

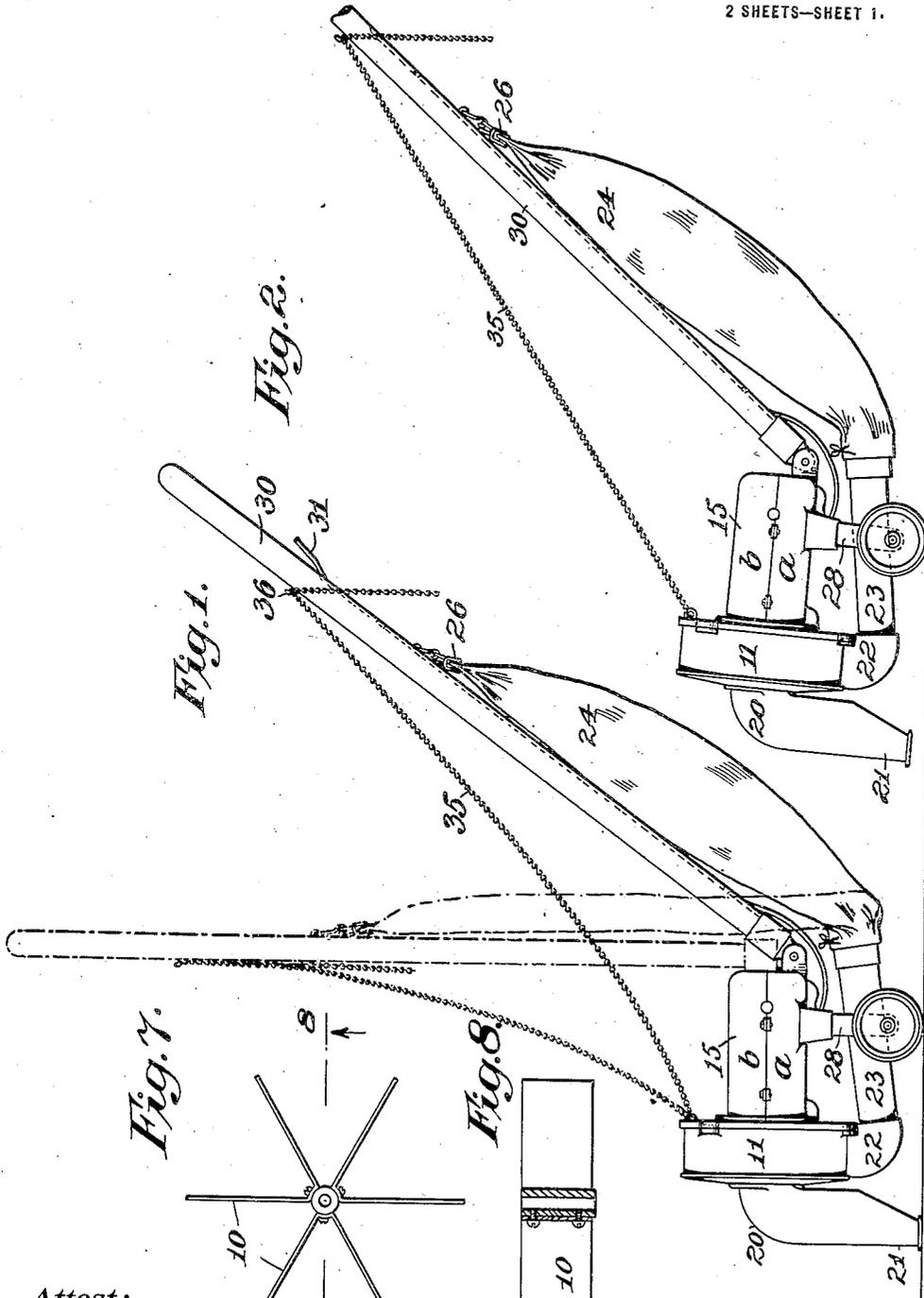
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 SUCTION CLEANER.

APPLICATION FILED APR. 14, 1910. RENEWED MAR. 13, 1915.

1,286,115.

Patented Nov. 26, 1918.

2 SHEETS—SHEET 1.



Attest:  
*M. McGinnis*  
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by

Inventor:  
 William W. Rosenfield  
*Arthur L. Kent* Atty.

