Aug. 20, 1929. S. JOHNSON 1,725,085

FAN CONSTRUCTION

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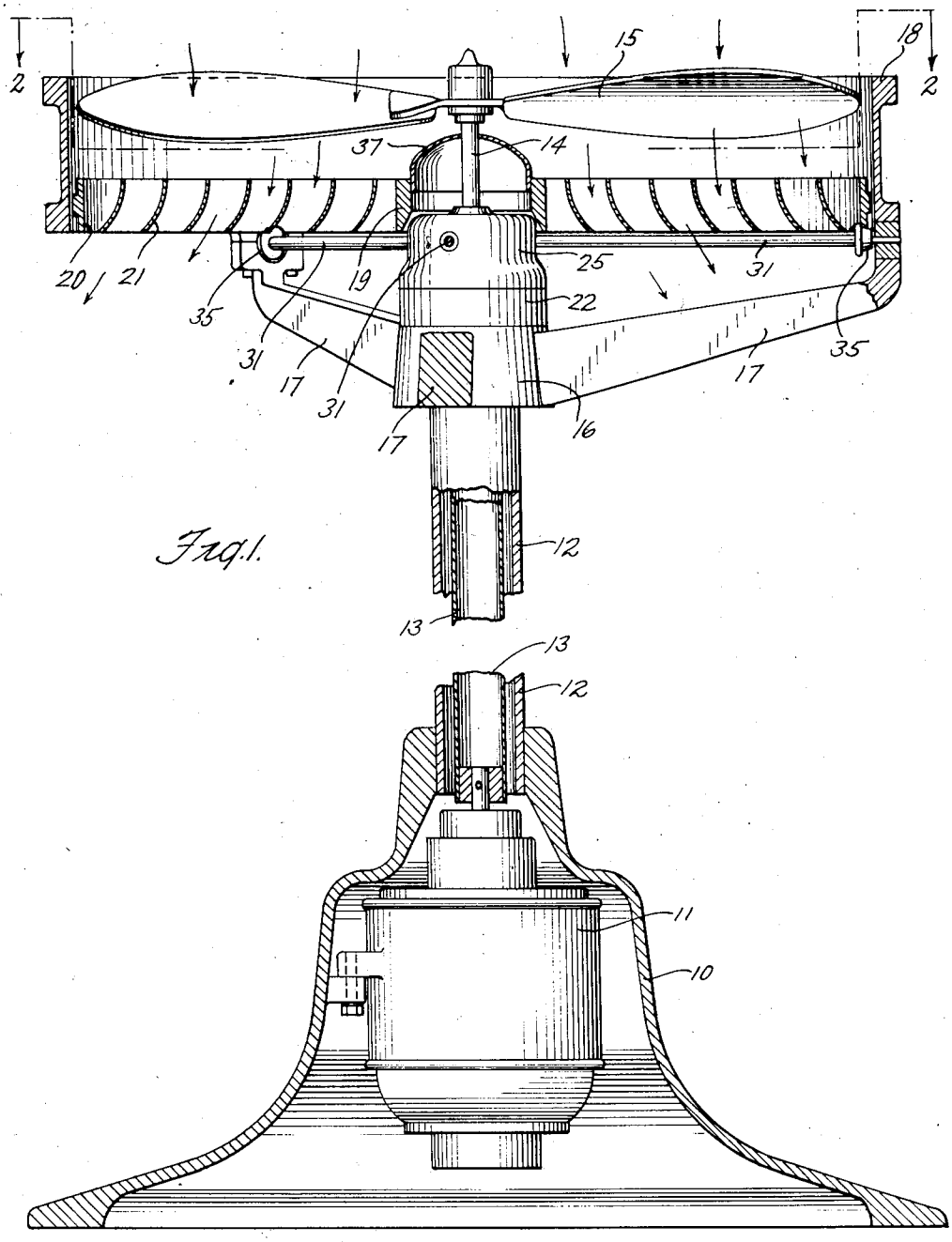


Fig. 1.

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Fig. 2.

