

Jan. 3, 1939.

R. DE MEY ET AL

2,142,307

MOUNTING OF AXIAL FLOW FANS AND THE LIKE

Filed June 13, 1935

3 Sheets-Sheet 1

Fig. 1.

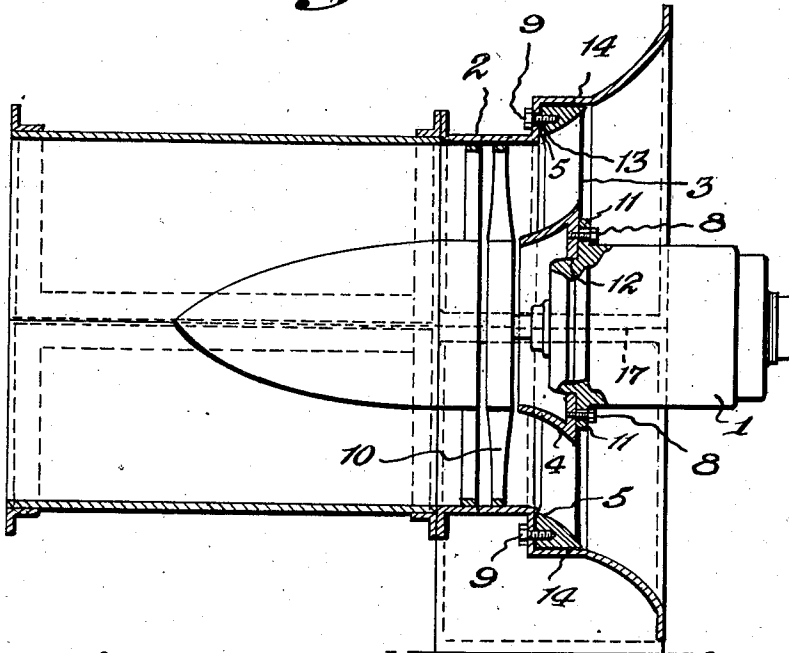


Fig. 2.

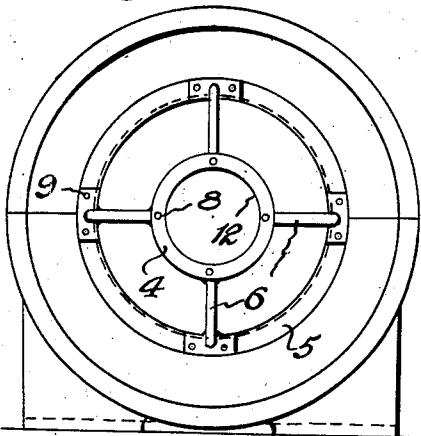
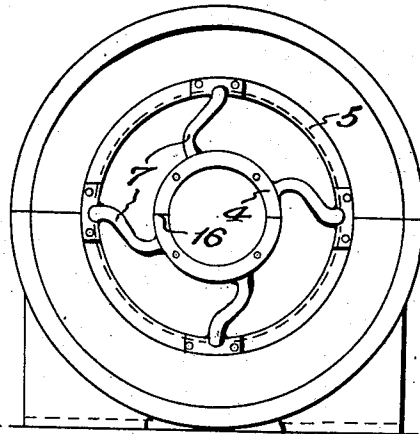


Fig. 3.



