L. GREENBERG & G. OLSON.

AIR CIRCULATING DEVICE.

APPLICATION FILED JULY 5, 1913.

1,125,684.

Patented Jan. 19, 1915.

2 SHEETS—SHEET 1.

Fig. 1.

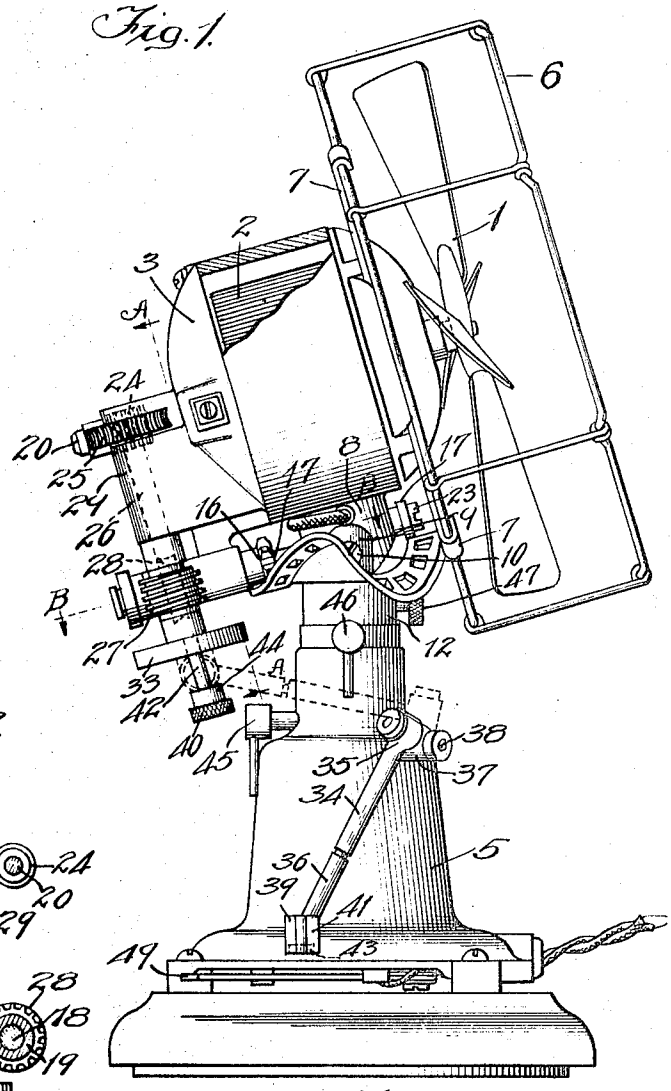


Fig. 2.
(A-A)

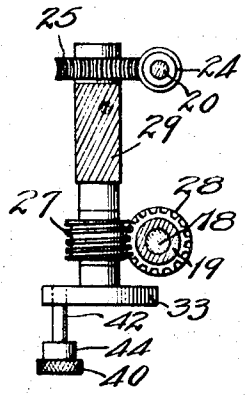
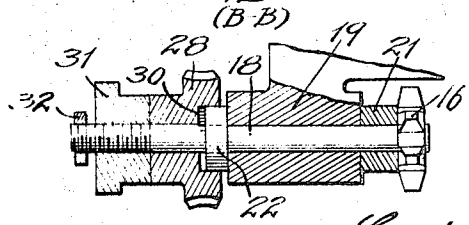


Fig. 3.
(B-B)



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2 SHEETS—SHEET 2.

Fig. 4.

