Jan. 11, 1938. H. I. FINCH 2,105,315

CIRCULATING FAN

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Fig-1.

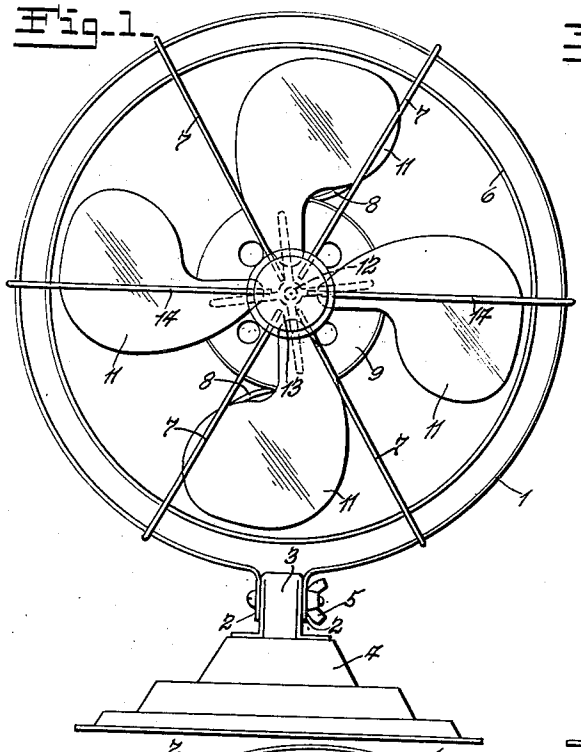


Fig-2.

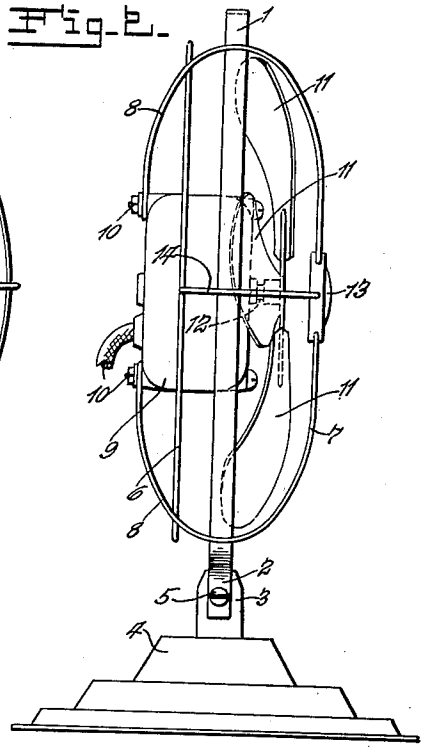
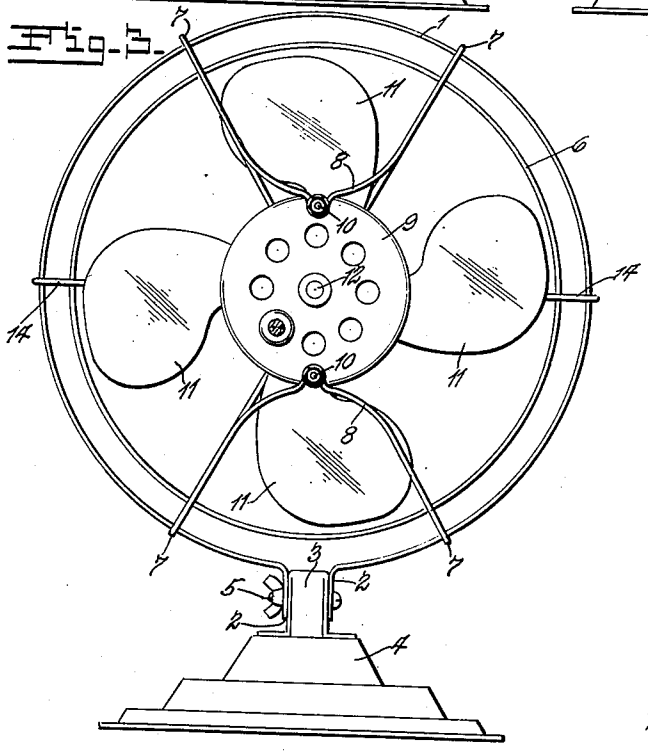


Fig-3.



