Dec. 11, 1945. J. A. HECKMAN 2,390,588

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Filed Oct. 25, 1943 2 Sheets-Sheet 1

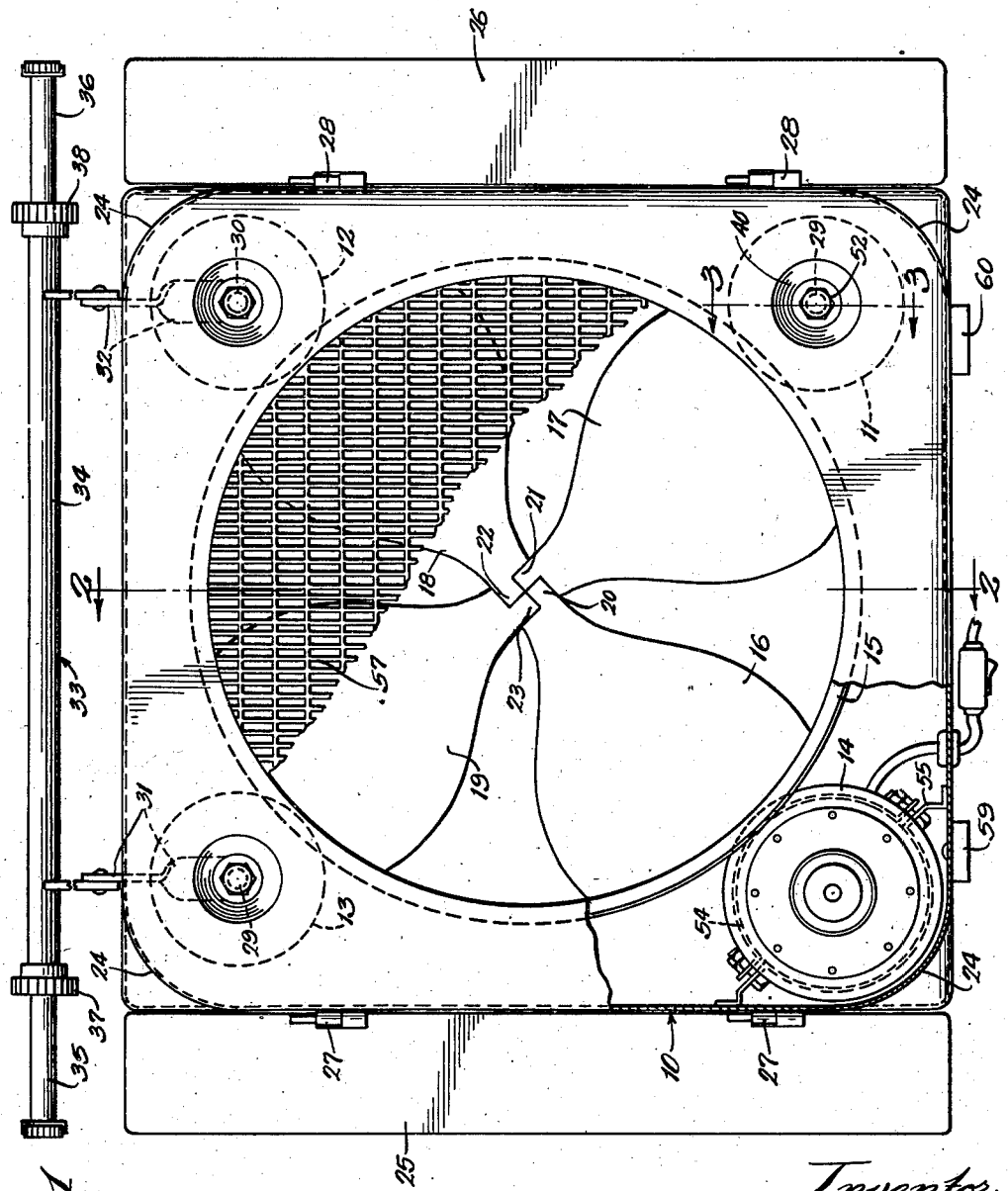


Fig. 1

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Fig. 2

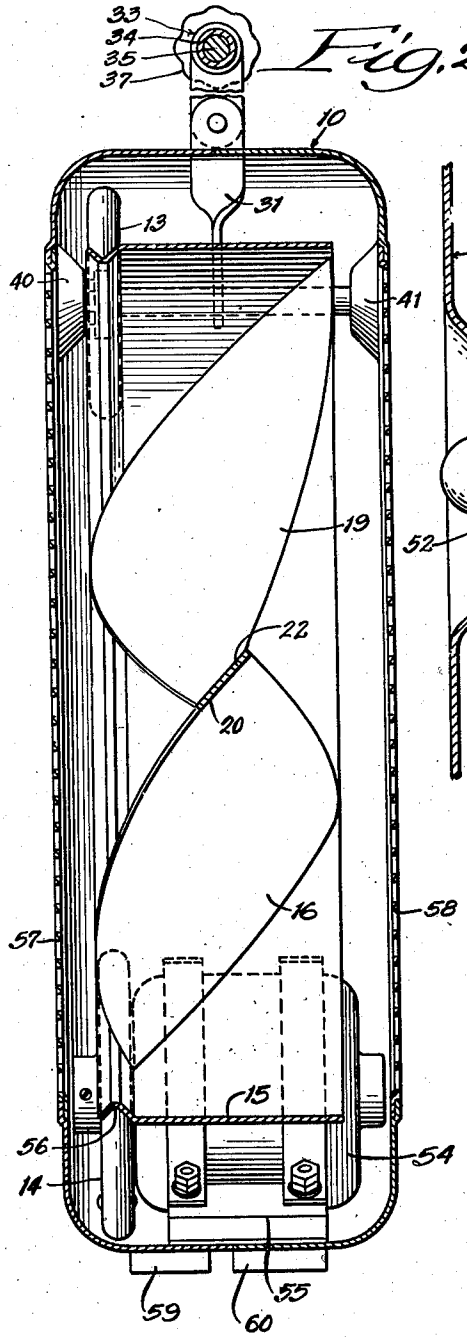
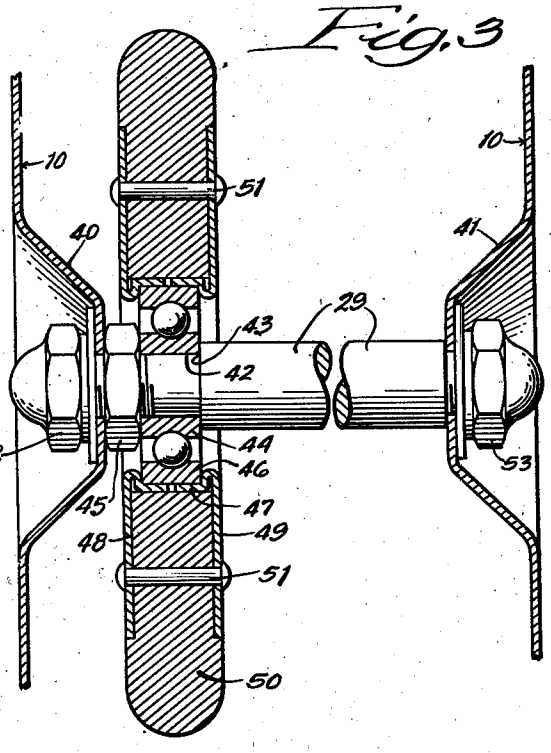


Fig. 3



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Application October 25, 1943, Serial No. 507,527

6 Claims. (Cl. 230—117)

This invention relates to a fan, and more particularly to a new and improved type of ventilating fan.

An object of the invention is to provide a sturdy construction for a ventilating fan in which vibration is minimized. Another object is to provide a fan adapted to be used in rectangular openings or in a rectangular housing and which occupies a minimum of space. Still another object is to provide a fan of relatively small depth.

Another object of the invention is to provide a low speed fan of unusually high efficiency. A further object is to provide a highly effective drive construction for imparting rotation to the fan from the motor or other source of power so as to rotate the fan at a speed substantially slower than the rotation of the motor and at the same time to eliminate belt drives and the difficulties normally encountered in the use of such belt drives.

Another object of the invention is to provide a ventilating fan in which the fan blades are supported at the periphery thereof. Yet another object is to provide a fan construction in which a motor for operating the fan is disposed outside the periphery of the fan blades. A further object is to provide a fan which is resiliently mounted and which is driven by a frictional drive engaging the outer periphery thereof. Still another object is to provide in a rectangular housing a circular fan with an actuating motor disposed radially beyond the periphery of the fan and within one of the corners of the housing.

Other features and advantages will appear from the following specification and drawings, in which—

Fig. 1 is a front elevational view of the fan; Fig. 2 is a transverse sectional view taken along the line 2—2 of Fig. 1; and Fig. 3 is a detail sectional view of one of the rollers on which the fan is mounted.

