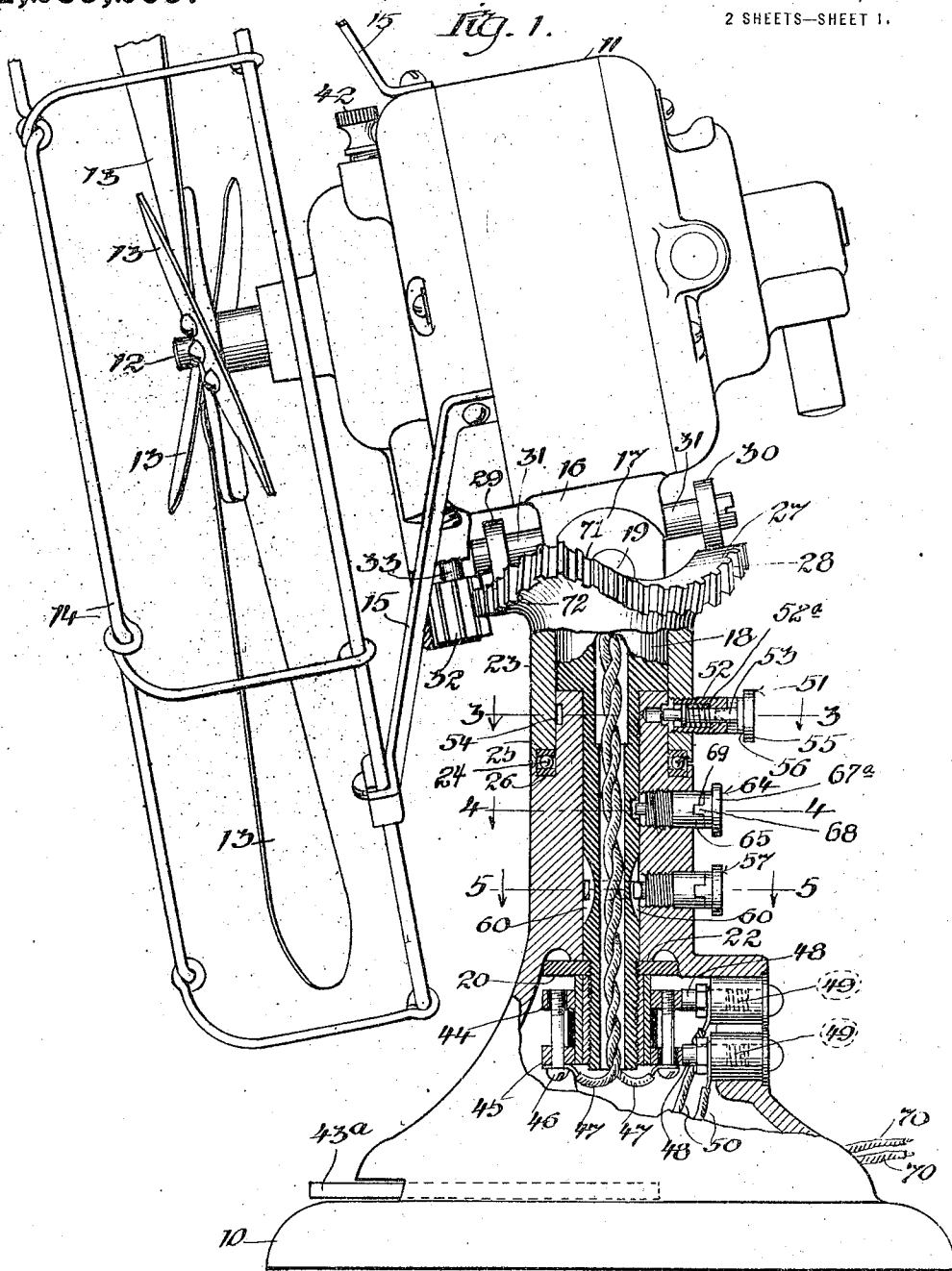


G. OLSON.
DRIVING MECHANISM FOR ELECTRIC FANS.
APPLICATION FILED JUNE 19, 1915.

1,269,209.

Patented June 11, 1918.
2 SHEETS—SHEET 1.



