No. 871,672. PATENTED NOV. 19, 1907.

C. E. CAMPBELL.

ROTARY FAN.

APPLICATION FILED APR. 16, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

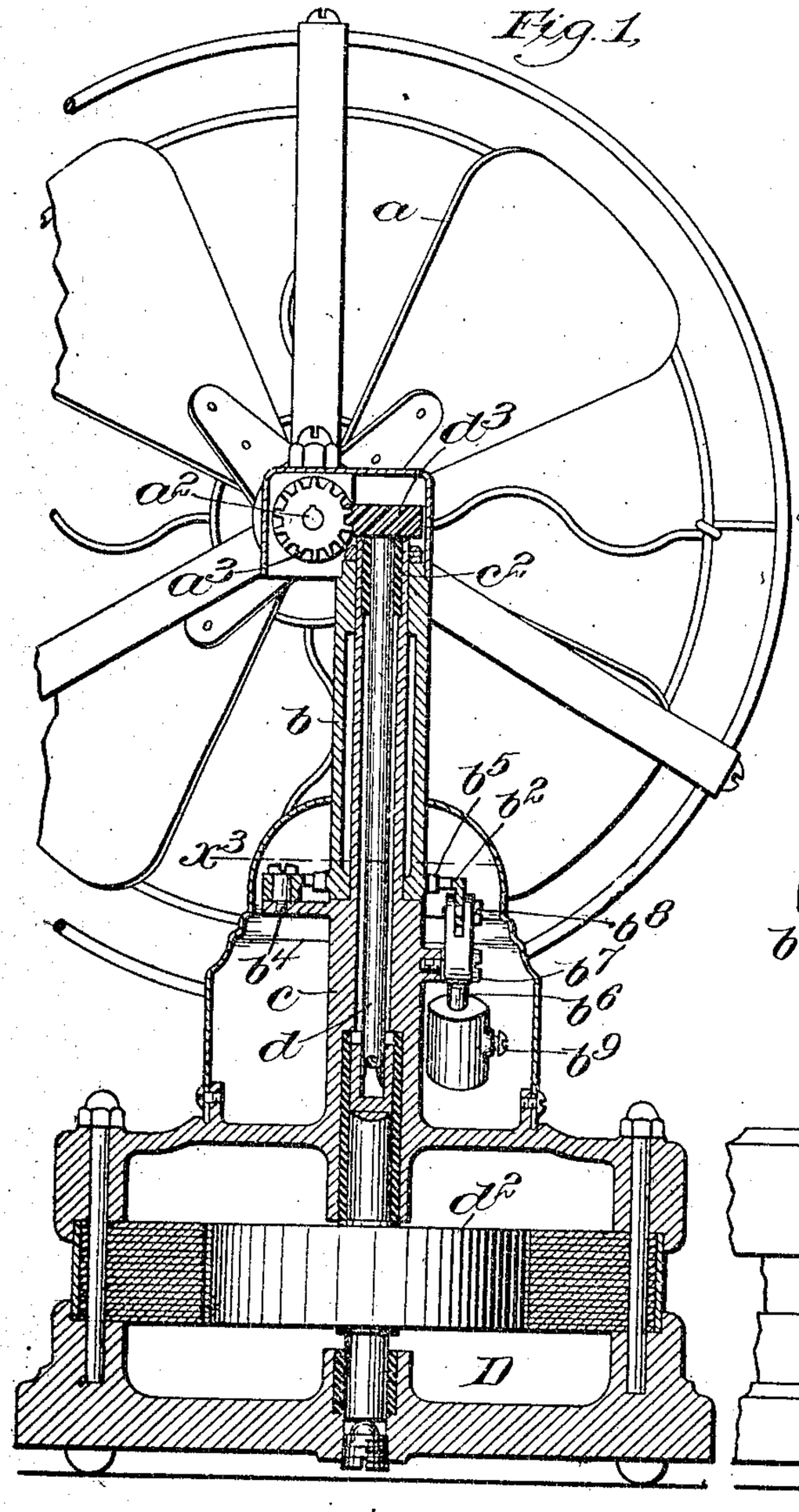


Fig. 2.