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Fig. 3.^a

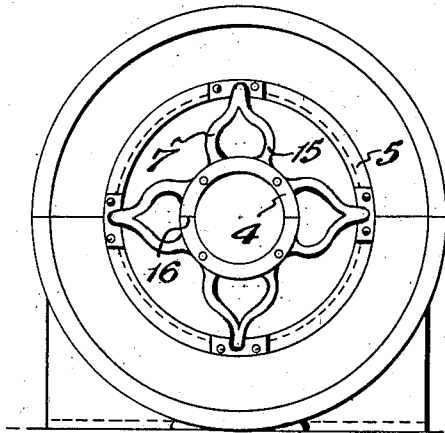


Fig. 6.^a

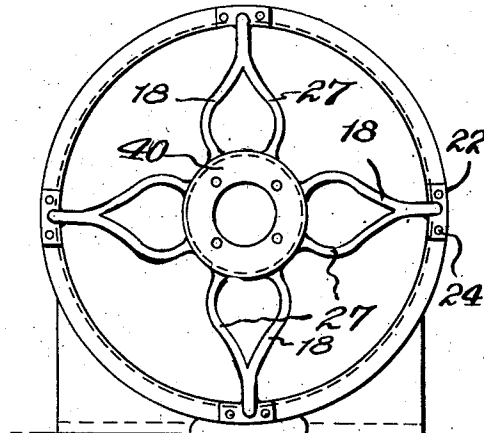
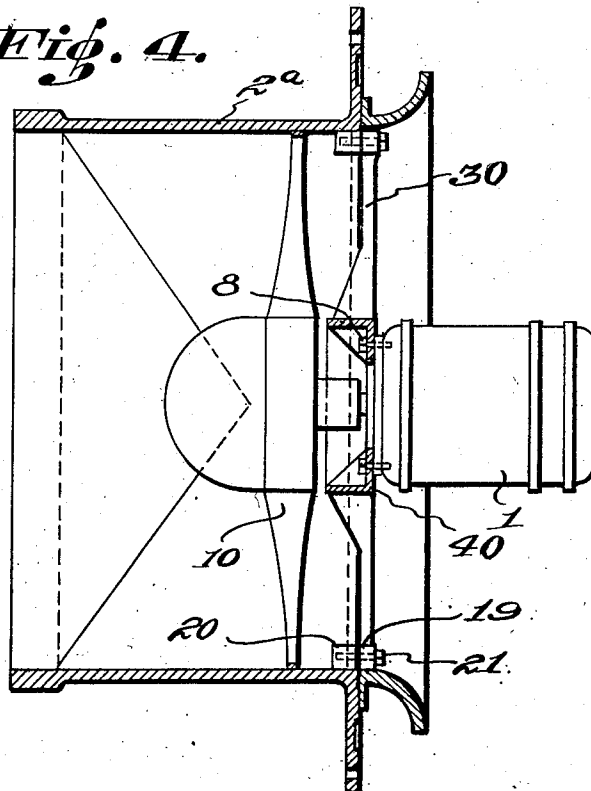


Fig. 4.



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Fig. 5.

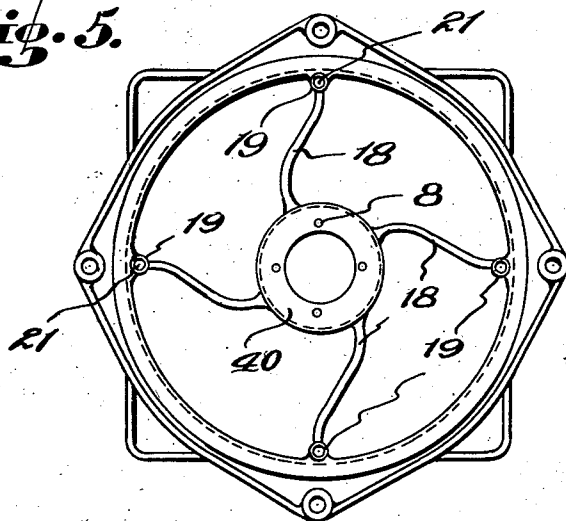


Fig. 7.

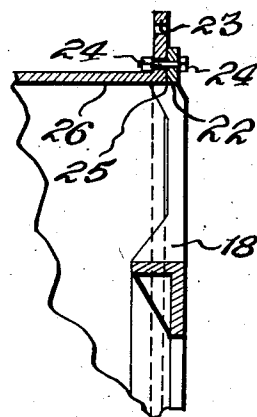
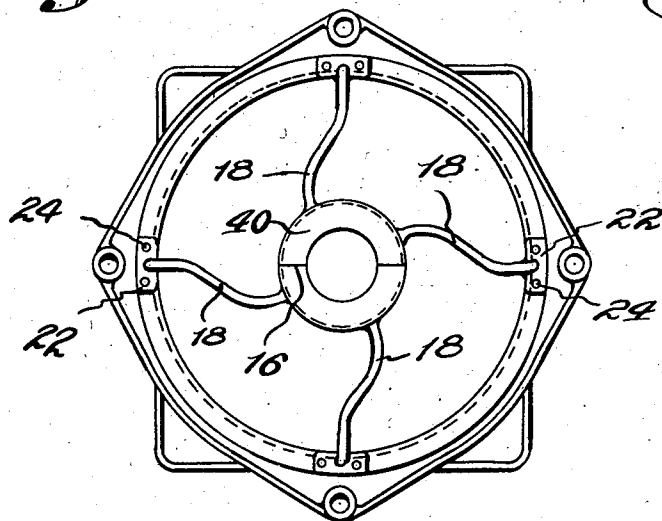


Fig. 6.



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UNITED STATES PATENT OFFICE

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MOUNTING OF AXIAL FLOW FANS AND THE
LIKERené De Mey and Paul Havard,
Brussels, BelgiumApplication June 13, 1935, Serial No. 26,486
In Great Britain June 14, 1934

8 Claims. (Cl. 230-117)

The present invention relates to the mounting of axial flow fans and the like and concerns particularly the fixing of the prime mover, for example the electric motor, actuating such machines.

For this purpose and in accordance with one method as actually used, use is made of radial supports the inner and outer extremities of which are provided with fastening lugs adapted to be bolted to the prime mover and to the fan casing respectively or, according to a modification, the radial supports are formed integral with the prime mover body as by a casting operation.