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Fig. 4.

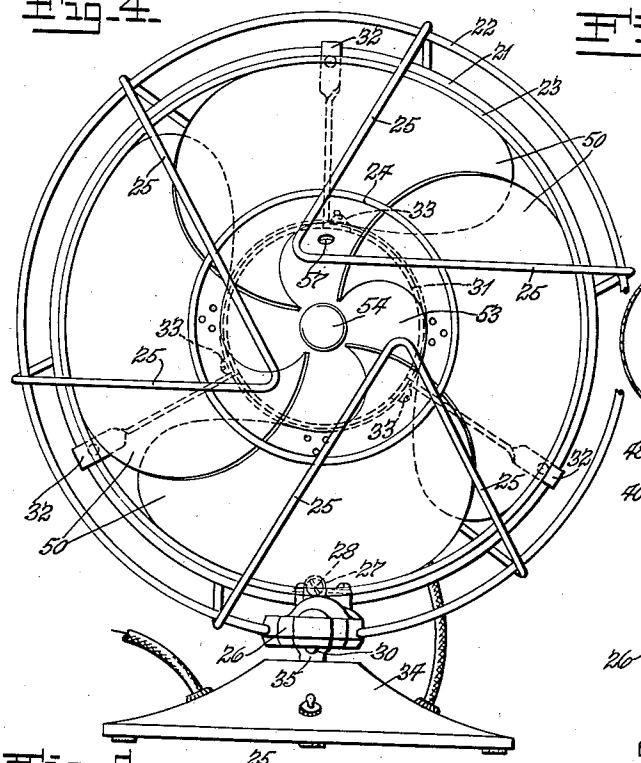


Fig. 5.

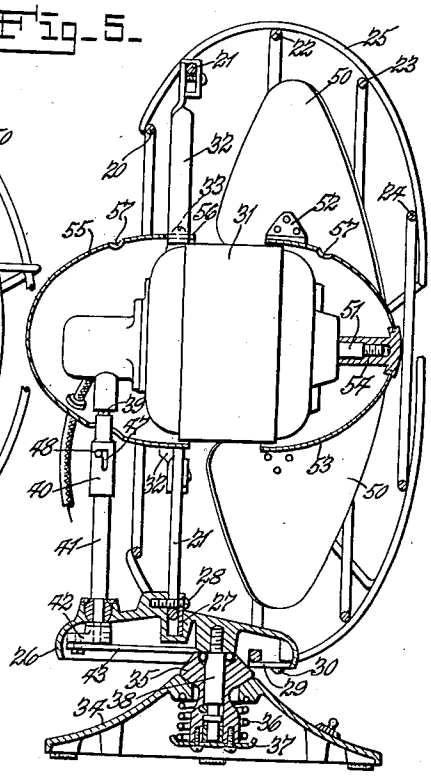


Fig. 6.

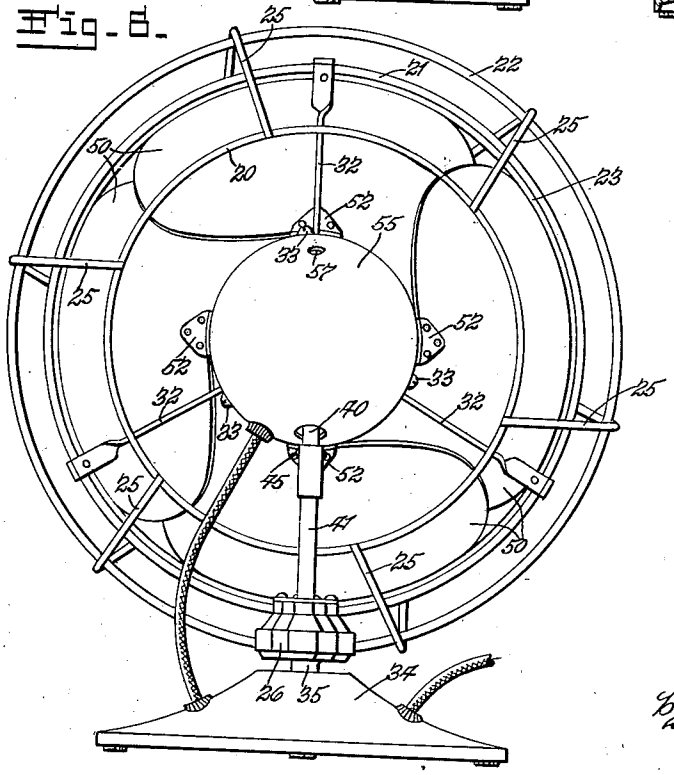
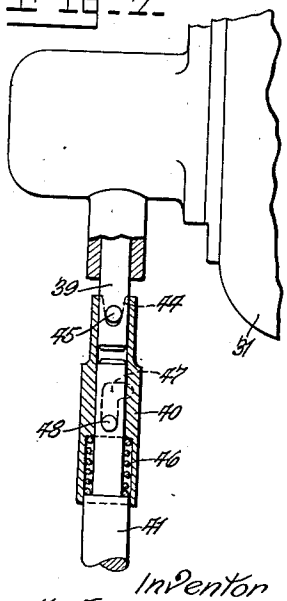