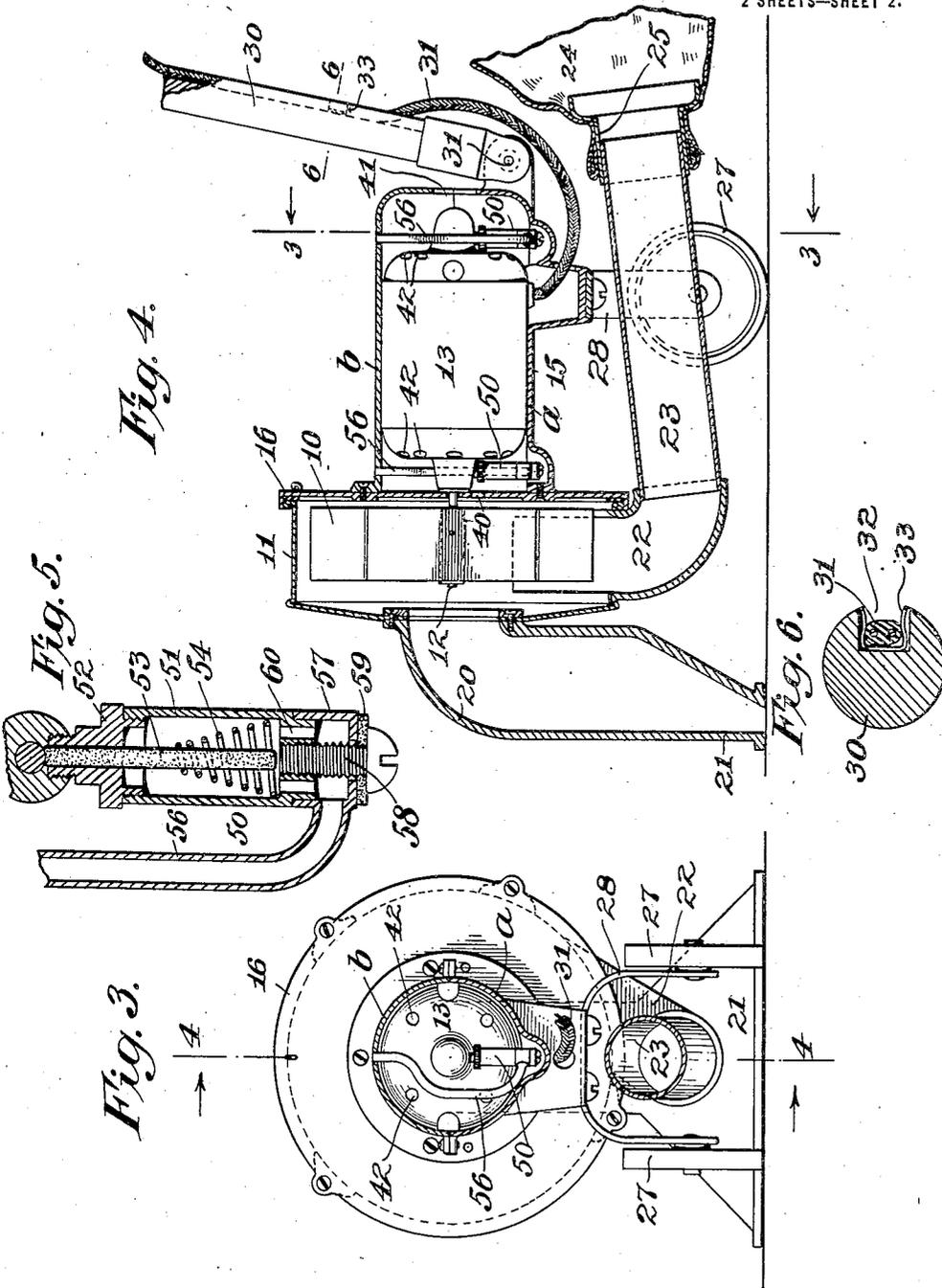
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Inventor:  
 William W. Rosefield  
 by *Arthur L. Keut* Atty.

# UNITED STATES PATENT OFFICE.

WILLIAM W. ROSENFELD, OF NEW YORK, N. Y.

## SUCTION-CLEANER.

1,286,115.

Specification of Letters Patent.

Patented Nov. 26, 1918.

Application filed April 14, 1910, Serial No. 555,426. Renewed March 13, 1915. Serial No. 14,229.

*To all whom it may concern:*

Be it known that I, WILLIAM W. ROSENFELD, a citizen of the United States, residing at New York city, county of New York, and State of New York, have invented certain new and useful Improvements in Suction Cleaners, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to suction cleaners of that class in which the efficiency of the apparatus is due to the use of a suction fan which has a high volume capacity so as to be able to suck in and discharge air in such quantity as to maintain the required suction at the cleaning nozzle with the use of a nozzle opening sufficiently large to draw in not only fine dust and dirt but also scraps and articles of considerable size.