These methods show several disadvantages amongst which may be cited: the difficult alignment of the prime mover and or the rotor inside the fan casing; difficult machining and assembling of the parts; necessity of a prime mover of special design; owing to the straight form of the radial supports objectionable noise, i. e., a siren effect, is produced when the supports are located closely adjacent the fan rotor.

The invention avoids these disadvantages.

One object of the invention is to provide a method and arrangements of parts which enable a perfect alignment of the prime mover and, or the rotor in relation to the fan casing to be obtained with a minimum of fitting work, as well as the radial clearance of the rotor blades or vanes to be kept easily equal, the prime mover further being able to be quickly dismantled and removed.

Another object of the invention is to enable a standard type of prime mover to be used.

Still another object of the invention is to eliminate the siren effect produced by the supports when placed in close proximity of the rotor thus enabling a very silent operation to be obtained.

With this and other objects in view the invention consists in supporting the prime mover by means of a spiderlike frame comprising an inner annular ring to which the prime mover is secured and means such as spokes enabling said ring to be secured to a bearing part or parts machined or otherwise provided on the casing.

The invention also consists in giving these spokes a stream lined section.

The invention further consists in giving these spokes a curved shape, and preferably a sinusoidal outline in radial direction.

According to one construction, the assembly to the casing is obtained by means of an outer annular ring, with which the spokes are made integral or to which such spokes are secured as

by means of bolts, rivets or other fastening devices, said annular ring having at least one face machined for cooperation with a machined face of the casing.

According to another construction, the outer ends of the spokes are provided with bosses by means of which the supporting frame is secured to the casing, as by means of bolts, studs or screws extending axially and, or in radial direction.

In both cases, the spokes may be straight or curved in radial direction and for example of sinusoidal outline, according to which the supporting frame is located away from or adjacent to rotating parts able to produce a siren effect.

Also the spokes may be simple or doubled, and their number may be varied according to the requirements.

In order that the invention may be clearly understood the aforesaid forms of construction of supporting frame will now be described with more details as applied by way of example to prime movers for axial flow fans, in reference to the annexed drawings, in which:

Fig. 1 is a side sectional elevation of an axial flow machine having the invention applied thereto;

Figs. 2 and 3 are end elevation views of the machine showing the supporting frame provided with straight and alternatively sinusoidal spokes;

Fig. 3a is an end elevation view illustrating a modification of the spokes shown in Fig. 3.

Fig. 4 is a side sectional elevation view of an axial flow machine showing another constructional form;

Figs. 5 and 6 are end elevation views of the machine, showing two alternative arrangements of the assembly of the outer ends of the spokes;

Fig. 6a is an end elevation of the spoke arrangement shown in Fig. 6.

Fig. 7 is a detail view in side elevation.

As will be seen in Fig. 1 the prime mover or electric motor 1 is supported and centralized in the fan casing 2 by means of a supporting frame 3 comprising inner and outer annular rings 4 and 5 connected together by spokes which may be directed radially as at 6 in Fig. 2 or may be sinusoidal shape, as shown, at 7 in Fig. 3 according to the proximity of the rotor 10. The supporting frame may have three, four or more spokes according to requirements. The motor 1 is bolted to the inner annular ring 4 of the supporting frame and the latter is bolted to the casing through the outer annular ring 5 as by means of the screws 8 and 9, whilst correct align-

ment of the motor 1 and centralization of the rotor 10 in the casing 2 is obtained by means of the machined face of the motor flange 11 being provided with a turned spigot to fit a corresponding hole 12 in the machined face of the inner annular ring 4, and by the outer annular ring being machined on its face and outside diameter to fit against and in a corresponding machined face and bore 13 and 14 provided in the casing 2.

With regard to the types of supporting frames having the sinusoidal spokes 7 illustrated in Fig. 3 these may be reinforced when necessary to increase their rigidity and prevent vibration by providing a duplicate set of spokes 15 of the opposite hand in addition to the spokes 7 as shown in Fig. 3a. This reinforcement is of particular importance when the supporting frame 3 is cast in two halves jointed as at 16 in Fig. 3a so as to enable the prime-mover 1 and rotor 10 to be easily removed from the casing 2 for example in vertical direction, in which case the casing 2 is provided with a joint 17 as indicated in Fig. 1.

In Fig. 4 the prime-mover or electric motor 1 is supported and centralized in the fan casing 2a by means of a supporting frame 30 comprising an inner annular ring 40 to which the prime-mover 1 is bolted as by means of the screws or bolts 8, said ring having three, four or more arms 18 cast thereon, Figs. 5 and 6, and of sinusoidal outline, said arms being provided with bosses 19 (see Figs. 4 and 5) cast on their outer extremities and secured, by means of screws or bolts 21, to corresponding bosses 20 cast or welded integral with the casing 2a.