Fig. 7.



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UNITED STATES PATENT OFFICE

2,105,315

CIRCULATING FAN

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Application November 24, 1933, Serial No. 699,499

11 Claims. (Cl. 230—273)

This invention relates to circulating fans.

An object of this invention is to provide an electric circulating fan which will be economical to manufacture, nearly noiseless in operation, durable in service, and which will lend itself to ornamental design.

A specific object of the invention is to provide, in a fan of the type in which the impeller is secured directly to the motor shaft, a combination guard and support for the motor and the fan whereby the motor will be resiliently supported in and by the guard.

Other and specific objects of the invention will be apparent from the following detail description, taken in connection with the accompanying drawings, in which—

Figs. 1, 2, and 3 illustrate one embodiment of the invention, Fig. 1 being a front elevation, Fig. 2 a side elevation, and Fig. 3 a rear elevation.

Figs. 4, 5, 6, and 7 illustrate a second embodiment of the invention, Fig. 4 being a front elevation, Fig. 5 a vertical section, Fig. 6 a rear elevation, and Fig. 7 a detail of a part of the oscillating mechanism.

In the embodiment shown in Figs. 1, 2, and 3 a guard and support for the fan includes a circular band 1 having ears 2 which are clamped to a lug 3 on a base 4 by means of a bolt 5. The guard and support also includes a circular member 6 concentric with the band 1. A plurality of transverse members 7 are secured to the band 1 and the ring 6, preferably by welding. The rear portions of the members 7 are formed into loops 8 with their tips secured to a motor 9 by bolts 10, as best shown in Fig. 3. Fan blades 11 are secured to the shaft 12 of the motor 9. The free ends of the members 7 are curved forwardly from the band 1, forming a guard in front of the fan blades 11. These ends are secured together centrally of the band 1 by means of a plate 13, in a manner which is well known in the art. Other transverse members 14 may be secured to the circular members 1 and 6 with their ends secured by the plate 13.

The band 1 and the ring 6 are preferably of resilient material, the band 1 being of sheet metal and the ring 6 of wire. The transverse members 7 and 14 are also preferably of wire.

The arrangement is such that the motor and fan are entirely supported by the resilient guard. Such an arrangement tends to reduce vibration to a minimum, and especially that incident to torsile vibration. The direction of the air stream may be changed by adjusting the position of the guard with respect to the base through loosening of the bolt 5.

Another embodiment of the invention, which includes a plurality of circular members fabricated with a plurality of transverse members to form a guard and support for a motor and fan, is shown in Figs. 4, 5, 6, and 7. The structure illustrated in these figures is a fan of the oscillating type. The structure shown in these figures is somewhat more complex than the simple embodiment shown in the preceding figures, but certain essential features shown in the preceding embodiment are included.

A plurality of circular rings 20, 21, 22, 23, and 24 are fabricated with a plurality of transverse members 25 to form the guard and support. The rings 21 and 22 are secured to and supported by a plate 26, as best shown in Fig. 5. The ring 21 is secured to the plate 26 by a clip 27 and a screw 28. The ring 22 is secured to the plate 26 by a clip 29 and a screw 30. These rings, and in particular rings 21 and 22, may desirably be made somewhat resilient to reduce the transmission of movement and vibrations from the rotating parts to the base. Also the transverse members 25 may be resilient.

