REVERSIBLE FAN MOTOR MOUNTING

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This invention relates to a reversible electric fan motor mounting and motor assembly of the type used in connection with window and wall ventilators when it is desired to move the air in either of the two possible directions.

Certain fundamental requirements must be met by the above mentioned type of device. The fan motor must be provided with oppositely extending radial arms which bend towards the fan end of the motor and which then radially align with each other approximately in or near to the radial plane intersecting the portions of the fan blades which are of maximum diameter. The outermost of the arms' ends must be adapted for pivotal mounting so that the fan motor can swing about them and point in either direction. The swinging axis must more or less coincide with the mentioned fan blade plane so as to keep the fan blades from striking the fan casing elements when the motor is swung to point in the direction desired.

In addition to the above, there are practical requirements which must be met if such a device is to be commercially successful. The arm mountings and their mode of attachment to the fan motor must be designed to provide adequate strength to prevent the elements from being shaken apart during shipment and rough handling incidental to the merchandising of the fan assembly. Fans of the character described occupy an extremely competitive position in the electrical appliance field, so the device must be capable of being manufactured and assembled with great economy. Easy disassembly and reassembly is also important since this affects the servicing cost reputation of the device. The fan motor mounting and motor assembly should furthermore be reasonably neat and efficient-looking in appearance because although partially concealed the device can be seen, particularly by a prospective purchaser making the usual careful examination.

With the foregoing in mind, the object of the present invention was to provide a reversible fan motor mounting and motor assembly successfully meeting the outlined requirements. However, the resulting invention or its elements may possibly be applied to other uses and may find application in fields remote from electric fans. In any instance it may be possible to redesign the assembly and elements involved by the invention so as to accomplish substantially the same result in substantially the same manner.

The invention in the form in which it is commercially used is illustrated by the accompanying drawings in which:

- Fig. 1 is a side view;
- Fig. 2 is an end view of one of the elements;
- Fig. 3 is a cross section taken on the line 3—3 in Fig. 2; and
- Fig. 4 is a cross section taken on the line 4—4 in Fig. 2.

As shown by these drawings the invention involves a cylindrical fan motor 1 having a power shaft 2 projecting from its fan end. The fan motor is provided with a plurality of radially extending blades. This is not illustrated since it is not needed to explain the invention. The ends of the motor 1 are flat and at right angles to the fan's cylindrical portion or side. Although not shown, the fan motor has ventilating openings in its ends which must be left open to prevent overheating of the motor.

The invention provides for the necessary radial arms by way of a pair of mountings having cylindrical segments 3 fitting the cylindrical exterior of the motor 1, in mutually offset axial relation, with adjacent ends 4 about on the motor's transverse center line. These segments have outwardly extending, mutually aligned, axial arms 5 provided with radially inwardly extending fingers 6 respectively engaging the opposite motor ends. The radial arms 7 oppositely extend in mutual alignment from the adjacent segment ends 4 at the circumferential central portions of the segments 3.

These mountings are each integrally formed from sheet metal of adequate gage to provide adequate stiffness. In the commercial form 18 gauge sheet steel is used. The arms 7 are formed as channels, as is shown by Fig. 3. These channels bend at the mentioned central portions of the segments and merge outwardly therewith. At spaced locations outwardly from these central portions of the segments 7, the arms bend at 8 toward the fan end of the motor 1 to provide the necessary offset required to swing the fan motor around without the fan blades striking objects which would be cleared when the fan motor is in either of its two operating positions. The arms 8 terminate with tubular ends 9 which are mutually aligned radially respecting the motor. This alignment is such as to fix the swinging pivot action of the motor properly, and it involves a reverse bending of the arms at 10.

The ends of the motor 1 are provided with axially projecting screws 11 which pass through holes in the ends of the fingers 6. The latter are
fastened to the ends of the motor by nuts 12 screwed onto the mentioned screws.

As can be seen from Fig. 1, the cylindrical segment 3 of each mounting has a length less than half the length of the motor 1. The lengths of the arms 5 depend on the extent to which the segments approximate half the length of the motor. Thus the arms 5 may, in effect, be caused to disappear by making the lengths of the segments equal one-half of the motor length, but in such an event the comparable portions of the segments would be functioning as arms.