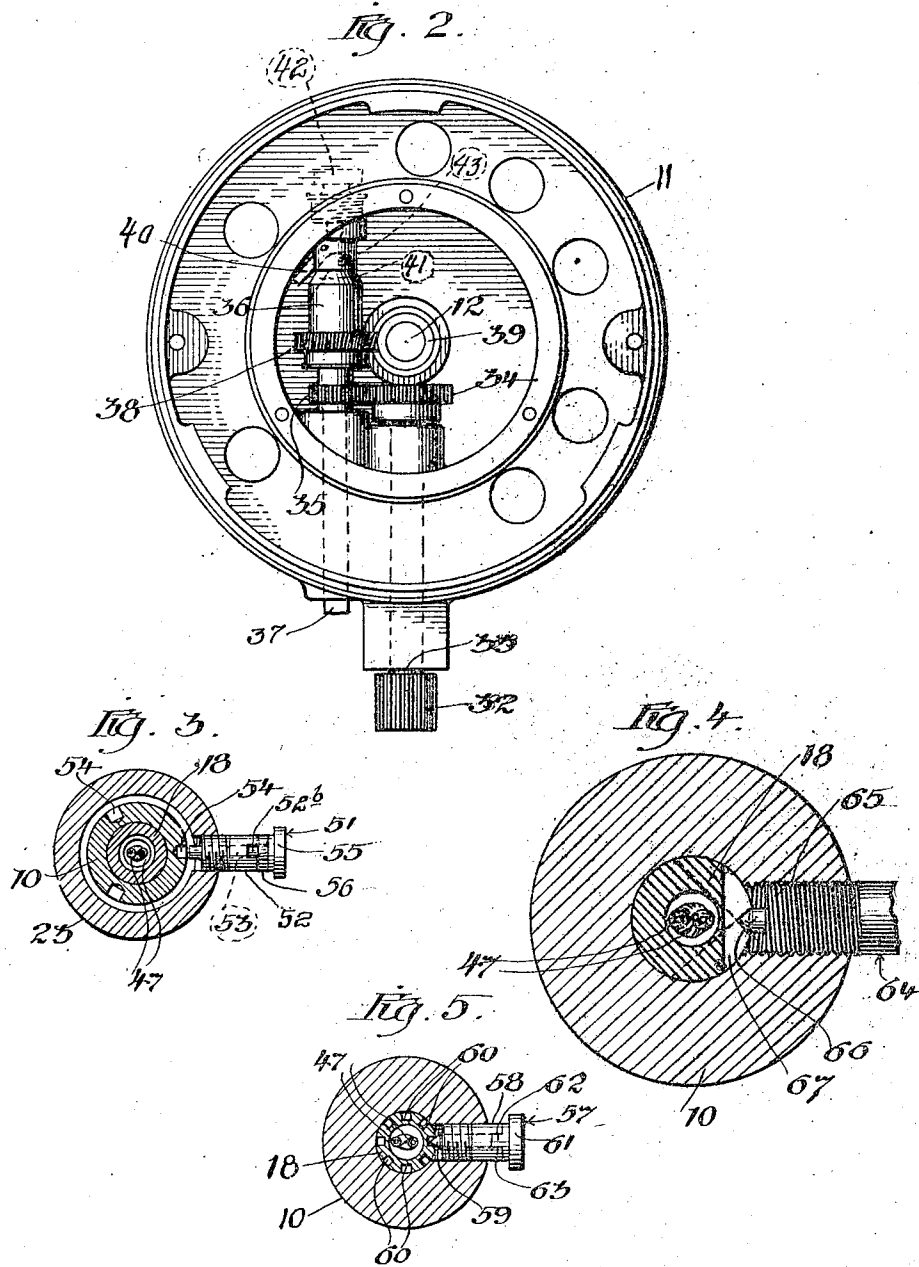
Witness:
R. F. Poole
C. L. Peoples

Inventor:
Gustaf Olson
By Poole & Mann
Attorneys.

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Inventor:
Gustaf Olson
By P. F. Hoole & C. L. Peoples
Attorneys

UNITED STATES PATENT OFFICE.

GUSTAF OLSON, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO LOUIS GREENBERG
AND ONE-SIXTH TO WILLARD M. McEWEN, BOTH OF CHICAGO, ILLINOIS.

DRIVING MECHANISM FOR ELECTRIC FANS.

1,269,209.