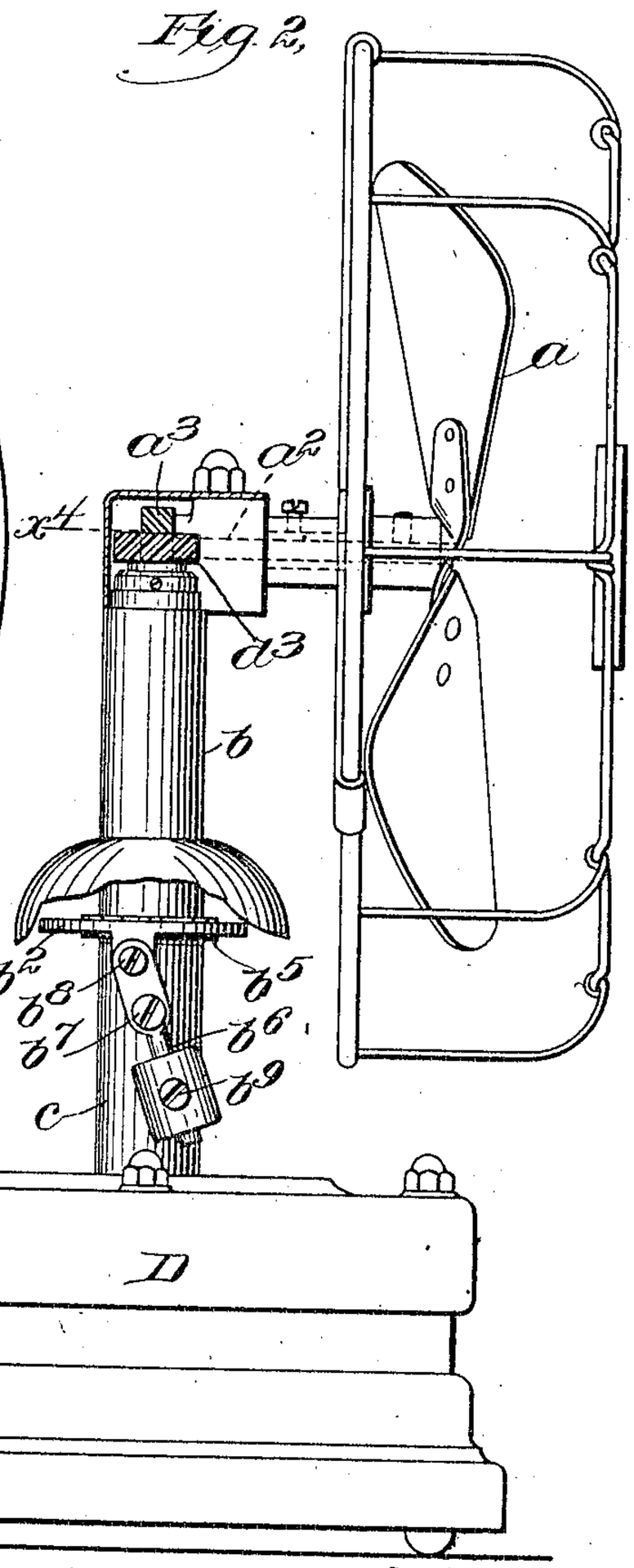
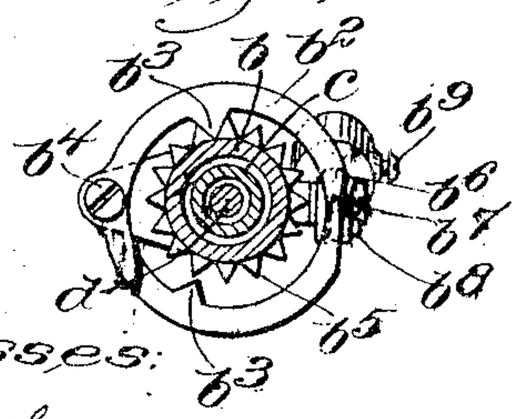
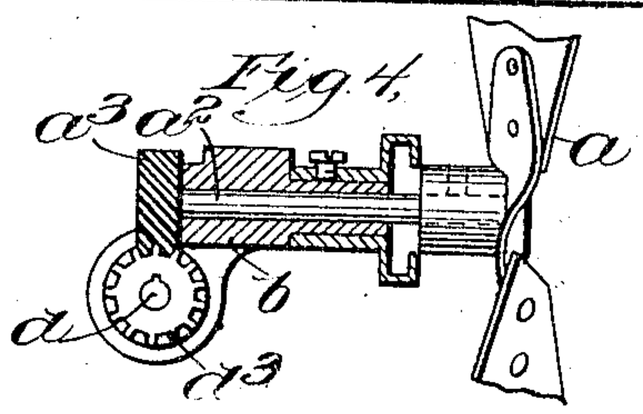


Fig. 3.