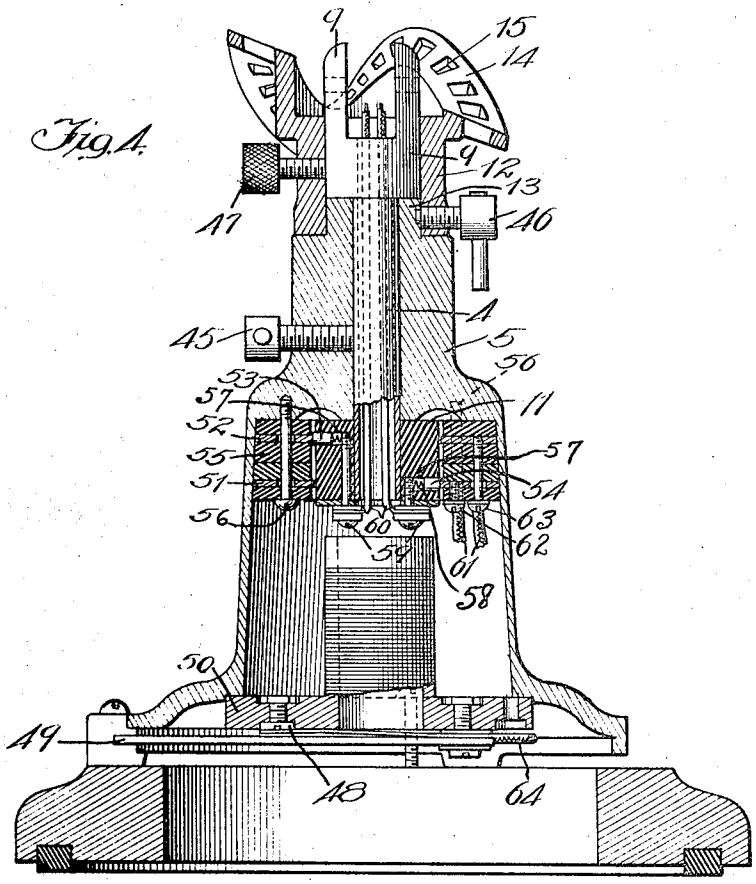
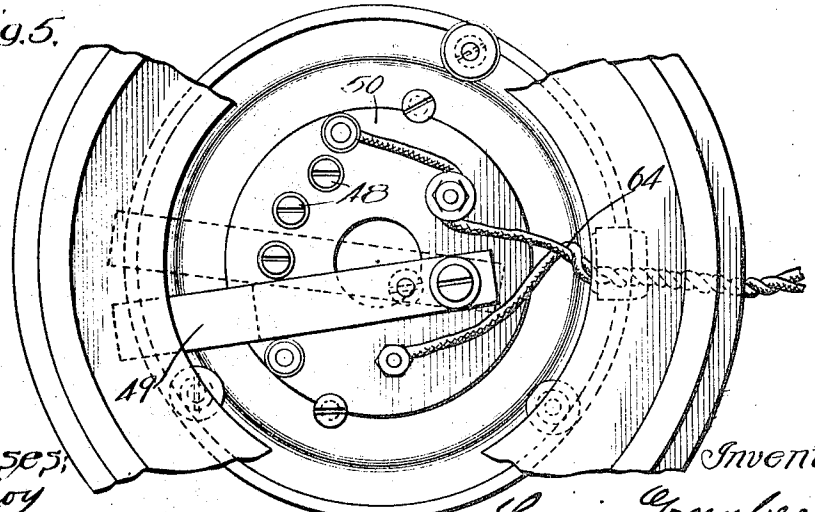


Fig. 5.



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UNITED STATES PATENT OFFICE.

LOUIS GREENBERG AND GUSTAF OLSON, OF CHICAGO, ILLINOIS, ASSIGNORS OF ONE-THIRD TO WILLARD M. McEWEN, OF CHICAGO, ILLINOIS.

AIR-CIRCULATING DEVICE.

1,125,684. Specification of Letters Patent. Patented Jan. 19, 1915.

Application filed July 5, 1913. Serial No. 777,558.

To all whom it may concern:

Be it known that we, LOUIS GREENBERG and GUSTAF OLSON, citizens of the United States of America, and residents of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Air-Circulating Devices, of which the following is a specification.

The main objects of this invention are to provide an improved construction for electric fans whereby they are adapted to be operated so as to direct the current of air in practically all directions; to provide improved mechanism adapted to be actuated by the operation of said fan for shifting said fan in horizontal and vertical planes; to provide an improved mounting for said fan and mechanism; and to provide improved means within said mounting for making electrical connections between said fan and the source of electricity.