Specification of Letters Patent. Patented June 11, 1918.

Application filed June 19, 1915. Serial No. 35,121.

To all whom it may concern:

Be it known that I, GUSTAF OLSON, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Driving Mechanism for Electric Fans; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to an electric or like fan, and more particularly to that type of fan such as shown in the prior Patent No. 1,125,684, dated January 19, 1915, and issued to Louis Greenberg and myself as joint inventors.

In the fan described and shown in said patent, the mechanism is such that the fan may be automatically tilted in a vertical plane during either the oscillation or rotation of the fan bodily in a horizontal plane, or, in other words, the fan is tilted bodily in both directions during either the rotation or oscillation of the fan bodily about an axis substantially transverse to the axis of rotation of the fan shaft.

The subject-matter of the present invention has particular reference to the mechanism for effecting the vertical tilting and either the oscillation or rotation of the fan bodily during the operation of the same.

Among the objects of my invention is to improve the construction of such mechanism in the several particulars as will hereinafter appear, and, further, to provide a construction whereby the tilting of the fan bodily in a vertical plane will set up forces causing the fan to turn or oscillate bodily in a horizontal plane, that is, in a plane transverse to the vertical plane in which the fan is tilted vertically.

The invention consists further in the matters hereinafter described and more particularly pointed out in the appended claims.

In the accompanying drawings—

Figure 1 is a side elevational view, with parts in section, of a fan or like device constructed in accordance with my invention;

Fig. 2 is an elevational view of the mechanism for connecting the motor of the fan with a wave-like track, to be hereinafter referred to;

Fig. 3 is a detail sectional view, taken on line 3—3 of Fig. 1;

Fig. 4 is a detail sectional view, taken on line 4—4 of Fig. 1; and

Fig. 5 is a detail sectional view, taken on line 5—5 of Fig. 1.

In the accompanying drawings, I have shown, in detail, one preferred form of driving mechanism embodying the features of my invention and as applied to an electric fan of that type comprising an upright supporting member or base 10, upon the upper end of which is mounted, for movement around a vertical axis, a motor casing 11. The motor housed within said casing is provided with an armature shaft 12 horizontally arranged and journaled at its ends in suitable bearings provided therefor in said casing 11. One end of said armature shaft 12 extends beyond said casing and has secured thereto the blades 13, 13 of the fan. Said fan blades are protected by a wire guard 14, which is attached to the motor casing 11 by means of arms 15, 15.

A motor casing 11 has a depending lug 16 formed on the under side thereof, which lug is received in the bifurcated head 17 on the upper end of a vertically arranged shaft or post 18. The latter is journaled in an upright position in said supporting member or base 10. Said lug 16 is pivotally connected with said post 18 by a pivot pin 19, which is inserted through said lug and into both parts of said bifurcated head 17. Said pivot pin 19 permits said casing 11 and its connected parts to be tilted in a vertical plane, both up and down. Said post 18 may be either oscillated or rotated about a vertical axis and is held from vertical movement with respect to the base 10 by means of a collar 20 on the lower end of said post and bearing upwardly against a downwardly facing shoulder 22 on said stand 10. (See Fig. 1.)

In order to effect either an oscillatory or rotary movement of the casing 11 and its directly connected parts about a vertical axis during the operation of the motor, and, further, to impart at the same time an automatic tilting to the casing 11 during the relative rotation of the base 10 and the casing 11, I provide the following construction:

Rotatably mounted on the upper end of the

base 10 is a vertically arranged sleeve 23, which embraces the bifurcated head 17, bearing balls 24, 24 are interposed between the lower end of said sleeve and said stand 10, and, as illustrated in the drawings, said bearing balls are located in a race-way, the top and bottom walls of which are in the form of annular rings 25, 26. Said sleeve 23 is provided at its upper end with a transversely disposed, annular flange or track 27 concentrically arranged with respect to the vertical post or shaft 18. Said annular track is of wave-like form with the crowns of the waves substantially diametrically opposite the depressions thereof. Said annular track is provided around one of its annular edges with rack-teeth 28, and the upper face of said flange forms a smooth bearing surface for rollers 29, 30 mounted on stud shafts 31, 31 secured to the depending lug 16. A gear pinion 32 meshes with said rack-teeth 28, and, as shown, said gear pinion is mounted on the lower end of a vertical shaft 33 journaled in said casing 11. The track sleeve 23 in itself constitutes the subject-matter of my application Serial No. 53,694 and filed October 2, 1915.