Witnesses:
Jas. J. Maloney.

Fig. 4.



Inventor:
Charles E. Campbell,
by J. P. and H. J. Livermore
Attys.

No. 871,672. PATENTED NOV. 19, 1907.

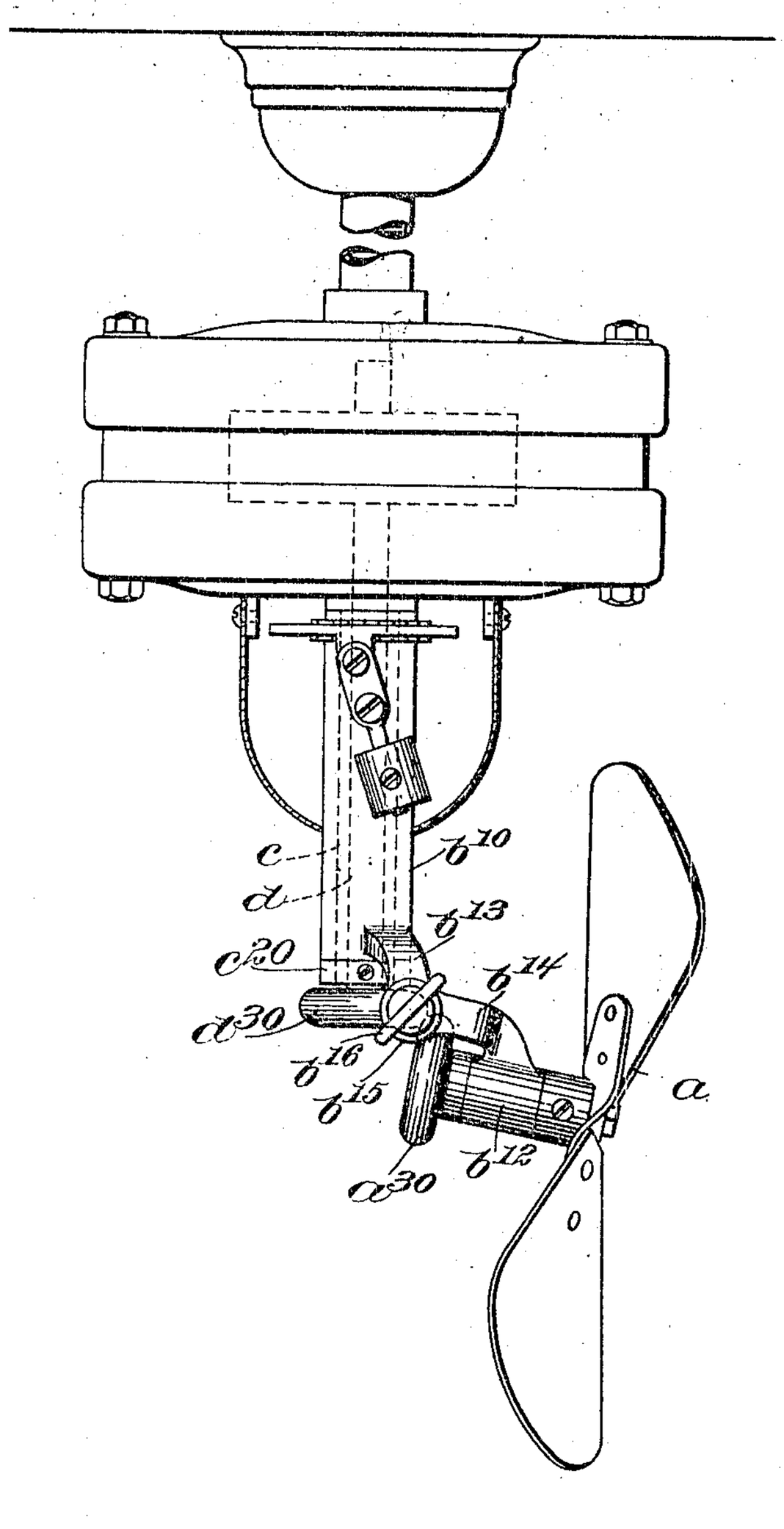
C. E. CAMPBELL.