In the embodiment of the invention described herein, a substantially rectangular housing 10 supports a plurality of rollers 11, 12, 13 and 14 within the housing. Preferably, as shown, the rollers are disposed at the four corners of the housing. A casing 15 of a substantially circular periphery is supported at spaced portions of the periphery thereof by engagement with the rollers 11, 12, 13 and 14. To the inner surface of the periphery are attached a plurality of fan blades 16, 17, 18 and 19, each of which is supported at its periphery by the casing 15. The blades extend inwardly from spaced portions of the periphery of the casing 15 and are secured to each other at their inner ends 20, 21, 22 and 23.

The housing 10 is preferably of sheet metal and may be of any suitable or desired construction. As illustrated, the housing may be substantially rectangular in shape, with the forward and rear corners mounted as at 24. A pair of flaps 25 and 26 may be supported on opposite sides of the housing 10 by the hinges 27 and 28 respectively. The flaps 25 and 26 are adapted to be swung outwardly to the position shown in Fig. 1 to cover a maximum area, or may be swung forwardly into a plane transverse to the main plane of the housing so as to cover a minimum area. In this manner, the housing 10 may be placed in an opening, such as a window, and by swinging the flaps 25 and 26 to the desired position the housing may be used to fill openings of slightly different width.

Shafts 29 and 30, upon which the rollers 13 and 12 are mounted, may also support straps 31 and 32 respectively, which in turn are secured to a mounting bracket 33. The bracket 33 may include a tubular section 34 having tubular extensions 35 and 36 telescopically and adjustably received in the ends thereof. Lock nuts 37 and 38 may be used to fix the extensions 35 and 36 in a predetermined position. By means of the adjustability of the extensions 35 and 36, the fan may be supported in a window or other opening of a width varying according to the length of the extensions. Thus, the extensions may be moved telescopically into the tubular member 33 and then extended between the surfaces which are to support the fan.

As seen particularly in Figs. 2 and 3, the rollers 13 and 14 may be supported within the housing in any suitable manner. The roller 13, which is shown in detail in Fig. 3, may be mounted on a shaft 29 which is supported by the brackets 40 and 41 mounted on the wall of the housing 10. The shaft may be provided with a portion 42 of reduced diameter forming a shoulder 43 against which a sleeve 44 may be received. A nut 45, threadedly received on the shaft 29, may be used to tighten the sleeve 42 against the shoulder 43. The sleeve 44 may be fixed in position on the reduced portion 42 of the shaft 29. A bearing race 46 extends about the sleeve 44 and is rotatable thereupon. An annular rim 47 is received in fixed position on the bearing 46 and is equipped with flanges 48 and 49 extending radially outwardly and receiving therebetween the roller 50 which may be of a resilient material,

such as rubber. A rivet 51 secures the roller 50 to the flanges 48 and 49.

The roller 50 rotates freely about the shaft 29 and is removably supported thereon. When the roller is to be removed, the nuts 52 and 53 may be removed from the shaft 29, and the nut 45 may also be removed. The roller assembly, including the sleeve 42, the bearing race 46 and the rim 47, as well as the roller 50, may then be removed from the shaft 29.

The roller 14 may be of a construction similar to the roller 13 except that a motor 54 is mounted on the housing 10 to rotate the shaft on which the roller 14 is mounted. A suitable bracket 55, attached to the housing 10, may support the motor 54. The drive shaft of the motor may extend through the roller 14 to support the same.

The other rollers 11 and 12 may correspond in construction to the roller 13 and need not be described in detail herein.

The casing 15 is cylindrical in shape and is provided at the forward end thereof with an annular recess or groove 55. The groove is adapted to receive the peripheral edge of each of the rollers 11, 12, 13 and 14 which thus support the casing 15 for rotation within the housing. The peripheral edges of the fan blades 16, 17, 18 and 19 may be secured to the inner surface of the periphery of the casing 15 in any suitable or desired manner. Similarly, the central portions or inner ends 20, 21, 22 and 23 of the blades may be secured to each other in any desired manner. Preferably, as illustrated, the blades are spaced substantially uniformly about the periphery of the casing. Each blade may be of a conventional construction as to the body thereof, but differs from conventional blades by the mounting thereof at the outer periphery of the blade and by the attachment at the inner portion thereof to the other blades.

As seen particularly in Fig. 2, foraminous sheets 57 and 58 may be secured to the front and rear walls of the housing 10 so as to provide a closed housing to permit the ready flow of air therethrough. Any suitable type of screen may be used, although as illustrated a rather heavy screen of foraminous metal sheet is to be preferred.