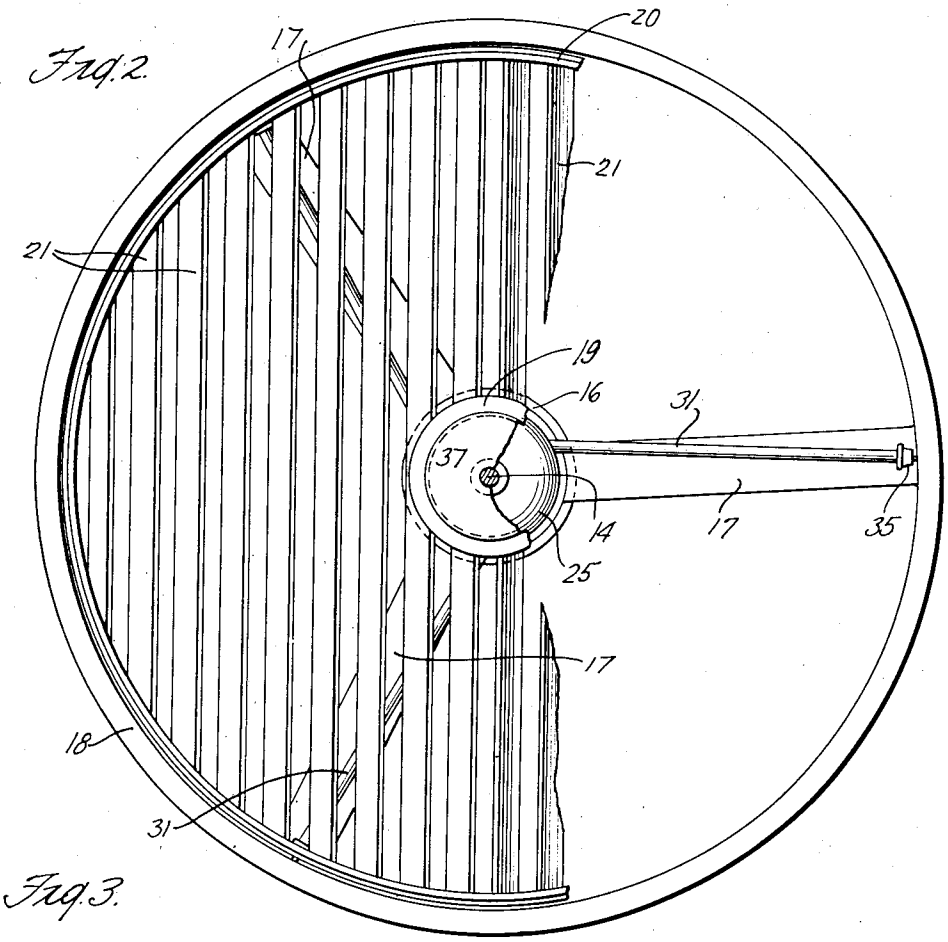
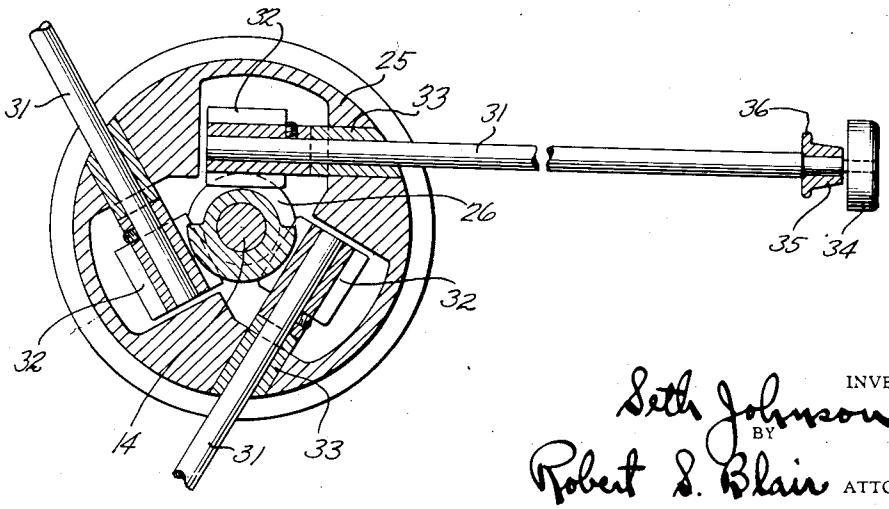


Fig. 3.



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Fig. 4.

