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OSCILLATING FAN MACHINE.

APPLICATION FILED APR. 17, 1914.

1,258,478.

Patented Mar. 5, 1918.

Fig. 1.

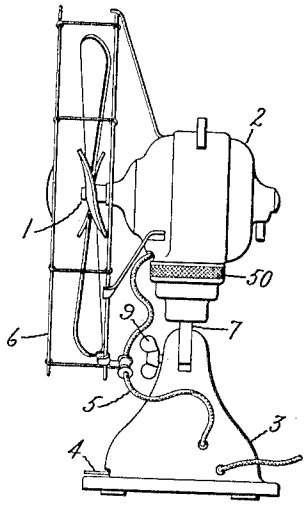

Fig. 2.

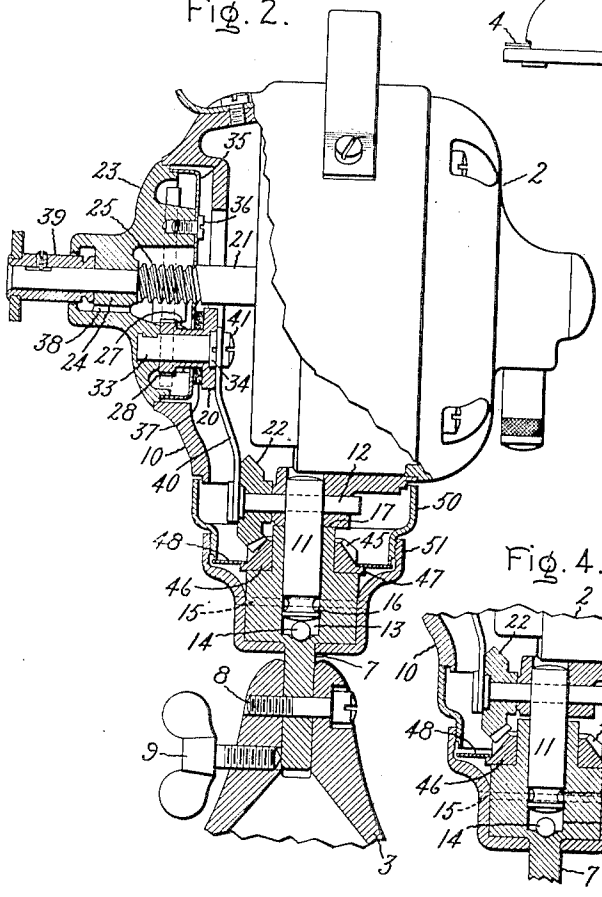

Fig. 3.

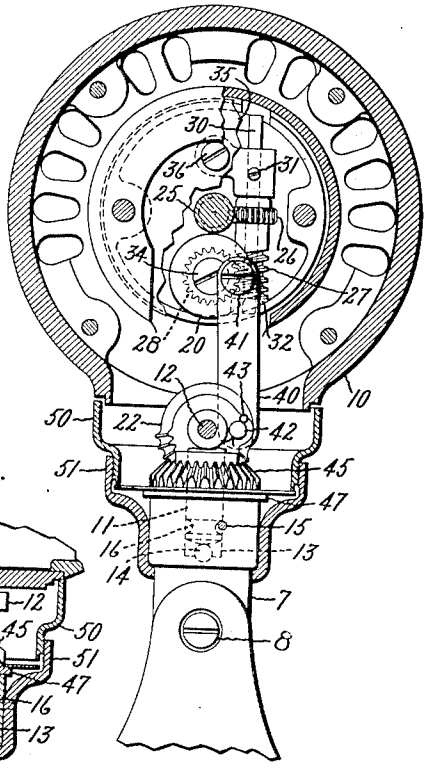

Fig. 4.

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UNITED STATES PATENT OFFICE.

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OSCILLATING-FAN MACHINE.

1,258,478. Specification of Letters Patent. Patented Mar. 5, 1918.

Application filed April 17, 1914. Serial No. 832,493.

To all whom it may concern:

Be it known that we, EDWARD T. SHAW and WESLEY E. LAIRD, citizens of the United States, both residing at Pittsfield, county of Berkshire, State of Massachusetts, have invented certain new and useful Improvements in Oscillating-Fan Machines, of which the following is a specification.

