No. 809,356. PATENTED JAN. 9, 1906.

H. S. BROWN.

OSCILLATING ELECTRIC FAN.

APPLICATION FILED JULY 27, 1904.

2 SHEETS—SHEET 1.

Fig. 1.

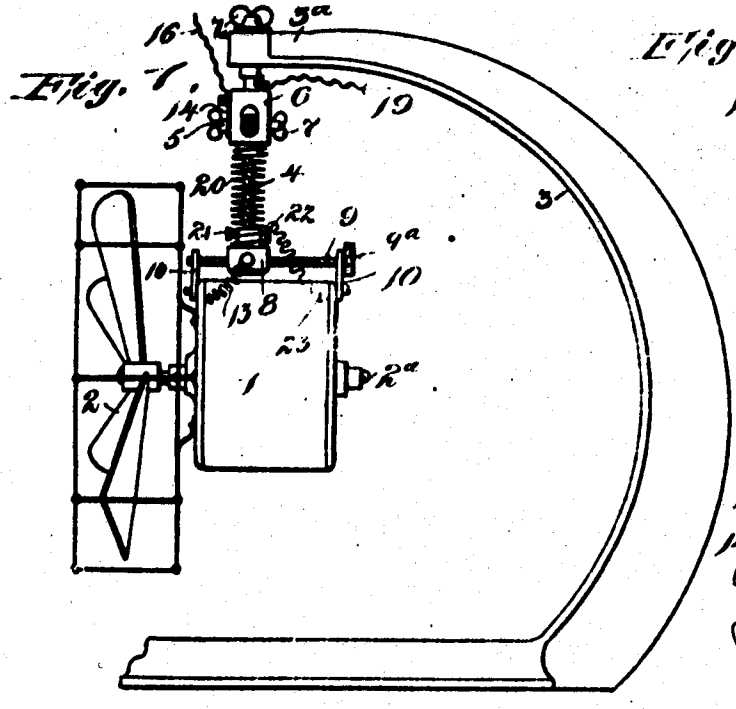
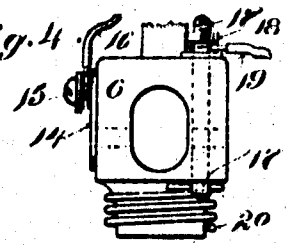


Fig. 4.



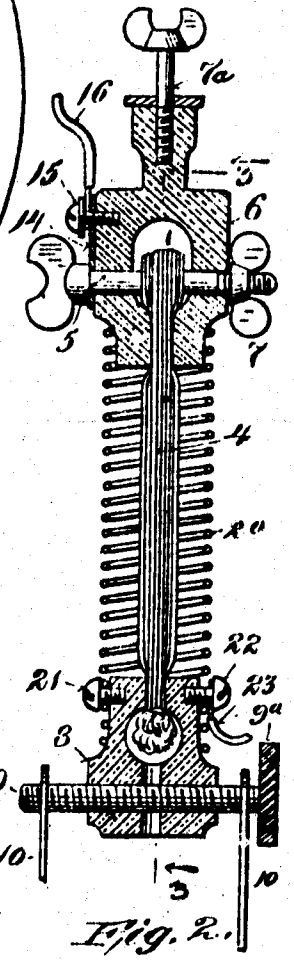


Fig. 2.

Fig. 6.

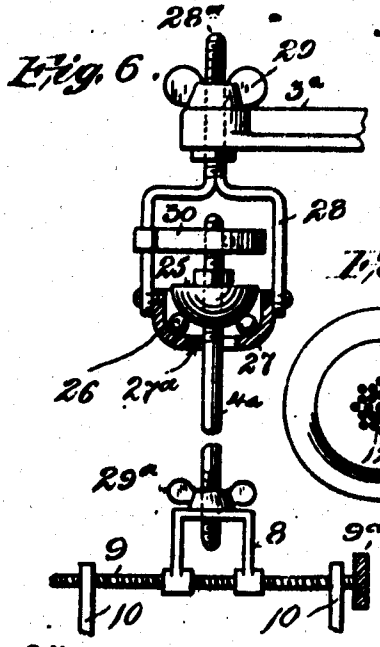
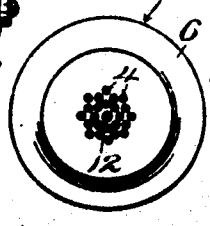


Fig. 5.