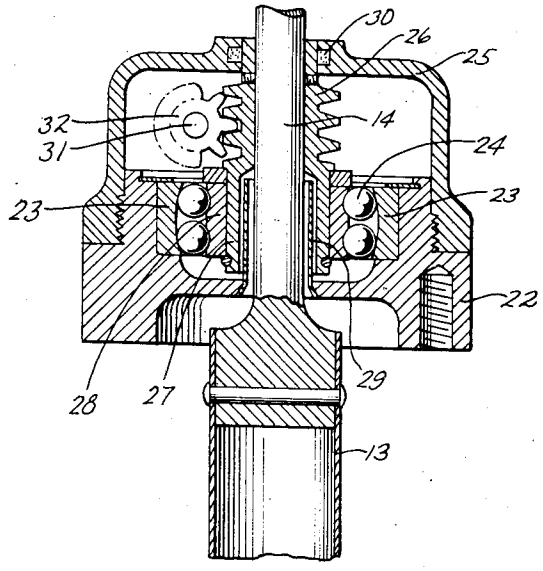
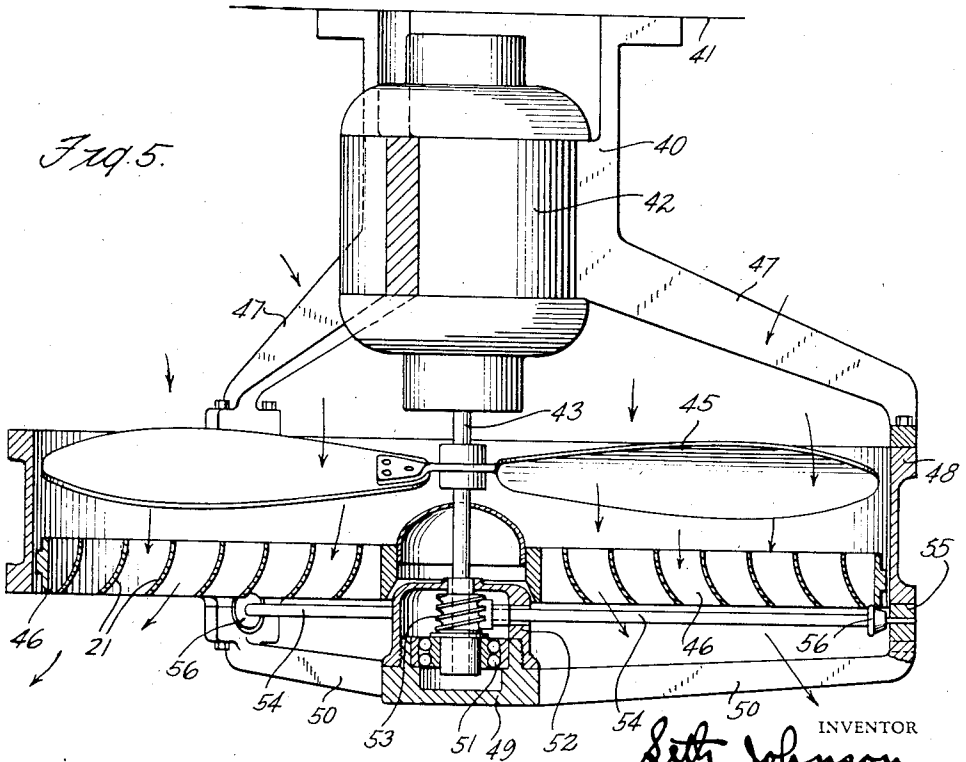


Fig. 5.



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Patented Aug. 20, 1929. 1,725,085

UNITED STATES PATENT OFFICE.

SETH JOHNSON, OF NEW HAVEN, CONNECTICUT, ASSIGNOR TO THE SAFETY CAR HEATING & LIGHTING COMPANY, A CORPORATION OF NEW JERSEY.

FAN CONSTRUCTION.

Application filed February 28, 1927. Serial No. 171,430.

This invention relates to fan construction. One of the objects thereof is to provide a fan construction which is practical and efficient in action. Another object is to provide a construction of the above nature which is simple and compact. Another object is to provide a construction of the above nature which is capable of operating quietly and smoothly. Other objects will be in part obvious or in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts as will be exemplified in the structure to be hereinafter described and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings in which are shown one or more of the various possible embodiments of the several features of this invention,

Figure 1 is a side elevation of a fan construction, certain of the parts being broken away or shown in section;

Figure 2 is a view taken substantially as indicated by the line 2—2 of Figure 1, the parts shown being partly broken away to better show certain features;

Figure 3 is a sectional view on a horizontal line showing certain driving mechanism;

Figure 4 is a vertical section of parts of the driving mechanism, and

Figure 5 shows a modified form of construction.