Our invention relates to oscillating fan machines, and our aim is to secure greater convenience and superior operating characteristics in such machines, and also to enhance their good appearance. More particularly, we aim to produce the oscillation of the rotary fan by mechanism which need not be visible and whose presence need not affect the appearance of the fan materially, and to provide for changing the region of oscillation, for preventing injury to the machine when the oscillation is interfered with or obstructed, and for rendering the oscillating mechanism ineffective so that the rotating fan may remain stationary. How these advantages may severally be secured in accordance with our invention will appear hereinafter,—as well as various other advantages obtainable in connection with it,—while its scope will be indicated in our claims.

Oscillation or periodic back and forth movement of a rotary fan on its support may be satisfactorily brought about by means for producing vibratory movement associated with one of these parts and connected with the other. In machines having oscillating mechanism of this sort, we provide for changing the region of oscillation by shifting the mechanism with reference to one of said parts; for preventing injury when the oscillation is obstructed by yieldingly securing said mechanism to one of the parts; and, again, for rendering the oscillating mechanism ineffective by releasing it from one of the parts. While the particular electric motor fan machine embodying all these features that we have hereinafter illustrated and described is the best embodiment of our invention at present known to us and while the invention extends to its various specific features and details of operation and construction and novel combinations and arrangements of parts, it will be understood that the invention is not confined thereto, but can be otherwise carried out and embodied.

In the accompanying drawing, Figure 1 is a side view of a fan machine constructed in accordance with our invention.

Fig. 2 is an enlarged view, partly in section, showing the oscillating mechanism, various parts being broken away and removed.

Fig. 3 is a sectional view at right angles to Fig. 2, certain parts being broken away and removed to show the mechanism more clearly.

Fig. 4 is a fragmentary view similar to Fig. 2 showing certain parts in different positions.

From Fig. 1 it will be seen that the rotary fan 1 with the electric motor 2 for driving it is mounted on a support comprising an ordinary base 3. The motor 2 may be of any preferred or approved character and construction, and the base 3 may contain any desired accessories for starting and speed control, such as the operating parts of a controller switch 4 and suitable resistance or reactance. The current connection from the electrical parts within the base 3 to the motor 2 is through a flexible cord 5 loosely attached to the guard cage 6 of the fan 1 so that it may not become entangled in any way. The upper part 7 of the support already referred to on which the fan 1 with its motor 2 is directly mounted to oscillate is pivoted at 8 (see Figs. 2 and 3) in the forked upper end of the lower or base part 3, so that the fan 1 and its axis of oscillation may be brought to any desired position with reference to the vertical, and a set-screw 9 serves to secure said part 7 when adjusted.

Referring, now, more particularly to the mounting of the fan 1 with its motor 2 so that it may oscillate, it will be seen from Figs. 2 and 3 that at the lower side of the motor casing 10 there is a bore in which a pin or pivot member 11 is secured by a somewhat similar but smaller member 12 extending transversely through it. The pivot member 11 fits loosely but snugly in a bore 13 in the part 7 with its lower end resting on an antifriction ball 14, and a round key member 15 at one side of the bore 13 engages in an annular groove 16 in the mem-

ber 11 so as to secure the parts together without interference with the oscillation of the fan 1 with reference to the support. As shown, the lower surface of the motor casing 10 appears to be in contact with the upper end of the part 7 at 17; but in practice there will preferably be a slight clearance.

In the oscillating mechanism shown, the means for producing vibratory motion is associated with the fan 1, and the variation or shift of the region of oscillation of the fan with reference to the support, the prevention of trouble or injury when the oscillation is interfered with, and the running of the fan without oscillation are all taken care of through the connection of said vibratory means with the part 7 of the support. The vibratory means comprises rotary actuating means 20 (shown as having the form of a disk crank) driven from the fan shaft 21 through reduction gearing and means for deriving a back and forth or vibratory motion from the continuous rotation of said actuating means and making connection to the support part 7 to produce the oscillation of the fan 1. As shown, the means last mentioned comprises a gear member 22 also associated with the fan 1 and itself oscillated by said actuating means 20 as the fan rotates. We will first describe the reduction gearing and its associated parts, and then the other parts and features of the oscillating mechanism.