An illustrative embodiment of this invention is shown in the accompanying drawings, in which—

Figure 1 is a side elevation of the fan. Fig. 2 is a sectional detail taken on the line A—A of Fig. 1. Fig. 3 is a sectional detail taken on the line B—B of Fig. 1. Fig. 4 is an enlarged sectional elevation of the supporting member. Fig. 5 is a bottom plan view of the same partly broken away.

In the construction shown in the drawings, the device comprises a fan 1 connected to a motor 2 rotatably mounted in a casing 3, and supported on a shaft 4 journaled in a supporting member or base 5.

The fan 1 and motor 2 may be of any desired construction, the fan being provided with the usual protecting guard 6 supported on the motor casing 3 by means of arms 7.

The motor casing 3 has a lug 8 formed on the underside thereof which is received in the bifurcated head 9 of the shaft 4 and pivotally connected thereto by the stud shaft 10 whereby the motor and fan are tiltably supported on a transversely disposed axis on the shaft 4. A collar 11 of insulating material, such as fiber, is attached to the inner end of the shaft and coacts with the enlarged bifurcated head 9 for securing the shaft against longitudinal movement in the member 5.

A sleeve 12 embraces the head 9, of the shaft 4, and an annular shoulder 13 integrally formed on the supporting member 5. The sleeve 12 is provided with an integral transversely disposed annular flange or track 14 concentrically arranged with respect to the shaft 4. This annular flange is of wave-like construction with the crowns of the wave diametrically opposite the depressions thereof. Apertures 15 are formed in the flange whereby it is adapted to serve both as a rack and a cam for coacting with a pinion 16 and roller 17. The pinion 16 is secured to a shaft 18 journaled in a bearing 19, depending from the motor casing 3. The shaft 18 is arranged substantially parallel to the motor shaft 20 and is secured in the bearing 19 against longitudinal movement by means of collars 21 and 22. The roller 17 is journaled on a stud shaft 23 which is secured to the lug 8 formed on the motor casing 3.

The mechanism for operating the pinion 16 comprises a worm 24 and gear 25 respectively carried on the motor shaft 20 and a shaft 26, and a worm 27 and gear 28 respectively carried on the shaft 26 and the shaft 18. The shaft 26 is journaled in a bearing 29 integrally formed on the motor casing 3 and disposed at right angles to the shafts 18 and 20. The gear 28 is slidably mounted on the shaft 18 and is recessed at 30 so as to embrace the collar 22. A lock nut 31 has threaded engagement with the shaft 18, preferably left hand, and is adapted to be shifted so as to move the gear 28 to cause it to bear against the collar 22 and thereby rotatably connect the gear 28 to the shaft 18. A washer or nut 32 is secured to the outer end of the shaft 18 in position to prevent the removal of the lock nut 31.

A member or disk 33 is secured to the shaft 26 below the worm 27, to which may be connected a link 34 for the purpose of oscillating the fan. The link 34 comprises two parts 35 and 36 rotatably connected together by having a threaded shank on one engage a threaded socket on the other thereby providing a swivel connection. The part 35 is pivotally connected to a bearing 37 which in turn is pivotally connected to the supporting member 5 by means of a pin 38,

thereby providing a universal joint. The part 36 is similarly pivotally connected to a bearing 39 which in turn is adapted to be pivotally connected to the disk 33 by means of a pin 40 so as to provide a second universal joint. The pin 40 is secured in the disk 33 near the edge thereof having threaded connection therewith, and has the end thereof upset so that it cannot be removed from the disk. The bearing 39 has a slit 41 cut in the side thereof substantially equal in width to the diameter of the shank 42 of the pin 40, and a counterbore 43 substantially equal to the enlargement 44 on the pin 40. This arrangement provides for quickly connecting or disconnecting of the link 34 and the disk 33.

A set screw 45 is mounted in the supporting member 5 in position to engage the shaft 4 so as to secure it against relative movement with respect to the supporting member 5. Another set screw 46 is mounted on the collar 12 in position to engage the annular shoulder 13 of the supporting member 5 for securing the cam against rotation with respect thereto. The collar 12 is also provided with a set screw 47 which is positioned so as to engage the head 9 of the shaft 4 for the purpose of securing the collar 12 to the shaft.