A motor 31 is supported within and by the guard by resilient straps 32, having their outer ends secured to the ring 21 and their inner ends secured by screws 33 to the frame of the motor 31.

The base plate 26 is secured to a base member 34 in such a manner that the fan may oscillate and also in such a manner that the angle of the fan may be easily adjusted. A ball member 35 is interposed between the plate 26 and the base member 34, forming with the member 34 a ball and socket joint, as best shown in Fig. 5. A spring 36 is held in position by a disc 37 secured to the bottom end of the ball member 35, the upper end of the spring bearing against the bottom side of the base member 34. This arrangement is such that the fan may readily be tilted, the spring keeping the ball and socket joint in tension and preventing displacement of the fan from adjusted position.

A stud shaft 38 is secured to the bottom of the plate 26 and is journalled in the ball member 35. By these means, the plate 26 is pivotally mounted with respect to the remaining portion of the base and permits the oscillation of the fan.

The oscillating mechanism includes a usual chain of gearing, not shown, by which the motor drives a shaft 39. A sleeve 40 connects the shaft 39, in a manner to be presently described, with a shaft 41, to which is connected a crank 42 for

driving a pitman 43, which is pivotally connected to the ball member 35. Since the connection of the pitman with a relatively stationary member for the purpose of oscillating a fan is well known and constitutes no part of this invention, it is not illustrated nor need it be further described in detail.

The sleeve 40 provides means whereby the oscillating mechanism may be readily disconnected or connected at will. The upper end of the sleeve 40 has a slot 44 to accommodate a pin 45, secured to the shaft 39. The sleeve 40 is pressed to extended position by a spring 46, bearing against shoulders respectively on the shaft 41 and on the sleeve 40. When the sleeve 40 is in extended position, as shown in Fig. 7, the pin 45 engages in the slot 44.

A bayonet slot 47 is cut in the sleeve 40 and accommodates a pin 48, secured to the shaft 41. The arrangement is such that the sleeve 40 may be pressed downwardly and latched by a pin 48 engaging in the transverse portion of the bayonet slot 47. In this latched position the pin 45, on the shaft 39, is entirely free of the slot 44 and rotation of the motor and of the shaft 39 will not rotate the sleeve or the shaft 41.

New and novel means for attaching the fan blades 50 to the shaft 51, of the motor 31, is employed in this embodiment. The blades 50 are attached by angles 52 to an oval shell 53. The oval shell 53 is attached at its tip to a collar 54, which is secured to the shaft 51. The shell 53 encompasses a part of the motor frame and a slight clearance only is provided between the outer surface of the motor frame and the inner surface of the shell 53. An oval shell 55, similar in size and shape to the shell 53, is secured to the rear of the motor, it being held in position by the screws 33, which secure the supporting members 32 to the motor frame. Slots 56 are provided in the shell 55 through which the members 32 extend. Holes 57 in the shells 53 and 55, respectively, provide means by which the motor may be lubricated.

It will be apparent from the foregoing description that the invention accomplishes its objects. The fan is simple in construction, economical to manufacture, and durable in service. The motor and fan assembly are resiliently supported, thereby reducing vibration and noise to a minimum, especially vibration in a torsile direction. When the motor rotates the impeller, there is a reaction resisting this rotation. This reaction tends to twist the motor housing within the guard ring upon which it is supported. It is this torsile or torsional vibration that is referred to. It is, of course, understood that many incidental vibrations in this direction are produced. It will also be apparent that the invention lends itself conveniently to an ornamental design, especially with respect to making a fan which is compact in structure and neat in appearance. It is thus clear that the cages or combination guard and support assemblages are directly secured to the bases in the sense that there are no intermediary springs, rubber bumpers, or the like, such as are conventionally employed to absorb vibration and shock as the primary absorbing means. It is, of course, to be understood that the thus defined use of directly secured includes the use of intermediate plates, and the like, such as are disclosed.

Various changes may be made in the details of construction, parts of the invention may be used without the whole and additions may be made, within the scope of the appended claims, without departing from the spirit of this invention.

