to the carrying panel or frame 10, with a vibration absorbing or dampening element operatively interposed between the latter and the former, the foot piece 20 of the supporting arm is inserted through slot 24 of the element body 22 until the chamfered end 25 of the supporting arm, from which the foot piece extends, abuts the rearward face of said element body, and so that the free end portion of said foot piece 20 projects outwardly beyond the forward face of said element body. Means is provided for retaining the foot piece 20 against displacement from such assembled relation to the element body 22 and attached relation to the carrying panel or frame 10. One and a preferred form of means for this purpose comprises a keeper plate 26 which is adapted to be superposed upon and suitably secured to the freely projecting outer end
portion of the foot piece 20, said keeper plate having an angular stop flange 27 at its inner or rearward end to abut and press against the forward face of the element body 22. A satisfactory and preferred means for attaching the keeper plate 26 to the foot piece 20 comprises forward and rearward clenching tongues 28 and 29 which are struck out from the body of the keeper plate for projection therewith. The foot piece 20 is provided with an opening 30 through which said clenching tongues 28 and 29 project, so that the same can be bent or clenched over opposite margins of said foot piece opening 30, thereby to strongly and immovably interlock the keeper plate in operative assembled relation to the vibration absorbing or dampening element (see Figs. 3, 4 and 5). It will be understood that within the broader aspects of this invention, any means, other than the clenching tongues 28 and 29, may be used to secure the keeper plate 26 to the foot piece 20 of a supporting arm 16.

The plurality of circumferentially spaced, inwardly and rearwardly inclined, radial supporting arms 16, not only serve to support the motor 14 and fan 13 driven thereby, but also are adapted to carry a multiplicity of closely concentrically spaced rings 31, which, in the aggregate, provide a safety guard structure that debars accidental access to the whirling fan 13 when it is in operation. Said guard rings 31 are engaged across the apex edges of the supporting arms 16, and are suitably secured thereto, as e.g., by welding. When the motor driven ventilating fan is in operation, pulsations and other vibrations incident to the operation thereof, can only be transmitted through the supporting arms 16 to the carrying panel or frame 10. Due, however, to the interposition of the resilient bodies 22 of the vibration absorbing or dampening elements between the carrying panel or frame 10 and the outer ends of the supporting arms 16 attached to the latter, any vibrations transmitted through said supporting arms will be intercepted and absorbed by said vibration absorbing or dampening elements before they can reach the carrying panel or frame, and consequently, now, due to such vibrations, that would otherwise be transmitted to and radiated from the carrying panel or frame surfaces, and amplified by the sounding board effect of the latter, is substantially silenced, thus assuring a quiet operation of the motor driven ventilating fan.

Having now described my invention, I claim:

1. In means to support a motor driven fan from its carrying panel including a plurality of radial sheet metal supporting arms, each supporting arm comprising a main body of V-shape cross-section disposed in inclined extension between the carrying panel and the fan motor and having means to rigidly attach its inner end to the fan motor, means to attach the outer end of the supporting arm to the carrying panel, said latter means comprising a resilient cushioning body of substantial thickness affixed to and through the carrying panel, said cushioning body having an axial slot extending therethrough, the outer end portion of said main body of the supporting arm being formed to provide a stop shoulder to abut the rearward face of said cushioning body, a flat foot piece angularly projecting beyond said stop shoulder to extend forwardly through the slot of the cushioning body, and keeper means affixed to the freely projecting end portion of said foot piece and adapted to abut the forward face of the cushioning body, whereby to clamp said outer end portion of the supporting arm to the cushioning body.

2. In means to support a motor driven fan from its carrying panel according to claim 1, wherein the keeper means comprises a keeper plate superposed upon the projecting end portion of the foot piece, said keeper plate having a right angularly extending flange at its inner end to engage the cushioning body, and said foot piece and keeper plate having cooperative means to secure the latter to the former.

3. In means to support a motor driven fan from its carrying panel according to claim 1, wherein the keeper means comprises a keeper plate superposed upon the projecting end portion of the foot piece, said keeper plate having a right angularly extending flange at its inner end to engage the cushioning body, said keeper plate having oppositely extending clenching lugs struck out therefrom, said foot piece having an opening therein through which said clenching lugs project, and the free end portions of said clenching lugs being clenched over opposite margins of said opening into interlocked engagement with said foot piece.

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