Alternatively, as will be seen in Figs. 6 and 7, the arms 18 may be provided with feet or lugs 22 cast on their outer extremities for fixing by means of bolts 24 to the end flange 23 of the casing. Centralization of the supporting frame and, incidentally, that of the rotor 10 may be ensured inside the casing 2 by machining a shoulder 25 on the arms 18 themselves or on the feet 22 of the arms if preferred, so as to fit the bore 26 or a machined recess in the flange 23 of the casing 2a.

With this type of supporting frame also, the sinusoidal support arms 18 in Fig. 6 may be reinforced to increase their rigidity and prevent vibration, by casting integrally with them and the inner annular ring 40 a duplicate set of arms 27 of the opposite hand as shown in Fig. 6a. Again as with the supporting frame described with reference to Figs. 1 to 3, this reinforcement is of special importance when the supporting frame is made in halves with a joint 16 arranged as shown in Fig. 6.

It will be seen that the arms 18 may be provided with feet or lugs adapted to receive one bolt or screw or, alternatively two bolts, the arrangement of Fig. 5 being intended for the smaller or lighter types and that of Fig. 6 for the larger or heavier types of fans.

It is to be understood that the arrangements may be used as well for supporting a bearing box carrying a shaft or a gear box when a belt drive or a gear drive is selected, and that the invention is not limited to the application to fans but includes similar applications.

We claim:

1. An arrangement for mounting axial flow fans and the like, including a prime mover, comprising an annular inner member forming an outer complete encircling support for the prime mover, integral spokes extending away from said annular member, an imperforate casing of substantially circular cross section, bearing surfaces extending

inwardly from said casing intermediate the ends thereof, complementary bearing surfaces associated to the spokes and axially extending means to secure together the bearing surfaces on the casing and the spokes.

2. An arrangement for mounting axial flow fans and the like, including a prime mover, comprising an annular inner member forming an outer complete encircling support for the prime mover, integral spokes extending away from said annular member, an imperforate casing of substantially circular cross section, bearing surfaces extending inwardly from said casing intermediate the ends thereof, said bearing surfaces lying in one plane transverse to the axis of the fan, complementary bearing surfaces associated to the spokes and axially extending means to secure together the bearing surfaces on the casing and on the spokes.

3. An arrangement for mounting axial flow fans and the like, including a prime mover, comprising an annular inner member forming an outer complete encircling support for the prime mover, integral spokes extending away from said annular member, an imperforate casing of substantially circular cross section, bearing surfaces extending inwardly from said casing intermediate the ends thereof, a ring connecting the outer ends of the spokes, said ring including bearing surfaces complementary to the bearing surfaces first named and axially extending means for securing together all the said bearing surfaces.

4. An arrangement for mounting axial flow fans and the like, including a prime mover, comprising an annular inner member forming an outer complete encircling support for the prime mover, integral spokes extending away from said annular member, said spokes lying in one and the same plane transverse to the axis of the fan, an imperforate casing of substantially circular cross section, bearing surfaces extending inwardly from said casing intermediate the ends thereof, complementary bearing surfaces associated to the spokes and axially extending means to secure together the bearing surfaces on the casing and on the spokes.

5. An arrangement for mounting axial flow fans and the like, including a prime mover comprising a spider like frame, said frame including a central annular member and spokes lying in a plane substantially parallel to the plane of the rotating blades, said spokes of curved shape in radial direction extending outwardly from said central member and joining said member under angles of incidence near of 90°.

6. An arrangement for mounting axial flow fans and the like including a prime mover, comprising an annular inner member forming an outer encircling support for said prime mover, spokes extending away from said annular member, a casing of substantially circular cross section, depressions in the inner face of said casing, bearing surfaces in said depressions, complementary bearing surfaces associated to the spokes, said complementary bearing surfaces housed in said depressions and means to secure together the bearing surfaces on the casing and on the spokes.

7. An arrangement for mounting axial flow fans and the like including a prime mover comprising an annular inner member forming an outer encircling support for said prime mover, spokes extending away from said annular member, a casing, a circular groove formed in the inner surface of the casing, bearing surfaces on said groove, a ring connecting the outer end of the spokes and lying in said groove, said ring including bearing

surfaces complementary to the bearing surfaces first named, and means for securing together all the said bearing surfaces.

8. An arrangement for mounting axial flow fans and the like including a prime mover, comprising an annular inner member forming an outer encircling support for said prime mover, spokes of sinusoidal curvature extending away from said annular member and lying in a plane substantially

parallel to the plane of the rotating blades, a casing, depressions in the inner face of said casing, bearing surfaces in said depressions, complementary bearing surfaces associated to the spokes, and means to secure together the bearing surfaces on the casing and on the spokes. 5

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