In operation, the motor 55, by rotating the shaft on which the roller 14 is mounted, produces rotation of the roller 14. The roller 14, being resilient and being in engagement at its peripheral edge with the groove 56 in the casing 15, provides a friction drive for the casing 15 and produces rotation of the casing. The rollers 11, 12 and 13 serve as idling rollers and support the casing for rotation. By reason of the use of a resilient material in the rollers 11, 12, 13 and 14, the casing and the fan blades therein are resiliently mounted and vibration of the unit is minimized.

The motor, as seen in Fig. 2, is disposed to the rear of the roller 14 and is mounted in one corner of the housing 10. Since the groove within which the roller 14 is received is at the forward end of the casing 15, the motor 54 is in alignment with the body of the casing 15 and the entire unit is of a substantially uniform thickness or depth and of a minimum of thickness or depth. The screens 57 and 58 by closing the housing provide a safety construction and yet do not interfere with the flow of air through the fan.

The ventilating fan is particularly adapted to be mounted in a rectangular opening, such as a window. As stated, the opening in which the fan may be mounted may be of any width between the width of the housing itself and the width of the housing plus the width of the flaps 25 and 26. Resilient blocks 59 and 60 of rubber or the like serve to support the base of the housing 10 on the bottom wall of the aperture. By reason of the mounting construction shown, the extensions 35 and 36 may be used to secure the fan in an opening of the width referred to.

Although the invention has been described in connection with a specific embodiment, it will be apparent that modifications and changes may be made without departing from the spirit and scope of the invention.

I claim:

1. A ventilating fan comprising a circular casing, a plurality of resilient rollers disposed in spaced relation about said casing and engaging the spaced portions of the periphery thereof, said casing being supported by said rollers for rotation about the central axis thereof, one of said rollers being arranged in frictional drive relation with the periphery of said casing whereby rotation of the roller produces rotation of the casing, means for rotating said last-mentioned roller, and a plurality of fan blades mounted in spaced relation about the inner surface of the periphery of said casing and extending radially inwardly therefrom.

2. A ventilating fan comprising a circular casing, a plurality of rollers mounted in spaced relation about the periphery of said casing and engaging the same, said casing being supported by said rollers for rotation about the central axis of the casing, one of said rollers being arranged in frictional drive relation with the periphery of the casing whereby rotation of the roller produces rotation of the casing, means for rotating said last-mentioned roller, and a plurality of fan blades mounted in substantially uniformly-spaced relation about the inner surface of the periphery of said casing and extending radially inwardly therefrom, said fan blades being secured to each other at the inner radial ends thereof.

3. A ventilating fan comprising a circular casing, a plurality of rollers mounted in spaced relation about the periphery of said casing and engaging said periphery to rotatably support the casing, a housing receiving said rollers and supporting the same, said casing being supported by said rollers for rotation about the axis of the casing, at least one of said rollers being arranged in frictional drive relation with the periphery of said casing whereby rotation of the roller produces rotation of the casing, a motor carried by said housing for rotating said last-mentioned roller, and a plurality of fan blades mounted on the inner surface of the periphery of said casing and extending radially inwardly therefrom, said fan blades being secured to each other at the inner radial ends thereof.

4. A ventilating fan comprising a cylindrical casing, said casing being equipped with an annular groove at the forward end thereof, a housing receiving said casing, a plurality of rollers mounted in said housing and arranged in spaced relation about the periphery of said casing, each of said rollers extending into said groove to support the casing, at least one of said rollers being resilient and being arranged in frictional drive relation with the casing whereby rotation of the roller produces rotation of the casing, means for rotating said last-mentioned roller, and a plurality of fan blades mounted on the inner surface of the periphery of said casing and extending

radially inwardly therefrom, said fan blades being secured to each other at the inner radial ends thereof.

5. A ventilating fan comprising a circular casing, a plurality of resilient rollers disposed about the periphery of said casing and engaging the same to support the casing, said casing being supported for rotation about the central axis thereof, a housing for receiving said casing and for supporting said rollers, one of said rollers being arranged in frictional drive relation with the periphery of said casing whereby rotation of the roller produces a rotation of the casing, a motor carried by said housing and disposed radially outwardly of the periphery of said casing, said motor being in substantial alignment with the body of said casing, and a plurality of fan blades mounted in substantially uniformly-spaced relation on the inner surface of the periphery of said casing and extending radially inwardly therefrom, said fan blades being secured to each other at the inner radial ends thereof.

6. A ventilating fan comprising a circular casing, a plurality of resilient rollers disposed in spaced relation about said casing and engaging spaced portions of the periphery thereof, said casing being supported by said rollers for rotation about the central axis thereof, one of said rollers being engaged in frictional drive relation with the periphery of said casing whereby rotation of the roller produces rotation of the casing, means for rotating said last-mentioned roller, and fan blades carried within said circular casing.

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