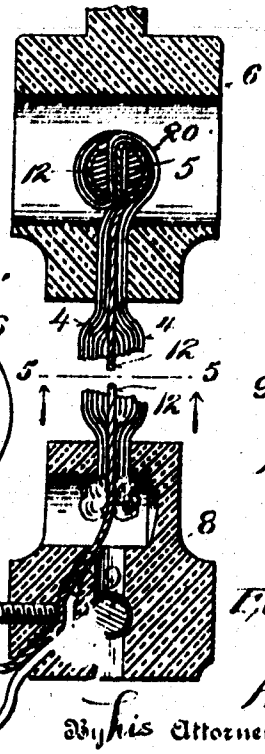


Fig. 3.

Witnesses
C. H. Benjamin
M. Hollingshead.

Inventor
H. S. Brown.
By his Attorney
F. A. Bourne

No. 809,356. PATENTED JAN. 9, 1906

H. S. BROWN.

OSCILLATING ELECTRIC FAN.

APPLICATION FILED JULY 27, 1904.

2 SHEETS—SHEET 2.

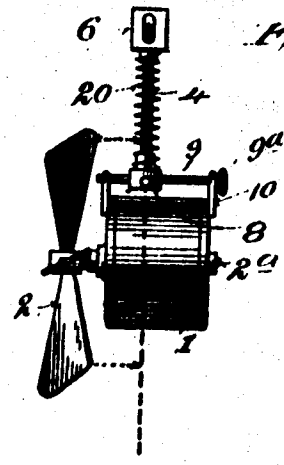


Fig. 7.

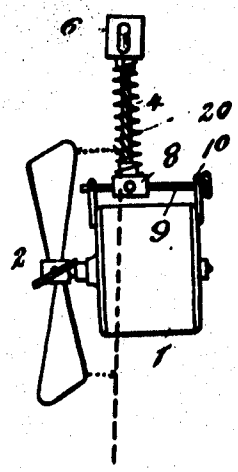


Fig. 8

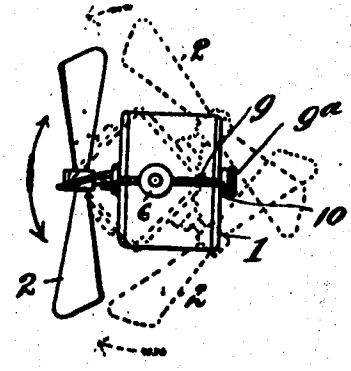


Fig. 9.

Witnesses
C. W. Burgess
M. Hollingshead

Inventor
H. S. Brown.
By his Attorney
T. F. Bonne

UNITED STATES PATENT OFFICE.

HERBERT STANLEY BROWN, OF NEW YORK, N. Y.

OSCILLATING ELECTRIC FAN.

No. 809,856. Specification of Letters Patent. Patented Jan. 9, 1906.

Application filed July 27, 1904. Serial No. 218,371.

all whom it may concern:

Be it known that I, HERBERT STANLEY BROWN, a citizen of the United States, residing in New York city, borough of Manhattan, New York, have invented certain new and useful Improvements in Oscillating Electric Fans, of which the following is a specification.

The object of my invention is to provide simple and efficient means for causing the oscillation of an electric fan, and in carrying out my invention I pivotally support the fan and embody means for resisting rotary movements of the fan structure, whereby such resistance reacts and causes oscillations of the fan. In one form of my invention I connect the fan structure with an overhead support by an interposed flexible connection capable of being put under torsion, whereby as the fan turns in one direction the supporting connection will be wound, the reaction of which after momentum dies out will cause the fan to move in the opposite direction with a similar result after passing the normal point or the point of equilibrium, and so on oscillating back and forth as the fan blades rotate. This torsional support may be in the form of one or more flexible strands or strings capable of twisting and untwisting in opposite directions.

The invention also comprises the novel details of improvement that will be more fully hereinafter set forth and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming part hereof, wherein—

Figure 1 is a side elevation of an oscillating electric fan embodying my invention. Fig. 2 is a vertical section, enlarged, through the fan-support. Fig. 3 is an enlarged section on the line 3 3 in Fig. 2. Fig. 4 is a detail view showing circuit connections for the fan-support. Fig. 5 is a section on the line 5 5 in Fig. 3. Fig. 6 is a detail of a modified form of support for the fan. Fig. 7 is a side view illustrating the fan in one position. Fig. 8 is a similar view showing a position of the fan during operation, the rearward tilt of the fan being somewhat exaggerated for illustration; and Fig. 9 is a plan view showing different positions of the fan during oscillation.