From Figs. 2 and 3 it will be seen that there is in the front end of the motor casing 10 next the fan 1 a recess or opening in which is secured by suitable screws a housing or head structure 23 which has a bearing 24 for the fan shaft 21 and a compartment behind said bearing for inclosing the reduction gearing itself. The reduction gearing shown is a double one comprising a worm 25 on the fan shaft 21, a worm wheel 26 in mesh with said worm 25 and another worm 27 attached to said worm wheel 26, and another worm wheel 28 in mesh with said latter worm 27 and attached to the crank means 20,—which last is arranged at the inner side of said structure 23 and of its gearing compartment. The part comprising the worm wheel 26 and the worm 27 is mounted on a spindle 30 which is secured near one end in a portion of the housing structure 23 by means of a set-screw 31 and at the other end extends into a lug 32 on said structure 23, and the part comprising the worm wheel 28 and the crank means 20 is mounted on a stud 33 secured in said structure 23 directly beneath the fan shaft 21 and is held in place by a flat-headed screw 34 screwed into said stud. The gearing compartment is closed at its inner side (toward the interior of the motor casing) by a cover 35 of sheet metal fitting over the rim of the housing structure 23 and secured in place by a screw 36. As the gear compartment is preferably filled with lubricating grease, a felt or other suitable washer 37 in interposed between the crank disk 20 and the cover 35 to prevent the escape of such lubricant through the opening in said cover at this point. Return to the gear compartment of lubricant forced out through the shaft bearing 24 by the worm 25 is provided for by a passage 38 between the gear compartment and an annular chamber extending around the grooved fan hub 39 in front of the bearing.

The gear member 22, it will be seen, is mounted in an opening in the lower wall of the motor casing 10 at the same side of the axis 11 about which the fan oscillates as the crank means 20, its pivotal axis being formed by the flat-headed pin member 12, which is for this purpose arranged to extend in the same direction as the fan shaft 21 and as the crank axis 33. The connection from the crank means 20 to the gear member 22 consists of a slightly off-set flat link or pitman 40 whose upper end is secured to the crank disk by a flat-headed screw 41 by way of a crank pin and whose lower end is secured to said gear member by a flat-headed crank or pivot pin 42 held in place by a cotter pin 43 at the rear side of the gear member. The crank radius of the pin 42 is greater than that of the screw 41, so that for each complete revolution of the crank means 20 the gear member 22 will oscillate or vibrate back and forth once. As this oscillation is materially less than a complete revolution, the gear member 22 is toothed for only a part of its circumference.

Still referring to Figs. 2 and 3, it will be seen that the part 7 of the support is provided with gear means comprising teeth 45 properly pitched and mitered or beveled for the teeth of the oscillating bevel gear member 22 to mesh with them and so complete the connection of the vibratory means with the support. When, therefore, the gear member 22 oscillates in consequence of the rotation of the fan shaft 21, the fan 1 itself with its motor 2 will oscillate bodily through an angular range or region depending on the angle of oscillation of the gear member 22 and on the relative diameter of said gear member and the gear means formed by the teeth 45,—the angular range for the proportions of the various parts shown in the drawing being about ninety degrees. To shift this range or region of oscillation angularly with reference to the support, it will obviously be sufficient to lift the oscillatory parts including said gear member 22 a little higher than shown in Fig. 4, and turn them bodily so as to shift said gear member with reference to the support; as the gear teeth 45 form a complete circle, any change con-

sistent with the length of the flexible cord 5 may be made in this way.

While the construction thus far described enables the region of oscillation to be changed as just set forth, it does not in any way provide for preventing trouble or injury when the oscillation of the fan 1 is obstructed. As shown, this is taken care of by having the teeth which form the gear means 45 on a separate member 46 mounted and arranged on the support part 7 coaxial with the oscillation of the fan 1 and secured thereto by yielding friction, so that though associated with the support said member 46 is in effect part of the connection thereto from the vibratory means. As will be seen from Figs. 2 and 3, the gear member 46 has a flange 47 on which rests the inner edge of a steel washer 48 that is thin enough to be slightly resilient, and at its outer edge this washer 48 is pressed down on said flange 47 by a collar part 50 of the exterior casing which is screwed into another part 51 thereof that is held in place on the support part 7 by the key member 15 already mentioned. The collar part 50 is knurled (see Fig. 1) to afford a better handhold and so facilitate turning it to adjust the friction on the gear member 46, as well as for other purposes presently to be explained. If, now, the oscillation of the fan 1 is interfered with by a length of cord 5 inadequate for the range on which it has been started or by some object in the path of the guard 6 or is otherwise obstructed, the member 46 will give by slipping with reference to the support part 7 and no harm will ensue. As a result of this slipping, however, the member 46 will be automatically shifted by the oscillating gear 22 and the region of oscillation of the fan 1 will be shifted and readjusted with reference to the support to avoid further interference from such obstruction, so that the fan 1 will resume oscillation through its full normal range from the point of obstruction.