The mechanism for connecting said gear pinion with and for operating the same from said armature shaft 12 is constructed as follows: As illustrated in the drawings, said vertical shaft 33 is journaled in the casing 11 on the side thereof adjacent the fan blades and is provided at its upper end with a horizontally arranged gear wheel 34, which meshes with a gear pinion 35 on the lower end of a vertical sleeve 36. Said sleeve 36 is loosely mounted on a vertically arranged shaft 37 journaled in said motor casing and offset laterally from said shaft 33. Said sleeve 36 is provided, above said gear pinion 35, with a worm 38 meshing with a worm 39 on the armature shaft 12. In order to lock the sleeve 36 to the shaft 37 and thereby transmit power from the armature shaft to the gear pinion 32 meshing with the rack-teeth 28, I provide a locking member 40 in the shape of a pawl and pivotally mounted between its ends on said shaft 37. (See Fig. 2.) One end of said pawl is adapted to be swung into and out of a notch or slot 41 provided in said sleeve 36. When the locking end of the pawl 40 is in said notch, the sleeve 36 and shaft 37 are locked together, and power is transmitted from the armature shaft 12 to the vertical shaft 33. On the other hand, when the locking end of said pawl is out of said notch, the sleeve 36 and shaft 37 are disconnected, and the armature shaft turns freely and without rotating either of said vertical shafts 33, 37 or the pinion 32. Said pawl is swung in a direction to effect the disconnection of the sleeve 36 and shaft 37 by an endwise movable operating member in the form of a set screw 42.

A spring 43 serves to move said locking pawl in the opposite direction, or in a direction to cause the locking end of the pawl to enter said notch 41. The mechanism for connecting the sleeve 36 to and disconnecting the same from a shaft forms the subject-matter of my application filed July 16, 1914, and bearing Serial No. 851,415.

A rheostat of the usual construction is located at the bottom of and within the hollow base 10. Said rheostat embraces a switch lever 43^a (see Fig. 1) adapted to be moved over a plurality of contacts (not shown) and by means of which the circuit is closed between the source and the motor of the fan. Electrical connection between the rheostat and the motor may be afforded by means such as shown in said Patent No. 1,125,684, or by the construction illustrated in Fig. 1 of the drawings herein. Such construction comprises rings 44, 45 carried on the lower end of said post or vertical shaft 18. Said rings are spaced apart, but connected by screws 46, 46, to each of which is attached a conductor 47, 47 extending through the hollow post 18 and leading to the motor of the fan. Slidably mounted on the base 10 are two plunger-like brushes 48, 48, one for each ring 44, 45. Said brushes are normally urged inwardly and held in contact with said rings by springs 49, 49. Conductors or wires 50, 50 connect each of said brushes with the rheostat.

In order to hold the track-sleeve 23 stationary while the vertical shaft or post 18 is free to rotate or turn about a vertical axis, I provide a stop member 51 comprising a short tube section 52 screwed into an aperture in said track-sleeve. (See Figs. 1 and 3.) Slidably mounted within said tube 52 is a plunger 53, the inner end of which is adapted to enter either one of a plurality of notches or recesses 54 in said base 10. Located within said tube 52 is a spring 52^a acting to urge the plunger inwardly and retain its inner end in one of said notches 54 and thereby connect the track-sleeve 23 with the base 10. The plunger 53 is provided at its outer end with a head 55 having a transverse rib 56 formed on the inner face thereof. Said rib 56 is adapted to bear against the outer annular edge of said tube 52, and formed in said edge are two diametrically disposed slots 52^b adapted to receive said rib when the inner end of the plunger extends into one of said recesses 54. When said rib 56 and slots 52^b are engaged, said plunger 53 is held from rotation in said tube 52, and the inner end of said plunger extending into one of the notches 54, said track-sleeve 23 and base 10 are locked together and the track-sleeve held stationary. To unlock the track-sleeve 23 from the base 10, so that said track-sleeve may be free to rotate about said base, the plunger 53 is drawn

outwardly against the pressure of said spring 52^a until the inner end of said plunger is withdrawn from the notch 54 and the rib 56 is free from the slots 52^b, and thereupon the plunger is turned slightly, so as to allow the rib 56 to bear against that portion of the outer end of said tube 52 between said slots 52^b and hold the plunger out of the notches. In this position of the parts, the track-sleeve 23 and base 10 are disconnected, and one may rotate relatively to the other.