A rheostat of the usual construction, comprising contacts 48 and switch lever 49 mounted on the insulating block 50, is secured within the bottom of the supporting member 5. Electrical connection between the rheostat and motor is afforded by means of slip rings 51 and 52 and brushes 53 and 54. The slip rings 51 and 52 are secured in a ring made up of fiber layers 55 and attached to the supporting member by means of screws 56. The brushes 53 and 54 are slidably mounted in metal tubes 57 embedded in the collar 11 and normally urged by springs 58 to bear against the slip rings 51 and 52. Screws 59 are screwed into the collar 11 so as to come into contact with the tubes 57 whereby the conductors 60 connect the brushes 53 and 54 with the motor 1. Conductors 61 are connected to the slip rings 51 and 52 by means of the screws 62 and 63, and to the respective contacts on the rheostat. Conductors 64 lead from the rheostat to a source of electricity.

The operation of the device shown is as follows: Altogether there are six different movements of the fan which may be obtained with the construction herein shown; three with the rack or cam independently of the link 34, and three others by means of the dependent action of the link 34. One of these movements is obtained if the sleeve 12 is secured to the supporting member 5 by means of the set screws 46 so that it cannot rotate, and the gear 28 locked in engagement with the collar 22. If then the circuit to the motor is closed the fan 1 will be revolved, and through the medium of the gearing will at the same time rotate the pinion 16. The shaft 4 being free to rotate, and the collar 12 being held against rotation, the pinion 16 operating on the rack will cause the fan to turn about a vertical axis. As the pinion travels along the rack, the fan is tilted up and down in a vertical position as the pinion 16 ascends or descends the wave portions of the rack. Thus if a fan of this construction 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. A second movement may be obtained by releasing the set screw 46 and securing the shaft 4 against rotation in the member 5 by means of the set screw 45. If then the motor 2 is set in operation the pinion 16 will rotate, but since the shaft 4 is fixed and the sleeve 12 is free to rotate, said pinion will cause the sleeve 12 to rotate. As the wave-like construction of the rack passes the pinion 16 the fan will be tilted up and down in a vertical plane. If the gear 28 is released from driving engagement with the shaft 18 the fan when operated will remain stationary so far as movement with respect to the supporting means 5 is concerned. However, it may be set at any angular position with respect to the horizontal by shifting the sleeve 12 so that the pinion 16 will rest at any point intermediate of the crests and depressions of the flange 14. A fourth movement of tht fan may be obtained by connecting the link 34 to the disk 33. This is readily accomplished by withdrawing the pin 40 as far as possible, at which time the notch 41 in the bearing 39 may be slipped over the shank 42 of the pin 40. The pin may then be screwed into the disk 33 so that the enlargement 44 becomes seated in the counterbore 43. The set screws 45 and 46 are withdrawn and the set screw 47 screwed up so as to secure the sleeve 12 to the shaft 4. The fan will then have a simple oscillatory movement in a horizontal plane as the disk 33 revolves. If desired the angular position of the fan with respect to the horizontal may be altered by shifting the sleeve 12, before it is secured to the shaft 4, so that the pinion 16 rests at any point between a crest and depression of the flange 14. A fifth movement of the fan may be obtained by securing the sleeve 12 to the supporting member 5 by means of the set screw 46. As the motor operates the link 34 will cause the fan to have an oscillatory movement, but in a diagonal plane, since the pinion 16 will travel along the wave of the flange 14. The sleeve 12 may be set so that the pinion 16 will travel over any portion of the wave. A

sixth movement of the fan may be obtained when the link 34 is connected to the disk 33 by releasing all of the set screws and locking the gear 28 to the shaft 18. If then the motor be set in operation the pinion 16 will be rotated as the fan is oscillated. Since the collar 12 is free to rotate on the shaft 4, the pinion 16 will cause it to revolve, whereby the fan will be tilted up and down in a vertical plane as it is being oscillated.