In the drawings, in which similar numerals of reference indicate corresponding parts in the several views, the numeral 1 indicates a motor-casing, and 2 the blades of any suitable electric fan, and at 3 is indicated a suitable bracket or hanger for the fan, which at 3^a extends over the fan, so that the latter may be suspended therefrom and oscillate freely around an upwardly-extending axis of rotation.

At 4 is indicated generally a support for the fan capable of permitting the same to oscillate in a substantially horizontal direction and so arranged that the swinging action of the fan will produce a resistance which will cause reverse motions or oscillations of the fan structure. Said support may be in the form of one or more cords or strings of silk, linen, or other suitable material capable of twisting and untwisting to produce torsion without undue injury. I find that several silk cords or strings placed loosely side by side and connected, respectively, to the hanger and to the fan, cause the fan to continue oscillating by reason of the air-currents propelled from the fan, the gyroscopic impulse set up by the rotation of the armature and blades at an angle to the horizontal, the momentum acquired by the fan as it oscillates, and the torsion thereby produced in the support. The length of the support 4 between its connection with the fan and the overhead hanger determines to some extent the speed of oscillation of the fan and the distance to each side of the normal point of equilibrium to which the fan structure may turn.

For the purpose of conveniently regulating the operative length of the support 4 the latter is shown connected at one end with a shaft 5, shown journaled in a block or head 6, preferably of insulating material, said shaft being provided with a nut 7 for holding it locked. The block or head 6 is shown supported upon the bracket 3, as by means of a screw 7^a, whereby the block 6 and the support 4 may be adjusted as desired in a rotary direction. The lower end of the support 4 is shown connected with the block 8, also preferably of insulating material, that is connected with the fan or motor-casing 1, whereby the fan is pivotally supported to oscillate. To permit adjustment of the fan with respect to its support 4 and to regulate the rotation of the axis of the fan-blades to a horizontal plane, I have shown means for adjusting the fan laterally beneath the support 4. To this end I have shown a screw-rod 9, journaled in bearings 10, carried by the motor-casing 1 and engaging a threaded aperture in block 8, a thumb-piece 9^a permitting

convenient operation of the screw 9. By turning the screw 9 to the right or left the fan structure may be adjusted in the direction of the axis of the blades 2, so that the fan-shaft may be placed horizontally or at any desired angle to the horizontal, whereby to regulate the direction of the air-currents from the blades, which adjustment also serves to regulate the oscillating motions of the fan.

The fan being supported as above set forth and the electric current passed through the motor, the rotation of the blades will first cause the fan to bodily swing rearwardly slightly, (see Fig. 8,) the angle of the fan-blades with respect to the vertical caused by such rearward swinging of the fan being variable from moment to moment according to the variable or fluctuating strength of the current passing through the motor from the line-wires. Then by reason of the leverage action of the fan-blades and the gyroscopic action of the rotating armature and blades the fan will start to rotate in one direction or the other, winding or twisting the support 4, the gathering momentum of the fan in its travel assisting in causing the support 4 to twist. When the torsional reaction produced in the support 4 equals or overcomes such leverage and gyroscopic action and momentum, the fan will cease to travel to one side, and then the torsional reaction in the support 4 will cause the fan to move in the opposite direction and the momentum thereby acquired will cause the fan to travel beyond the point of equilibrium between the leverage and gyroscopic action and the torsional reaction and twist the support 4 in such direction, whereupon the fan will stop moving in that direction, when the leverage and gyroscopic action now coöperating with the reaction from such torsion in the support 4 again equals or overbalances the momentum of travel of the fan and the fan will move in the reverse direction; but by reason of the varying angle of the blades to the vertical produced by the fluctuations in the extent of rearward swing of the fan-motor, which themselves are due to differences in the force of the blast caused by variations or fluctuations in the current passing over the line to the motor, oscillations of the fan are prevented from dying out, because such variations or fluctuations of the current by causing variable speed of rotation of the blades vary the leverage action of the blades upon the surrounding air and the gyroscopic action of the rotating armature and blades, causing the mean torsional strain in the flexible support to vary, whereby the point of equilibrium toward which the fan constantly tends is varied, whereby continued readjustments of the fan movement are maintained, the fan thus oscillating from side to side.