To lock the vertical shaft or post 18 to the base 10 and hold the former stationary, I provide a stop member 57, which comprises a short tube section 58 screwed into a hole in the base 10 below the lower end of the track sleeve 23. Slidably mounted in said tube 58 is a plunger 59, the inner end of which is adapted to enter a vertical groove or slot 60 formed in said post 18. As shown in Fig. 5, I have provided a plurality of such vertical slots 60, all in the same horizontal plane, but spaced apart circumferentially. A spring located in said tube 58 serves to normally urge said plunger 59 inwardly and maintain its inner end in one of said vertical slots. Said plunger 59 is provided with a head 61, the inner face of which is provided with a transverse rib 62 adapted to enter aligned slots 63 in the outer end of said tube 58. When the rib 62 is in said slots 63, the plunger 59 is held from rotation with respect to said tube 58, and the inner end of said plunger is held in one of the vertical slots 60 in said post 18. When the parts are in such position, said post or vertical shaft 18 is held from rotation about a vertical axis, and consequently the casing 11 mounted upon the upper end of said post is held from being rotated or turned bodily in a horizontal plane. To disconnect the vertical shaft or post 18 from the base 10, the plunger 59 is drawn outwardly until the rib 62 thereof is free from said slots 63. A slight turn of the plunger will remove the rib from alinement with said slots 63 and position said rib so as to bear against the outer end of said tube 58 between said slots 63.

In order to limit the degree of oscillation of the vertical shaft or post 18, I provide a stop member 64 embracing a short tube section 65 screwed into a hole provided in said base 10 below the lower end of the track-sleeve 23. Located in said tube 65 is a plunger 66, the inner end of which is adapted to project into a horizontally disposed slot 67 formed in said post 18. A spring in said tube 65 serves to normally urge said plunger 66 inwardly, and said plunger is provided with a head 67^a having a transverse rib 68 adapted to enter outwardly opening aligned slots 69 in the outer end of said tube. The construction and operation of said plunger 66 and its connected parts are the same as

the two stop members 51 and 57 above described. As shown in Fig. 4, said slot 67 is in the form of a straight kerf provided in said post 18, and, when the inner end of said plunger 66 extends into said slot, the degree of oscillation of the vertical shaft or post 18 is limited by the inner end of said plunger contacting alternately with the ends of said slot.

Conductors 70, 70 lead from the rheostat to a source of electricity.

The operation of the device shown is as follows:

There are a number of different movements of the fan which may be obtained with the construction herein shown and described. One of these movements is obtained if the vertical shaft or post 18 is locked to the base 10 by the stop member 57, and the track-sleeve 23 is unlocked from the post and free to rotate on the base 10. With the post 18 held stationary, and the circuit to the motor closed through the rheostat, the fan blades 13 will be revolved, and at the same time the track-sleeve 23 will be turned about a vertical axis through the medium of the gear pinion 32, which at such time is being revolved by the motor of the fan. As the track sleeve 23 is thus revolved, the rollers 29, 30 travel over the crowns and depressions of said wave-like track 27, and consequently the casing 11 and its parts are tilted in a vertical plane, but held from being revolved or turned bodily in a horizontal plane and about a vertical axis. The fan, thus operated, will direct a current of air in a fixed horizontal direction, but up and down in a vertical plane.

A second movement of the fan may be obtained by releasing the vertical shaft or post 18 and securing the track sleeve 23 to the base 10 by the stop member 51. If then the fan motor is set in operation, the gear pinion 32 will rotate, but, since the track-sleeve 23 is held stationary and the post 18 is free to revolve, said gear pinion 32 will roll around the outer annular edge of the same and thereby cause the casing 11 and its parts to be revolved or turned bodily in a horizontal plane and about a vertical axis, while at the same time being tilted up and down in a vertical plane, due to the fact that the rollers 29, 30 roll over the crowns and depressions of the now stationary wave-like track 27. Thus, if the fan is placed in the center of a room, it will direct its air currents entirely around the room in a horizontal plane and, at the same time, up and down in a vertical plane.