Although but one specific embodiment of this invention has been herein shown and described, it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of this invention as defined by the following claims.

We claim:—

1. An air circulating device, comprising a supporting member, a motor, blower mechanism mounted on said supporting member and driven by said motor, mechanism operatively connecting said blower mechanism and said supporting member and positively driven by said motor so as to cause a relative rotation of said blower mechanism and said supporting member, and co-acting means on said blower mechanism and said supporting member adapted to automatically tilt said blower mechanism in a vertical plane during the relative rotation of said blower mechanism with respect to said supporting member.

2. An air circulating device, comprising a supporting member, a motor, blower mechanism mounted on said supporting member and driven by said motor, a track carried by said supporting member, means carried by said blower mechanism and engaging said track, and mechanism operatively connecting said blower mechanism and said track and being positively driven by said motor so as to cause a relative rotation of said blower mechanism and said track, said track and means being relatively formed to cause said blower mechanism to be tilted automatically in a vertical plane during the rotation thereof relative to said track.

3. An air circulating device, comprising a supporting member, blower mechanism mounted on said supporting member, a track of wave-like form on said supporting member, means carried by said blower mechanism and engaging said track, and mechanism adapted to cause a relative rotation of said blower mechanism and track.

4. An air circulating device, comprising a supporting member, a blower mechanism tiltably mounted on the said supporting member, a transversely disposed annular flange of wave-like form carried by said supporting member, means carried by said blower mechanism and engaging said flange, and mechanism operatively connected to said means and adapted to cause a relative rotation of said blower mechanism and flange.

5. An air circulating device, comprising a supporting member, a motor tiltably mounted on said supporting member, a fan carried by said motor, a cam of wave-like form carried by said supporting member, means carried by said motor and engaging said cam, and mechanism connecting said motor and means and adapted to cause a relative rotation of said motor and cam.

6. An air circulating device, comprising a supporting member, a shaft journaled on said supporting member, a motor tiltably mounted on said shaft on a transverse axis, a transversely disposed flange of wave-like form carried by said supporting member and embracing said shaft, means carried by said motor and engaging said flange, and mechanism connecting said motor and means and adapted to cause a relative rotation of said shaft and flange.

7. An air circulating device, comprising a supporting member, a motor tiltably mounted thereon, a fan carried by said motor, a rack of wave-like form carried by said supporting member, a pinion carried by said motor and meshing with said rack, and mechanism connecting said pinion with said motor and adapted to cause a relative rotation of said motor and rack.

8. An air circulating device, comprising a supporting member, a transversely disposed flange of wave-like form carried by said supporting member, a shaft journaled on said supporting member concentrically of said flange, a motor tiltably mounted on said shaft, a fan carried by said motor, means on said motor adapted to engage said flange, and mechanism connecting said means with said motor whereby said motor is adapted to cause a relative rotation of said shaft and flange.

9. An air circulating device, comprising a supporting member, a shaft journaled in said member, a cam of wave-like form rotatably supported on said member concentrically of said shaft, a motor tiltably mounted on said shaft on a transverse axis, a fan carried by said motor, means carried by said motor and engaging said cam, mechanism adapted to cause a relative rotation of said shaft and cam, and locking means adapted to secure either said shaft or said cam against rotation on said supporting member.

10. An air circulating device, comprising a supporting member, a shaft journaled in said member, a cam of wave-like form rotatably supported on said member concentrically of said shaft, a motor tiltably mounted on said shaft on a transverse axis, a fan carried by said motor, means carried by said motor and engaging said cam, mechanism adapted to cause a relative rotation of said

shaft and cam, and set screws carried by said supporting member and by said cam and adapted to be shifted to respectively engage said shaft or said supporting member whereby either said shaft or said cam may be secured against rotation with respect to said supporting member.

11. An air circulating device, comprising a supporting member, a shaft journaled on said supporting member, a motor tiltably mounted on said shaft on a transverse axis, a transversely disposed flange of wave-like form carried by said supporting member and embracing said shaft, means carried by said motor and engaging said flange, and mechanism connecting said motor and means and adapted to cause a relative rotation of said shaft and flange, said mechanism having a clutch interposed therein adapted to be shifted for connecting or disconnecting said motor and means.