The two mountings may be cut from sheet metal and pressed to form by anyone familiar with this kind of work. Therefore these elements may be manufactured very inexpensively. The motor is made in the usual fashion.

Assembly of the device is effected simply by arranging the two mountings as described and applying the nuts 12. The screws 11 may be passed through the holes in the fingers 6 by moving the two mountings axially together with the motor sandwiched between the fingers.

It is to be noted that in operation the motor 1 is not centrally clamped between the segments 3 and thereby retained. This kind of installation tends to be insecure and usually does not satisfactorily withstand rough treatment occurring during shipment and storing.

Instead of the above kind of operation the device of the present invention functions by one of the arms being rigidly anchored to one of the ends or faces of the motor, with the other mounting similarly anchored to the other end of the motor. Therefore the motor cannot tend to wobble as it does when clamped only between two semi-cylindrical segments.

It is to be understood that in the finished fan the tubular segments 6 have stub shafts inserted in them with these shafts pivotally mounted so as to accommodate the required swinging action required for reversing the air flow. These stub shafts also prevent the ends 9 from moving apart from each other.

Although the mounting of the present invention is made in two parts so that it is easy to manufacture and assemble with the motor, great structural rigidity results when this assembly is completed. If the motor attempts to tilt it is resisted at two points by each mounting. Thus, in the case of either mounting the nuts hold the end of the motor while the cylindrical segment, which acts as a saddle for the motor, holds the side of the motor. If the motor tries to twist it is resisted by the fact that the channel arms 7 are structurally rigid respecting torque and by the fact that these arms fade gradually into or grow gradually from the central portions of the cylindrical segments. If the motor attempts to oscillate axially it is resisted by the fact that the segments 4 cannot rotate respecting the motor 1 because the fingers 6 are fastened to the motor ends.

All of the above types of action are apt to occur during shipping or rough handling of a window or wall fan incorporating the present invention. It can be seen that in spite of the mounting consisting of only two parts, each integrally made from sheet metal, that when assembled with the motor the result is extremely rigid to all motions. The motor 1 is naturally heavy respecting any type of mounting that might be used, thus accounting for the need for structural rigidity.

I claim:
1. A reversible fan motor mounting and motor assembly comprising, in combination, a cylindrical fan motor having a fan end, cylindrical segments diametrically fitting said motor respectively in mutually offset axial relation with adjacent ends outwardly extending from said motor center line, mutually aligned axial arms respectively connected with said segments and oppositely extending therefrom axially and having radially inward fingers respectively engaging the opposite motor ends, radial arms connected with and oppositely extending in mutual alignment radially from said adjacent segment ends at the circumferentially central portions of said segments, said mountings each integrally formed from sheet metal and said radial arms being formed as channels which bend at said central portions and merge outwardly together and at locations spaced outwardly therefrom bending toward the fan end of said motor and terminating with tubular ends which are mutually aligned radially respecting said motor, and means fastening said fingers to said motor's ends.
2. A reversible fan motor mounting including a set of elements with each element having a substantially cylindrical segment having axial and circumferential ends, an arm extending radially outwardly from the central portion of the segment adjacent to one of its axial ends, arms extending axially from the segment adjacent to the other of its axial ends and adjacent to the segment's circumferential ends, and fingers extending radially inwardly respecting the segment from the ends of the axially extending arms and which are substantially flat in a radial plane respecting the segment.
3. A set of elements adapted to be used for mounting an electric motor, the elements each having a mounting arm, a saddle longitudinally extending transversely from the arm, the saddle being shaped to engage an extended circumferential portion of the side of the motor, the saddle having one axial end transversely connected to the arm and an opposite axial end, and fingers connected to said opposite axial end of the saddle and radially inwardly extending therefrom, the fingers being constructed and arranged for fastening to an end of the motor.

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References Cited in the file of this patent

UNITED STATES PATENTS

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<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,126,559</td>
<td>Anderson</td>
<td>Aug. 9, 1938</td>
</tr>
<tr>
<td>2,130,359</td>
<td>Smith</td>
<td>Sept. 20, 1938</td>
</tr>
<tr>
<td>2,151,561</td>
<td>Morrill</td>
<td>Mar. 31, 1939</td>
</tr>
<tr>
<td>2,225,406</td>
<td>Anderson</td>
<td>Dec. 17, 1940</td>
</tr>
</tbody>
</table>