Another movement of the fan may be obtained by releasing both the post 18 and the track-sleeve 23 from the base 10, so that such parts may be free to rotate independently of each other. The stop-member 64, at this time, is in its released position. Upon set-

ting the fan motor in motion, the parts operate substantially as follows: As the gear-pinion 32 is driven, the same acts to turn the now loosely mounted track-sleeve about its vertical axis and continuously in one direction. As the roller 29 travels up each upwardly inclined portion 71 of the track-sleeve, the pressure of the roller on the track is in a direction opposed to the direction of rotation imparted to the track-sleeve by the gear pinion 32. With such two forces in opposition, the free rotation of the track-sleeve is retarded, and the pinion tends to roll around the track-sleeve, and the latter is turned in a direction opposite to the direction of rotation of the gear-pinion, with the result that the track-sleeve and motor casing are oscillated in such direction until the roller 29 passes over the crown of the inclined portion of the track-sleeve. As the roller 29 starts down the joined inclined portion of the track-sleeve, the direction of oscillation of the parts is changed or reversed, due in part to the fact that the force of the roller on the track, aided by the effect of gravity on the tilting motor casing, serves to move the track sleeve and motor casing in the direction of rotation of the pinion 32, or in the direction normally urged on the track-sleeve by the revolving gear pinion. Under the effect of such forces, the swing of the track-sleeve in the direction stated is in effect accelerated and continues until the roller 29 starts up the next upwardly inclined portion, whereupon the direction of oscillation is again reversed, or in the direction first stated. This operation continues as long as the fan motor is in motion. Inasmuch as the track-sleeve is provided with a plurality of joined upwardly and downwardly inclined portions, the motor casing and its parts are oscillated back and forth during the continued rotation of the parts about a vertical axis. As said roller 29 travels over said upwardly inclined portion 71, it is of course understood that the casing 11 and revolving fan blades are tilted upwardly. After the roller 29 passes over the crown and starts down the joined downwardly inclined portion 72 of said upwardly inclined portion 71 of said track, the casing 11 under the effect of the action of gravity thereon is tilted downwardly and the angular position of the revolving fan blades being also changed, the pressure of the volume of air on said revolving blades acts to assist the effect of gravity on such parts, with the result that said casing and track-sleeve 23 are turned in the direction of rotation of said gear pinion 32. The casing 11 oscillates in the direction of rotation of the pinion 32 to a greater degree than in the opposite direction. Thus the casing 11 is oscillated in one direction by a positive drive as the roller 29 travels over each upwardly

inclined portion of the track 27, and oscillates in the opposite direction by the combined effect of the action of gravity and pressure of the air on the revolving fan blades as said roller 29 travels over each downwardly inclined portion of said track. It will be noted that the casing 11 during its rotation in a horizontal plane and about a vertical axis also oscillates back and forth and, in addition, is automatically tilted in a vertical plane. With the fan thus operated, it will direct a current of air in all directions in a horizontal plane and also back and forth in said horizontal plane, and, in addition, will direct a current of air up and down in a vertical plane during its combined oscillatory and rotative movement in a horizontal plane. From the foregoing it is noted that, when the motor and its connected fan blades are set in operation, with the post and track sleeve loose on the base 10, during the tilting of the motor and its revolving fan blades in a vertical plane certain forces are brought into play on the parts as to cause the motor casing to be oscillated or turned in a horizontal plane or with the post 18 about its vertical axis.

With the stop members 51 and 57 released, and the stop member 64 having its inner end projecting into said horizontal slot 67, as shown in Fig. 4, a further movement of the fan may be obtained. When the parts are in the positions shown in full lines in said Fig. 4, the inner end of said stop member 64 is positioned intermediate the ends of said slot 67, and the track-sleeves 23 and post 18 are free to turn or rotate about a vertical axis independent of each other. If the fan motor is now set in operation, by closing the circuit through the rheostat, the gear pinion 32 serves to drive the track-sleeve 23 about a vertical axis. As the roller 29 adjacent the gear pinion 32 travels up an upwardly inclined portion 71 of the wave-like track 27, the forces hereinbefore referred to tend to cause the pinion 32 to turn the track-sleeve 23 in one direction, and as a result the post 18 is given a relative movement in such direction until one end of the slot 67 contacts with the inner end of the plunger 66, as shown by one of the dotted lines in Fig. 4. When such parts are in contact, the post 18 is held against rotation in the direction stated until the gear pinion 32 travels over the crown of said upwardly inclined portion. As the said roller 29 travels down the joined downwardly inclined portion 72 of the wave-like track 27, the track-sleeve and post 18 again rotate relatively to each other in the opposite direction until the opposite end of the slot 67 contacts with the plunger 66, as shown by the other of the dotted lines in said Fig. 4. When such parts are in contact, the post 18 is again held against rota-