Similar reference characters refer to similar parts throughout the several views of the drawings.

Referring now to the drawings in detail, and first to Figure 1, there is shown a base or pedestal 10 which is suitably shaped to rest upon the floor and of a size to afford a firm stance for the base and the parts carried thereby. This base 10 is hollow, and suitably supported therein is an electric motor 11. Projecting upwardly from the base 10 is a hollow upright 12. The motor 11 drives a shaft 13 which extends therefrom through the upright 12, the shaft 13 being preferably hollow as shown thereby to gain a maximum of strength with minimum weight. The shaft is connected, as will be described in detail presently, to drive a shaft 14 upon which is mounted a fan 15.

The hollow upright 12 is broken away in the drawing, but it will be understood that this part is of such length as to position the fan 15 at a convenient height above the floor. The fan 15, rotated by the motor 11, draws air downwardly as indicated by the arrows in Figure 1.

At the upper end of the upright 12 is an enlarged portion 16 from which extend a plurality of radial arms 17, shown herein as three in number. Supported by the outer ends of these arms 17 and secured thereto is an annular frame or guard 18 which extends about the fan 15. Also, within this annular frame 18 and directly beneath the fan, is a deflector which is adapted to deflect and spread outwardly the current of air discharged downwardly by the fan. This deflector comprises an inner ring or collar 19, an outer ring 20 and a plurality of inclined blades 21 arranged in parallel fashion within the outer ring or rim 20. It may be here noted that the specific construction of this deflector is unimportant as concerns the broader features of this invention, and that the term "deflector" is used herein in a broad sense to denote any element adapted upon being exposed to an air blast to tend to discharge the air in a desired direction. The deflector is adapted to be rotated about its axis which is substantially coincident with that of the fan 15, and at considerably lower speed than the speed of rotation of the fan.

Referring now to Figure 4, there is shown the hollow driving shaft 13 and its driving connection with the shaft 14 at the upper end of which the fan is mounted. A fixture 22 is secured to the upper side of the frame portion 16 and supports the outer race 23 of a ball bearing 24. Secured to the fixture 22, for example, by the threaded connection shown, is a housing 25. Within this housing and rigidly secured to the shaft 14 is a worm gear 26. This worm gear has a downward extension or hub 27 upon which is carried the inner race 28 of the ball bearing 24. The hub portion 27 has an enlarged inner diameter and extending upwardly thereinto is a sleeve 29 which is secured to the fixture 22 about the opening therein through which the shaft 14 passes. This sleeve 29 serves as a guard which prevents lubricant supplied to the gear 26 and the ball bearing 24 from escaping downwardly. About the upper opening through which the

shaft 14 leaves the housing 25 is provided suitable packing 30 to prevent escape of lubricant at this point.

As shown in Figure 3, extending into the housing 25 are a plurality of substantially radially extending shafts 31, shown herein as three in number. Upon the inner end of each of these shafts 31 is fixed a gear 32 which meshes with the worm wheel 26. Also, each of the shafts 31 is provided with a bearing 33 in the housing 25. Thus the three radially extending shafts 31 are all driven by the shaft 14 through the single gear 26, and at greatly reduced speed. The housing 25 may be packed with grease so that all of the gears and the ball bearing 24 are dependably lubricated.

As may be seen in Figures 1 and 2, the three shafts 31 extend outwardly above the respective supporting arms 17 so that they are not at all noticeable from beneath the fan. At their outer ends the shafts 31 are provided with bearings 34. These bearings 34 are clamped between the annular guard 18 and the outer ends of the arms 17. The three shafts 31 are adapted to support and rotate the deflector. Adjacent the outer end of each of the shafts there is fixed thereto a friction roller 35. The outer or peripheral rim 20 of the deflector rests upon these three friction rollers. The rollers are preferably tapered as shown, and each is provided with a shoulder 36 which comes just within the rim 20 so that the deflector is thereby centered for rotation about an axis substantially coincident with the axis of rotation of the fan.

The three shafts 31 engaging the outer rim 20 of the deflector through the rollers 35, thus support the weight of the deflector, center the deflector for rotation and drive the deflector. The deflector thus rotates substantially without friction. No support is required at the center of the deflector, the inner ring 19 thereof rotating freely about the upper portion of the housing 25. As shown in Figure 1, the inner ring 19 of the deflector preferably carries a curved guard 37 which insures that all of the air discharged downwardly by the fan 15 will pass through the deflector blades.