It will readily be seen that by taking hold of the motor 2 or of the guard 6 at any time—even when in motion—one can shift the member 46 and change the region of oscillation of the fan 1; and in practice this method of doing so will usually be so far preferable to that previously described that the key member 15 will ordinarily be arranged as shown in Fig. 4 to prevent the gear member 22 from being lifted out of mesh with the gear teeth 45. It will also be seen that by screwing the adjusting collar 50 upward from the position shown in Figs. 2 and 3 so that the frictional securing means 48 shall release the gear member 22 the oscillating mechanism will be rendered ineffective and the fan 1 allowed to remain stationary, and that by screwing said part 50 on up to the position shown in Fig. 4 the fan 1 will be frictionally locked fast on the support part 7 and oscillation or accidental displacement absolutely prevented. The release feature, moreover, affords another method of changing the region of oscillation, this additional method consisting in stopping the fan 1, releasing the friction clutch formed by the parts 46, 48, and 50, turning the fan bodily to the extent of the desired change, and then resetting the clutch by means of the adjusting and controlling part 50 to secure the member 46 to the support and render the oscillating mechanism once more effective before restarting the fan. The parts 50 and 51 serve to catch oil that may escape from oscillating gear and prevent it from reaching the outside of the device.

What we claim as new and desire to secure by Letters Patent of the United States, is:

1. In a fan machine, the combination of a support, a rotary fan mounted thereon so that it may oscillate with reference thereto, means for producing vibratory movement associated with said fan and operated from the fan shaft, and means for connecting said vibratory means with the support to cause the fan to oscillate comprising a member associated with said support mounted and arranged coaxial with the oscillation of the fan and a clutch with handhold controlling means for securing said member to said support to render the oscillating mechanism effective and for releasing it and so permitting the fan to remain stationary.

2. In a fan machine, the combination of a support, a rotary fan adapted to oscillate with reference thereto, means for producing vibratory movement comprising reduction gearing driven from the fan shaft, a gear member also associated with said fan and oscillated by said vibratory means, a gear member associated with said support arranged coaxial with the oscillation of the fan and in mesh with the first-mentioned gear member so that the oscillation of the latter may cause the fan to oscillate, and means for securing said latter gear member to said support by yielding friction so as to render the oscillating mechanism effective which is adapted to release it and so permit the fan to remain stationary.

3. In a fan machine, the combination of a support, a rotary fan with a driving motor mounted on said support so that it may oscilllate with reference thereto, means for producing vibratory movement comprising reduction gearing driven from the fan shaft inclosed in a separate lubricant retaining compartment at one end of the motor casing and rotary actuating means at the inner side of said compartment, adjacent the motor, operated by said reduction gearing, a gear member mounted on the motor structure within the casing and oscillated by said

rotary actuating means, and gear means on said support in mesh with said oscillating gear member.

4. In a fan machine, the combination of a support, a rotary fan mounted thereon so that it may oscillate with reference thereto, means for producing vibratory movement associated with one of the aforesaid parts, means for connecting said vibratory means with the other of said parts including a member associated with said latter part, and means for securing said member to the part with which it is associated to render the oscillating mechanism effective or releasing it and so rendering the oscillating mechanism ineffective, and for securing the fan to the support so as to prevent oscillation or displacement thereof.

5. In a fan machine, the combination of a support, a rotary fan mounted thereon so that it may oscillate with reference thereto, means for producing vibratory movement associated with said fan and operated from the fan shaft, means for connecting said vibratory means with the support including a member associated therewith mounted and arranged coaxial with the oscillation of the fan, and a clutch for securing said member to the support including a threaded controlling collar arranged to move in the direction of the axis of oscillation of the fan, said collar acting to set the clutch and render the oscillating mechanism effective when turned in one direction and to release the clutch and lock the fan to the support when turned in the other direction.

6. In a fan machine, the combination of a support, a rotary fan with a driving motor mounted on said support so that it may oscillate with reference thereto, said motor comprising a casing with an opening in its front end and a structure mounted in said opening having a bearing for the fan shaft, means for producing vibratory movement comprising reduction gearing in said structure driven from the fan shaft and revolving crank means at the inner side of said structure operated by said reduction gearing, a gear member mounted in an opening in the lower wall of the motor casing in front of its axis of oscillation so that it may oscillate about an axis extending transversely thereto and in the same direction as the fan shaft, a link connection from said crank means to said gear member within the casing whereby said gear member is caused to oscillate as the fan rotates, and gear means on said support beneath said oscillating gear member and in mesh therewith.

In witness whereof, we have hereunto set our hands this 10th day of April, 1914.

EDWARD T. SHAW.
WESLEY E. LAIRD.

Witnesses:
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ANNIE R. NUGENT.