tion in the direction of rotation of the gear pinion 32, and the operation above described repeated. In other words, the post 18 is oscillated back and forth about a vertical axis, the degree of oscillation being determined by the length of the slot 67. Consequently, the motor casing 11 and its connected fan blades are oscillated in a horizontal plane, while at the same time being tilted up and down in a vertical plane during the operation of the fan motor.

In all of those movements of the fan wherein the roller 29 travels up and down, the downward movement is in effect caused by the action of gravity on the parts in conjunction with the air pressure on the revolving fan blades.

When the locking pawl 40 is in its released position, the fan blades may be revolved without affecting the transmission mechanism between the motor and the track 27.

Although but one specific embodiment of my invention has been herein shown and described, it is to be of course understood that the details of construction and arrangement of parts shown may be variously modified and changed without departing from the spirit of my invention, and I do not want to be limited to the details and arrangement shown, except as pointed out in the appended claims.

I claim as my invention:

1. An air-circulating device comprising a supporting member, blower mechanism revolubly mounted thereon, a motor connected with said blower mechanism, co-acting means on said supporting member and said blower mechanism, so constructed and adjusted that, upon the operation of said motor, said blower mechanism will rotate to a predetermined extent in one direction with respect to said supporting member, will then rotate to a less extent in an opposite direction, and will again rotate in the first direction.

2. An air-circulating device comprising a supporting member, blower mechanism revolubly mounted thereon, a motor connected with said blower mechanism, and co-acting means carried by said supporting member and said blower mechanism, so adjusted antifric tionally that the operation of said motor will cause said blower mechanism to rotate in one direction with respect to said supporting member, and to allow it to rotate in an opposite direction, under the influence of gravity.

3. An air-circulating device comprising a supporting member, blower mechanism revolubly and tiltably mounted thereon, a motor connected with said blower mechanism,

and co-acting means carried by said supporting member and said blower mechanism, adapted to effect a tilting movement of said blower mechanism, said co-acting means being so adjusted anti-frictionally that the operation of said motor will cause said blower mechanism to rotate in one direction with respect to said supporting member, and to allow it to rotate in an opposite direction, under the influence of gravity.

4. An air-circulating device comprising a supporting member, blower mechanism revolubly and tiltably mounted thereon, a motor connected with said blower mechanism, and co-acting means carried by said blower mechanism and said supporting member, so adjusted anti-frictionally that, upon the operation of said motor, said blower mechanism will rotate to a predetermined extent in one direction with respect to said supporting member, will then rotate to a less extent in an opposite direction, and will at all times be continuously tilted up and down in a vertical plane.

5. An air-circulating device comprising a supporting member, blower mechanism revolubly mounted thereon, a motor connected with said blower mechanism, and co-acting means carried by said supporting member and said blower mechanism, so adjusted anti-frictionally that, upon the operation of said motor, said blower mechanism will be allowed to rotate continuously about said supporting member in one direction, said continuous rotation, however, being interrupted at predetermined intervals with backward rotation to a less extent.

6. An air-circulating device comprising a supporting member, blower mechanism revolubly and tiltably mounted thereon, a motor connected with said blower mechanism, and co-acting means carried by said supporting member and said blower mechanism, and so adjusted anti-frictionally that, upon the operation of said motor, said blower mechanism will be allowed to rotate continuously about said supporting member in one direction, said continuous rotation, however, being interrupted at predetermined intervals with backward rotation to a less extent, and to be continuously tilted up and down in a vertical plane.

In testimony that I claim the foregoing as my invention I affix my signature, in the presence of two witnesses, this 18th day of June, A. D. 1915.

GUSTAF OLSON.

Witnesses:

EUGENE C. WANN,
C. L. PEOPLES.