By "gyroscopic" action in this specification I refer to the composition of rotation of, first, the armature and parts rigidly attached to it rotating about the motor-shaft as an axis, and, second, due to the action of gravity, the rotation or effort to rotate about a horizontal axis at an angle to the axis of the motor-shaft of the whole fan and motor structure when supported, so that the axis of the motor-shaft is not in a horizontal plane, which two rotations, according to the principle of the composition of rotations familiarly exemplified in the gyroscopic top, set up, and, third, a resultant rotation of the whole structure upon a vertical axis. The direction of this resultant rotation depends upon the direction of the two component rotations and under usual conditions is identical with that due to the leverage action of the fan-blades, there being a difference only in point of velocity.

As a convenient means for conducting the electric current from a line-wire I have shown the following arrangement: A conductor 12 is attached to and in electrical connection with the shaft 5 (see Fig. 3) and leads through an aperture in block 8 to a conductor or terminal 13 of the fan-motor, a screw serving to hold the conductors 12 and 13 in contact, and the shaft 5 is in electrical connection with a contact 14, carried by block 6, a screw 15 serving to make electrical connection with the line 16. For the other side of the circuit I have shown a screw-rod 17 passing through an aperture in block 6 and provided with a nut 18 to make connection with the line-wire 19, the opposite end of rod 17 being connected with a coiled wire 20, which is shown surrounding the flexible support 4 and the conductor 12 and also surrounding the reduced portions of the blocks 6 and 8, to which the coil 20 is secured. By preference the conductor 12 is located centrally within the strands of the support 4, whereby the latter serve to keep the conductors 12 and 20 from contact. The conductor 20 is rigidly connected with the block 8, as by a screw 21, which permits adjustment in a circular direction of the conductor 20 and block 8 with respect to each other, and said screw or a companion screw 22 serves to connect the conductor or terminal 23, that is connected with the fan-motor, with the conductor 20. (See Fig. 2.) The conductor 20 will preferably be in the form of a lightly and loosely coiled wire or spring, and in order to reduce the excess torsional resistance caused by the coiled wire 20 over that of the torsional support 4 I preferably twist one against the other, so that the two neutralize each other to some extent. This may be done by turning the block 8 within the coil 20 and then fastening the screw 21 against the coil. The flexible torsional support 4 may be used independently of the coil 20, in which case the circuit will lead from conductor 19 to the

fan-motor terminal by any loose conductor or wire, and the conductor 12 may also be similarly arranged independently of its association with the flexible support 4, as shown in the drawings. As a convenient means for connecting the support 4 and conductor 12 with the shaft 5 I have shown said shaft as split longitudinally and the ends of the support and conductor placed therein, the nut 7 serving to squeeze the members of the shaft 5 upon the support and conductor.

In Fig. 6 I have shown a different form of reactional support for the fan, but one acting in a manner similar to that above described with respect to Fig. 1. In this case the support 4^a is pivotally connected with the hanger 3^a by means of a universal connection, permitting the fan to oscillate or swing back and forth as may be required. In the form shown I have provided antifriction-bearings wherein a hemisphere or the like 25, secured to the rod-support 4^a, rests upon balls 26, carried by a cup 27, connected by a yoke 28 with the hanger 3^a, the threaded stem 28^a and nut 29 permitting connection of the yoke with the hanger, and at 30 is a coiled spring connected at one end with the support and at the other end with the yoke 28, which spring may be in the nature of a clock-spring normally not under tension. The opening 27^a in the cup 27 is of sufficient size to permit the support 4^a to swing freely, and the hemispherical surface of the member 25 serves to permit the fan to have universal as well as oscillatory motion. A nut 29^a on support 4^a permits vertical adjustment of the fan with respect to its support. With this form of support for the fan the latter will operate in the manner similar to that described with respect to Fig. 1, the twisting and untwisting of spring 30 serving in manner similar to the twisting and untwisting of the flexible support 4 to produce the required torsion to cause the continued oscillations of the fan.

My invention is not limited to the particular arrangements and details of construction shown and described, as the same may be varied without departing from the spirit thereof.

Having now described my invention, what I claim is—

1. The combination, with a fan having its axis placed at an angle to the vertical and arranged to deliver a stream of air in the general direction of said axis, of an electric motor therefor and a suspending device having means for producing torsional reaction to the movement of the fan about the suspending device as a pivot, whereby variations in the current supplied to the motor serve to maintain oscillation of the fan, substantially as described.