Referring now to Figure 5, there is shown a modification of this construction, certain features of the invention being embodied in a fan adapted to be supported from the ceiling as distinguished from the pedestal construction hereinbefore described. A suitable supporting frame 40 is secured to a ceiling indicated at 41. Carried by this frame is an electric motor 42 driving a shaft 43 upon which is mounted a fan 45. Beneath the fan 45 is a deflector 46. The fan 45 is adapted to draw air downwardly, as indicated by the arrows, and discharge the air through the deflector 46 which is adapted to direct and discharge the air blast in a predetermined manner, preferably spreading it out.

In the embodiment shown in Figure 5, the frame 40 is provided with three outwardly and downwardly extending supporting arms 47 to the outer ends of which is secured an annular frame or guard 48 surrounding the fan 45 and the deflector 46. Beneath the deflector is a fixture 49 having three radially extending arms 50. This fixture 49 supports the outer race of a ball bearing 51 for the shaft 43 and, mounted thereon for example, by the threaded connection shown, is a housing 52.

Within the housing 52 there is fixed upon the shaft 43 a worm gear 53, and meshing with this worm gear are three gears fixed respectively upon the inner ends of three radially extending shafts 54. These shafts are provided with bearings in the housing 52 and, at their outer ends they are supported in bearings 55. The bearings 55 are clamped between the outer ends of the arms 50 and the annular frame part 48, the arms 50 and the fixture 49 with the parts carried thereby being thus supported from the part 48 which is in turn carried by the arms 47. The radially extending shafts 54 have fixed thereon adjacent their outer ends friction rollers 56 similar to the friction rollers 35 previously described, and upon these friction rollers rests the outer rim of the deflector 46. The shafts 54 thus support and rotate the deflector in this embodiment of the invention substantially as do the shafts 31 of the embodiment first described.

From the foregoing, it will be seen that there are herein provided constructions which achieve the objects of this invention and accomplish results of practical value. This fan construction is simple and inexpensive and is capable of operating efficiently with the expenditure of a minimum amount of power. The number of parts employed are few and the mechanisms are compactly arranged to furnish, in addition to an efficiently operating device, a construction which is neat and finished in appearance.

As many possible embodiments may be made of the above invention and as many changes might be made in the embodiment above set forth, it is to be understood that all matter hereinbefore set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

I claim as my invention:

1. In a construction of the class described, in combination, a fan, a rotary deflector in the path of discharge of said fan, and means engaging said deflector adjacent the periphery thereof for rotatably supporting and driving said deflector.

2. In a construction of the class described, in combination, a fan, a rotary deflector in the path of discharge of said fan, and means engaging said deflector at a plurality of spaced points adjacent the periphery thereof, said means rotatably supporting and being adapted to drive said deflector.

3. In a construction of the class described, in combination, a fan, a rotary deflector in the path of discharge of said fan, rotatable friction means supporting said deflector, and means for rotating said last means to drive said deflector.

4. In a construction of the class described, in combination, a fan, a rotary deflector in the path of discharge of said fan, a plurality of rotatable members upon which said deflector rests and adapted to support the weight of said deflector, and means for rotating said members to drive said deflector.

5. In a construction of the class described, in combination, a fan, a rotatable deflector in the path of discharge from said fan and positioned in a substantially horizontal plane, a plurality of friction rollers engaging said deflector adjacent the periphery thereof and supporting the weight thereof, and means for rotating said rollers to drive said deflector.

6. In a construction of the class described, in combination, a fan, a rotatable deflector in the path of discharge from said fan and positioned in a substantially horizontal plane, said deflector comprising vanes and an annular peripheral rim about said vanes, and a plurality of friction rollers engaging said rim and supporting the weight of said deflector, and means for rotating said rollers to drive said deflector.

7. In a construction of the class described, in combination, a fan, a rotatable deflector in the path of discharge from said fan, means for driving said fan, rotatable means engaging said deflector adjacent the periphery thereof and supporting the weight thereof, and means for rotating said last means from said driving means to rotate said deflector.

8. In a construction of the class described, in combination, a fan, a rotatable deflector in the path of discharge from said fan, a plurality of friction rollers substantially equidistant from the axis of rotation of said deflector, said rollers being adapted to support the weight of said deflector and center said deflector for rotation, and means for rotating said rollers to drive said deflector.