ROTARY FAN.

APPLICATION FILED APR. 16, 1906.

2 SHEETS—SHEET 2.

Fig. 5.



Witnesses:
Jas. F. Maloney.
F. Lowen.

Inventor:
Charles E. Campbell
by J. P. and H. J. Livermore
Attys.

UNITED STATES PATENT OFFICE.

CHARLES E. CAMPBELL, OF LYNN, MASSACHUSETTS.

ROTARY FAN.

No. 871,672. Specification of Letters Patent. Patented Nov. 19, 1907.

Application filed April 16, 1906. Serial No. 311,884.

To all whom it may concern:

Be it known that I, CHARLES E. CAMPBELL, a citizen of the United States, residing in Lynn, in the county of Essex and State of Massachusetts, have invented an Improvement in Rotary Fans, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

The present invention relates to a rotary fan, the purpose of the invention being to cause a fan rotated by a suitable motor to revolve bodily, in order to produce a continual variation in the direction of the current of air produced by the fan.

In accordance with the invention, the fan proper is provided with a bearing member, which in turn is capable of rotating on an axis so that the said bearing member will carry the fan with a revolving movement around the axis of the bearing member.

In order to produce the revolving movement, the resistance of the air is utilized, a further feature of the invention consisting in means for controlling the revolving movement of the fan so as to prevent the same from being unduly accelerated.

The fan is herein shown as embodied in what is known as an electric fan, a small electric motor being utilized to drive the fan blades, the fan, however, in this case, having a bearing independent of the bearing for the rotary member of the motor, so that the said fan is capable of movement independent of the motor.

A further feature of the invention is embodied in means for adjusting the angular relation of the fan shaft to the motor shaft, so as to vary the angular position of the fan.

Figure 1 is a vertical section, partly in elevation, of a rotary fan embodying the invention; Fig. 2 is a similar view looking towards the right hand side of Fig. 1; Fig. 3 is a horizontal sectional detail, on line x^3, of Fig. 1; Fig. 4 is a horizontal section, on line x^4, of Fig. 2; and Fig. 5 is an elevation showing a modified construction, in which means are shown for adjusting the angle of the fan axis.

The fan a, which is of the ordinary type, is herein shown as having a bearing in a member b which, in turn, bears on a member c so that it is capable of rotation with relation to said member. In the construction shown, the member c consists of a vertical sleeve which surrounds the driving shaft d which is connected with the rotor member or armature d^2 of the motor D. The member c also constitutes a bearing, as indicated at c^2, for the upper end of the driving shaft d. To transmit the rotary movement of the driving shaft to the fan, the driving shaft and the fan-shaft a^2 are provided with a driving connection, such as a pair of inclined gears d^3 and a^3 which mesh when the driving and driven members are substantially at a right angle to each other. (See Figs. 1, 2 and 4.) It is obvious, however, that any other suitable driving connection might be employed to connect the driving shaft d with the fan to produce the rotary movement thereof, as, for example, in the construction shown in Fig. 5, which will be hereinafter described in detail.

The fan is indicated as offset with relation to the axis of the driving shaft d, so that, as soon as the fan a begins to rotate and the blades encounter resistance from the inertia of the air, there will be a reactionary effect through the gears, the resistance to the rotary movement causing the gear d^3 to rotate the bearing member b in the direction of rotation of the gear d^3, thus causing the fan shaft to travel radially, and the fan itself to revolve around the axis of the driving shaft d.

It is obvious that other forms of connection might be employed whereby the fan would revolve in the opposite direction, that is to say, would be pushed bodily back by the resistance of the air, but the construction shown is desirable in view of the fact that the effect of the fan in producing an air current is thereby increased rather than reduced. It is further desirable to control the revolving movement so as to prevent the same from becoming too highly accelerated, and, for this purpose, a retarding device is employed in connection with the rotary bearing member b. In the construction shown, the said rotary bearing member b is provided with an escapement device b^2 which is herein shown as a member provided with two teeth b^3, the said member being pivoted at b^4. The teeth b^3 coöperate with teeth b^5 formed around the rotating member b, the operation being that of an ordinary escapement, since the move-

ment of the member b^2 in one direction releases one tooth, while the movement in the opposite direction releases another. The oscillating movement of the member b^2 is herein indicated as further controlled by means of a weighted pendulum b^6 which is shown as pivoted at b^7 and connected with the member b^2 at b^8.