I claim:

1. In a circulating fan including a motor and an impeller secured to the shaft of the motor, a base, a support having a plurality of loop members at least one of which is directly clamped thereto, a plurality of transverse members joining said loop members, such of said loop members as are clamped to the base, and said transverse members being resilient and of relatively small cross section to absorb vibration from the motor and impeller, and being fabricated to form a guard for the impeller, and a plurality of flexible members secured to one of said loop members and to the motor for supporting the motor therefrom.

2. In a circulating fan including a base a motor and an impeller secured to the shaft of the motor, a plurality of resilient circular members, directly clamped to the base so as to be free to vibrate, a plurality of transverse members attached to and fabricated with said circular members to form a guard for the impeller, and flexible means cooperating with one of said circular members for supporting the impeller and motor within the guard, and for absorbing at least part of the vibration of the impeller and motor.

3. In a circulating fan having a motor and impeller secured to the shaft of the motor, a unitary support and guard for the motor and impeller comprising a plurality of resilient members fabricated in open pattern to surround the periphery of and extend in front of the impeller, supporting members connected to said unitary support and guard and to the frame of the motor for wholly supporting the motor and impeller in the relationship aforesaid, a base, and means for clamping the unitary support and guard at one place in its periphery directly to the base to maintain the unitary support and guard with the motor and impeller in upstanding relationship to the base.

4. In a circulating fan including a motor and impeller secured to the shaft of the motor, a unitary support and guard for the motor and impeller comprising a resilient loop member and a plurality of transverse members fabricated in open pattern to surround the periphery and extend in front of the impeller, supporting members connected to said unitary support and guard and to the frame of the motor for wholly supporting the motor and impeller in the relationship aforesaid, a base and means for clamping the loop member at one point in its periphery directly to the base to maintain the unitary support and guard with the motor and impeller in upstanding relationship to the base.

5. In a circulating fan including a motor and impeller secured to the shaft of the motor, a unitary support and guard for the motor and impeller comprising a plurality of loop members and a plurality of transverse members fabricated in open pattern to surround the periphery and extend in front of the impeller, supporting members connected to said unitary support and guard and to the frame of the motor for wholly supporting the motor and impeller in the relationship aforesaid, a base and means for clamping a plurality of said loop members directly to the base substantially in one transverse line at the periphery thereof to maintain the unitary support and guard with the motor and impeller in upstanding relationship to the base.

6. In a device of the kind described, a motor, an impeller thereon and rotated thereby, a base, and means flexibly securing the motor to the

base, said means including a flexible band surrounding the motor and secured at its ends directly to the base, and spaced, resilient elements connecting the motor to the band so that the motor is supported thereby.

7. In a device of the kind described, a base, a pair of rings each of which is secured directly to the base on one point in its periphery, a motor with an impeller thereon and rotated thereby, means joining said rings and with said rings forming a cage, and resilient means connecting said motor with one of said rings, so that said motor is supported on said cage, and the impeller is surrounded by the cage.

8. In a circulating fan having a motor and an impeller, a support at least one resilient loop member clamped directly to the support, a plurality of guard members secured to and supported by said loop member, and a plurality of resilient members secured to said loop member and extending inwardly across one face of said impeller to support the motor.

9. A fan including a base, a flexible loop attached at one point directly to said base and outstanding therefrom, a motor having an impeller attached thereto, and means attaching the motor to the flexible loop to be supported thereby and therein, the flexible loop being adapted to absorb vibration from the motor and impeller without transmitting the same to the base.

10. A fan including a base, a flexible band shaped into a loop with the ends of the band projecting from the loop, said ends being oppositely engageable over the base, pivotal clamp means through the ends and releasably securing the loop in adjusted position on the base, a motor and an impeller thereon, and means securing the motor to the band, the band being adapted to absorb vibration from the motor, and being adjustable to direct the air from the impeller in a selected direction.

11. In a fan, a base, a flexible loop member attached at one point in its periphery directly to the base and outstanding therefrom, a motor and an impeller thereon, and flexible transverse members to support the motor within the loop and to form a guard for the impeller, said transverse members being attached to the motor inwardly of the loop, extending outwardly to the loop, and then being bent inwardly across the front of the impeller, said transverse members and loop member being adapted to absorb vibration from the motor and impeller and avoid transmission thereof to the base.

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