9. In a construction of the class described, in combination, a fan, a rotatable deflector in the path of discharge from said fan, a rotatable shaft substantially coaxial with said fan and from which said fan is driven, and means for driving said deflector from said shaft and at reduced speed comprising a shaft extending outwardly in a substantially radial direction from said first shaft and having adjacent its outer end a driving connection with a peripheral portion of said deflector.

10. In a construction of the class described, in combination, a fan, a rotatable deflector in the path of discharge from said fan, a rotatable shaft substantially coaxial with said fan and from which said fan is driven, rotatable means supporting the weight of said deflector, and means for rotating said last means to drive said deflector comprising a shaft extending outwardly in a substantially radial direction from said first shaft and driven therefrom.

11. In a construction of the class described, in combination, a fan, a rotatable deflector in the path of discharge from said fan, a rotatable shaft substantially coaxial with said fan and from which said fan is driven, and a plurality of shafts extending outwardly in a substantially radial direction from said first shaft and driven therefrom, said deflector resting upon said shafts and being driven therefrom.

12. In a construction of the class described, in combination, a fan, a rotatable deflector in the path of discharge from said fan, a rotatable shaft substantially coaxial with said fan and from which said fan is driven, a plurality of shafts extending outwardly in a substantially radial direction from said first shaft and driven therefrom, and friction rollers carried by said shafts at outer portions thereof, said deflector being supported by said rollers and being driven thereby.

13. In a construction of the class described, in combination, a fan, a rotatable deflector in the path of discharge from said fan, a shaft substantially coaxial with said fan and from which said fan is driven, a plurality of shafts extending outwardly in a substantially radial direction from said first shaft and connected at outer portions thereof to rotate said deflector, and a worm gear upon said first shaft connected to drive all of said plurality of shafts at reduced speed.

14. In a construction of the class described, in combination, a fan, a rotatable deflector in the path of discharge from said fan, a shaft substantially coaxial with said fan and from which said fan is driven, a plurality of shafts extending outwardly in a substantially radial direction from said first shaft, gearing for driving said plurality of shafts from said first shaft at reduced speed, a housing about said gearing through which said shafts pass and in which they are supported adjacent their inner ends, a frame work in which said plurality of shafts are supported adjacent their outer ends, and

friction means upon said shafts upon which said deflector is supported and by which said deflector is rotated.

15. In a construction of the class described, in combination, a base member adapted to rest upon the floor, an electric motor supported by said base, a hollow upright extending from said base, a vertical shaft driven by said motor extending therefrom upwardly through said upright, a fan at the upper end of said shaft rotated thereby about a vertical axis and adapted to discharge air downwardly about said upright, a deflector positioned below said fan, and means driven from said shaft for rotatably supporting and for driving said deflector.

16. In a construction of the class described, in combination, a base member adapted to rest upon the floor, an electric motor supported by said base, a hollow upright extending from said base, a vertical shaft driven by said motor extending therefrom upwardly through said upright, a housing at the upper end of said upright, an extension of said shaft projecting through said housing and out through the top thereof, a fan mounted on the projecting part of said shaft, a deflector beneath said fan, gearing within said housing driven by said shaft, and means driven from said gearing for rotatably supporting and rotating said deflector.

17. In a construction of the class described, in combination, a hollow base adapted to rest upon the floor, an electric motor mounted in said base with its axis substantially vertical, a hollow upright extending from said base, a vertical shaft driven by said motor extending therefrom upwardly through said upright, a plurality of arms extending outwardy from the upper portion of said pright, an annular frame member supported at the outer ends of said arms, a fan mounted within said frame member and rotated by said shaft about a substantially vertical axis, a deflector beneath said fan and rotatably supported, and means for rotating said deflector from said shaft.

18. In a construction of the class described, in combination, a hollow base adapted to rest up on the floor, an electric motor mounted in said base with its axis substantially vertical, a hollow upright extending from said base, a vertical shaft driven by said motor extending therefrom upwardly through said upright, a plurality of arms extending outwardly from the upper portion of said upright, an annular frame member supported at the outer ends of said arms, a fan mounted within said frame member and rotated by said shaft about a substantially vertical axis, a deflector beneath said fan and rotatably supported, and a plurality of shafts extending outwardly in a substantially radial direction from said first shaft and driven therefrom, said shafts supporting and driving said deflector and the outer ends thereof being supported in said annular frame.

In testimony whereof, I have signed my name to this specification this 16th day of February 1927.

SETH JOHNSON.