2. The combination, with an electric motor-driven fan having its axis placed at an angle to the vertical and arranged to deliver a stream of air in the general direction of said axis, of a suspending device having means for producing torsional reaction to the movement of the fan about the suspending device as a pivot, and means for supplying current to the motor, whereby variations in the current serve to maintain oscillation of the fan, substantially as described.

3. The combination, with an electric motor-driven fan having its axis placed at an angle to the vertical and arranged to deliver a stream of air in the general direction of said axis, of a suspending device having means for producing torsional reaction to the movement of the fan about the suspending device as a pivot, the axis of the fan and of the suspending device being in one vertical plane, and means for supplying current to the motor, whereby variations in the current serve to maintain oscillation of the fan, substantially as described.

4. The combination of an electric fan, having a motor, with a hanger above the same, a flexible connection between the hanger and the fan, means for adjusting the operative length of said connection between the fan and hanger, and means to convey electrical current to the motor from a source of electrical energy, substantially as described.

5. The combination of an electric fan having a motor, with a hanger above the same, terminals connected with said hanger for connection with line-wires, a flexible support for the fan depending from the hanger, conductors connecting said terminals with the motor, and means for adjusting the fan laterally with respect to said support, substantially as described.

6. The combination of an electric fan, a horizontally-disposed rod having a block for adjustment along the fan, a hanger above the fan, and a flexible connection between the hanger and the block, substantially as described.

7. The combination of an electric fan, a horizontally-disposed rod having a block for adjustment along the fan, a hanger above the fan, a flexible connection between the hanger and the block, and means for adjusting the operative length of the support between the hanger and the fan, substantially as described.

8. The combination of an electric fan with a block provided with a shaft, a flexible support connecting said shaft with the fan, and means for supporting said block, substantially as described.

9. The combination of an electric fan with a flexible support for the fan, means for sustaining said support, and a shaft connected with said support for regulating the operative length of the support, substantially as described.

10. The combination of an electric fan,

with a block having a shaft, a flexible support connecting said shaft with the fan, and a conductor in circuit with the fan-motor and connected with said shaft, substantially as described.

11. The combination of an electric fan, a hanger, a block connected therewith, a shaft carried by the block, a flexible support connecting the shaft with the fan, a conductor connected with said shaft and in circuit with the fan-motor, a contact in circuit with said shaft for connection with a line-wire, and another conductor connected with the terminal of the motor for connection with the line-wire, substantially as described.

12. The combination of an electric fan, with a block, a flexible support connecting the block with the fan, a conductor coiled around said flexible support and in circuit with the fan-motor, and another conductor in circuit with the fan-motor, substantially as described.

13. The combination of an electric fan with a block, a flexible support connecting the block with the fan, a conductor coiled around said flexible support and in circuit with the fan-motor, another conductor in circuit with the fan-motor, and means for holding the support and coiled conductor under opposing twisting strains, substantially as described.

14. The combination of an electric fan, with a pair of blocks, one of which is connected with the fan, a hanger for the other block, a flexible support connecting said blocks, a coiled conductor surrounding said flexible support and connected with said blocks and in circuit with the fan-motor, and another conductor in circuit with the fan-motor, substantially as described.

15. A support for an oscillating fan comprising a pair of blocks, a flexible support connecting said blocks, and a coiled conductor connected with said blocks and inclosing said support, substantially as described.

16. A support for an oscillating fan comprising a pair of blocks, a flexible support connecting said blocks, a coiled conductor connected with said blocks and inclosing said support, and means for adjusting said coiled conductor and one of the blocks with respect to each other, substantially as described.

17. A support for an oscillating electric fan, comprising a pair of blocks, a shaft carried by one block, a flexible support connecting said shaft with the other block, and a coiled wire connected with said blocks and surrounding said support, substantially as described.

18. A support for an oscillating electric fan, comprising a pair of blocks, a shaft carried by one block, a flexible support connecting said shaft with the other block, a coiled spring connected with said blocks and surrounding said support, and a conductor connected with said shaft and with a contact carried by the opposite block, substantially as described.

19. A support for an electric fan comprising a pair of blocks, a shaft carried by one block, a flexible support connecting said shaft to the other block, a conductor connected with said shaft and leading to the other block, a coiled conductor surrounding said support, and contacts carried by said blocks for connection with the coiled conductor, substantially as described.

HERBERT STANLEY BROWN.

Witnesses:
T. F. BOURNE,
M. HOLLINGSHEAD.