It will be seen from the foregoing description that when the motor D is started, the fan a will begin to rotate, while the reaction of the air upon the blades will cause the revolving movement to be set up, which revolving movement can be perfectly controlled through the action of the retarding device or escapement hereinbefore described.

The weighted portion of the pendulum b^6 is indicated as longitudinally adjustable with relation to the stem of the pendulum, so that the effect of the escapement can be adjusted to accelerate or retard the revolving motion of the fan. In the construction shown, the weight is held in its adjusted position by means of a set-screw b^9.

A further feature of the invention consists in an arrangement whereby the axis of the fan may be varied in position with relation to the motor, this feature being especially desirable in connection with ceiling fans, in which it is usually best to have the current of air directed, to a certain extent, downward. While, therefore, this feature of the invention may be useful and desirable in any fan, I have shown it as embodied in a ceiling fan.

Referring to Fig. 5, the bearing member for the fan a which corresponds to the member b, previously described, is made in two parts, viz., the sleeve b^{10} which bears on the stationary member c to provide for the rotation of the fan bearing member, and the part b^{12} which affords the direct bearing for the fan shaft. These two parts are provided with bracket arms b^{13} and b^{14} which are hinged together at b^{15}, so that the annular relation between the driving shaft d of the motor and the fan shaft may be adjusted. The two parts of the bearing member are arranged to be clamped together after the proper adjustment has been made by means of a thumb screw b^{16}. In this construction, in order that the annular position of the two shafts may be adjusted without interfering with the driving connection, the said driving connection is made through the agency of friction wheels d^{30} and a^{30} which correspond to the gears d^3 and a^3, these friction wheels having, as shown, convex peripheries preferably of some such substance as rubber, the convexity being such that the wheels will remain in frictional engagement with each other throughout a reasonably wide range of adjustment. In other respects, the construction is substantially the same as that previously described, the sleeve b^{10}, however, being supported upon a collar c^{20} at the end of the stationary bearing member c, instead of resting upon the frame of the motor. The escapement device is also located near the top of the member b^{10}, but the construction and operation of said escapement device are the same as described in connection with Figs. 1, 2 and 3. It is obvious, however, that the adjustable feature might be equally well applied to the fan having the ordinary standard, the ceiling construction having been chosen as an illustration merely for the reason that the adjustable feature is more nearly essential when the fan is hung from above.

1. The combination with a rotary fan; of a motor the body portion of which is stationary; a bearing for said fan rotatably mounted with relation to said motor whereby said fan may be revolved; and a driving connection between the motor shaft and the fan shaft whereby the reactionary effect of the air resistance causes the rotation of the fan shaft bearing in the direction of the air current produced by the fan.

2. The combination with a rotary fan; of a motor; a bearing member for the motor shaft upon which the fan shaft bearing member is rotatably mounted; and a driving connection between said shafts whereby the reactionary effect of the resistance of the air causes the fan shaft bearing to rotate in the direction of the air current produced by the fan.

3. The combination with a rotary fan and its shaft; of a rotary bearing for said shaft; a motor shaft; a driving connection between said motor shaft and said fan shaft whereby the reactionary effect of the air resistance causes the fan shaft bearing to rotate in the direction of the air current produced by the fan; and means for retarding the speed of rotation of said fan shaft bearing member.

4. The combination with a motor; of a driving shaft connected with the rotary member thereof; a vertical bearing for said driving shaft; a sleeve mounted to rotate on the outside of said vertical bearing; a fan having a bearing connected with said sleeve; gears connecting the driving shaft of the motor with the fan shaft to cause the rotation of the fan shaft, and also by the reaction of the air the rotation of the fan shaft bearing in the direction of the air current; and a retarding device coöperating with the sleeve, substantially as described.

5. The combination with a rotary fan; of a motor the body portion of which is stationary; a bearing for said fan rotatably mounted with relation to said motor, whereby said fan may be revolved as well as rotated; a positive driving connection between the motor shaft and the fan shaft whereby the reactionary effect of the air resistance causes the rota-

tion of the fan shaft bearing in the direction of the air current produced by the fan; and means for adjusting the angle at which the fan shaft stands with relation to the driving shaft without disconnecting one shaft from the other.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES E. CAMPBELL.

Witnesses:
M. E. COVENEY,
H. J. LIVERMORE.