12. An air circulating device, comprising a supporting member, a shaft journaled thereon, a motor tiltably mounted on said shaft on a transverse axis, a fan carried by said motor, a rack of wave-like form supported on said member concentrically of said shaft, a second shaft journaled on said motor substantially parallel with the axis thereof, a pinion carried by said second shaft and meshing with said rack, and gearing connecting said second shaft with said motor.

13. An air circulating device, comprising a supporting member, a shaft journaled thereon, a motor tiltably mounted on said shaft on a transverse axis, a fan carried by said motor, a rack of wave-like form supported on said member concentrically of said shaft, a second shaft journaled on said motor substantially parallel with the axis thereof, a pinion carried at the forward end of said shaft and meshing with said rack, a gear slidably mounted on said shaft adjacent to the outer end thereof, coacting engaging surfaces on said gear and shaft, means for shifting said gear, and gearing connecting said gear with said motor.

14. An air circulating device, comprising a supporting member, a shaft journaled thereon, a motor tiltably mounted on said shaft on a transverse axis, a fan carried by said motor, a rack of wave-like form supported on said member concentrically of said shaft, a second shaft journaled on said motor substantially parallel with the axis thereof, a pinion carried at the forward end of said shaft and meshing with said rack, a gear slidably mounted on said shaft adjacent to the outer end thereof, coacting engaging surfaces on said gear and shaft, means for shifting said gear, a third shaft journaled on said motor, transversely to said second shaft and having a worm carried at one end thereof meshing with said gear, and a worm and gear connecting said shaft with said motor.

15. An air circulating device, comprising a supporting member, a shaft rotatably journaled thereon, a motor tiltably mounted on said shaft, a fan carried by said motor, a rotating member carried by said fan, a link pivotally connected to said supporting member and to said rotating member and adapted to impart an oscillatory movement to said fan during the operation thereof, a transversely disposed inclined track concentrically arranged on said supporting member, and means carried by said motor and adapted to engage said track for causing a tilting thereof during its oscillatory movement.

16. An air circulating device, comprising a supporting member, a shaft rotatably journaled thereon, a motor tiltably mounted on said shaft, a fan carried by said motor, a rotating member carried by said fan, a link pivotally connected to said supporting member and to said rotating member and adapted to impart an oscillatory movement to said fan during the operation thereof, a transversely disposed inclined flange on said supporting member, and means on said motor adapted to coact with said flange for changing the angular disposition of said fan with respect to the horizontal.

17. An air circulating device, comprising a supporting member, a shaft journaled thereon, a motor tiltably mounted on said shaft, a fan carried by said motor, a rack of wave-like form carried by said supporting member concentrically of said shaft, a pinion carried by said motor and meshing with said rack, mechanism connecting said motor with said pinion, a rotating member operated by said mechanism, a link pivotally connected to said supporting member and to said rotating member and adapted to impart an oscillatory movement to said fan, and means for securing said rack in any desired position with respect to said supporting member, so as to cause said pinion to travel over any part of said rack during the oscillation of said fan.

18. The combination of a supporting base, a member rotatably mounted on said base, means tiltably carried by said member, an annular track of wave-like construction mounted on said base, driving mechanism carried by said member and engaging the said track, a motor connected to operate said driving mechanism and adapted to rotate said member whereby said driving mechanism is caused to traverse said track for tilting said means during the rotation thereof.

19. An air circulating device, comprising a supporting member, a motor tiltably

mounted thereon, a fan carried by said motor, a rotating member carried by said fan, a link pivotally connected to said supporting member and to said rotating member and adapted to impart an oscillatory movement to said fan during the operation thereof, an inclined track arranged on said supporting member, and means carried by said motor and adapted to engage said track for causing a tilting of said motor and fan during the oscillatory movement thereof.

Signed at Chicago this 30th day of June 1913.

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Witnesses:
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