The invention relates more particularly to a suction cleaner of the self-contained type in which the motor, fan, suction nozzle and dirt receptacle are mounted to move together as the suction or cleaning nozzle is moved over the surface to be cleaned; and the invention aims generally to provide a suction cleaner of this type, which shall have to a high degree the qualities and characteristics of lightness, efficiency, simplicity and durability, besides possessing other advantages peculiar to itself. While the invention has been made especially with the idea of providing such a self-contained suction cleaner, intended primarily for cleaning carpets, rugs or other floor coverings, or uncarpeted floors of wood or other material, it will be understood that features of the invention may be applied to other apparatus to which they may be found applicable.

A full understanding of the invention can best be given by a detailed description of a construction embodying the various features of the invention in the preferred form, and such a description will now be given in connection with the accompanying drawings, in which:—

Figure 1 is a view showing the suction cleaner in position for operation, and showing also, by dotted lines, the operating handle thrown up to vertical position.

Fig. 2 is a similar view showing the manner of raising the suction nozzle from the floor.

Fig. 3 is a rear end view of the cleaner partly in section on line 3 of Fig. 4.

Fig. 4 is a central longitudinal section on line 4 of Fig. 3.

Fig. 5 is an enlarged detail sectional view of one of the motor oil cups.

Fig. 6 is an enlarged detail sectional view of the operating handle on line 6 of Fig. 4.

Fig. 7 is a face view of the suction fan.

Fig. 8 is a section on line 8 of Fig. 7.

Referring to the drawings, 10 is a rotary suction fan mounted to rotate about a horizontal axis in a fan casing 11. The fan is mounted on and driven by the shaft 12 of an electric motor 13, which is mounted in a supporting case 15. The rear wall of the fan casing 11 is formed by a plate 16 which is secured to the motor case 15 and forms a partition wall between the motor chamber and the fan chamber. The motor case 15 is formed in two halves *a* and *b*, meeting in a horizontal plane and the upper half *b* being secured to the lower half *a* and to the plate 16 so as to be readily removable to give access to the motor and to permit the motor to be placed into and removed from the case 15. The front and side walls of the fan casing are also removable from the plate 16 to give access to the fan, the two parts of the fan casing being detachably secured together by suitable means, such as the screw held clips shown.

The front wall of the fan casing is formed with a central opening and has secured to it a downwardly extending casing 20 providing an intake passage, the lower end of the casing being contracted in the direction longitudinal of the machine and extended transversely of the machine to form a suction or cleaning nozzle 21 having a horizontal bottom edge or face formed with an elongated intake slot or opening which extends transversely of the direction in which the cleaner is moved. The length of the nozzle passage from the intake slot to the center of the opening into the fan chamber through the front wall of the fan casing is substantially the same as the distance of the

fan axis above the floor or surface to be cleaned, and the nozzle is in direct and free communication with the fan chamber. A discharge passage 22 leads downward from the under side of the fan chamber and communicates through a backwardly leading pipe 23 with a receptacle 24 for the dirt and dust discharged from the fan chamber. The receptacle 24 should be porous to permit the air to escape while retaining the dirt and dust received from the fan, including all scraps and articles drawn in through the suction nozzle and discharged through the pipe 23. A bag of suitable close woven fabric forms the best receptacle, one end of the bag being connected to the discharge pipe as by being secured to a short pipe length 25 adapted to slip over the end of the pipe 23 as shown, and the other end of the bag being suitably supported from the operating handle, as shown, and being formed with an opening for cleaning out the bag, which opening is normally closed by a spring clip 26.

A pair of running wheels 27 are mounted on pins carried by supporting brackets 28 extending downward from the rearward part of the motor case, one on either side of the discharge pipe 23. An operating handle rod 30 is pivotally connected to the rear end of the motor case to swing vertically, as shown at 31. The motor is supplied with current from any suitable and convenient source through the wires of a cable 31 which leads from the motor through an opening in the lower part of the case 15 and then up along the handle to near its upper end. The cable is conveniently housed in a groove 32 formed in the under side of the handle rod, being held therein by clips 33.

In use, the cleaner stands normally in the position shown in Figs. 1 and 4, supported partly by the wheels 27 and partly by the suction nozzle, and is moved to carry the nozzle over the surface to be cleaned by means of the handle rod. The fan 10 rotating at high speed draws the air in strongly through the intake passage and forces it out through the discharge passage, and dirt and dust from the carpet or rug or other material or surface over which the cleaner is moved are thus drawn in through the nozzle and intake passage into the fan chamber and discharged through the passage 22 and pipe 23 into the receiving bag 24, where the dust and dirt are retained while the air escapes freely. The intake slot of the nozzle being of considerable width, and the intake passage above the nozzle being of comparatively large cross-section, scraps of paper and other articles of quite considerable size will be picked up and collected in the bag 24. The running

wheels and the nozzle provide means for supporting the cleaner with the nozzle held by the weight of the cleaner and by the suction directly in contact with the article or surface to be cleaned, and in normal operation over a smooth surface the handle rod is used only for imparting forward or backward movement to and for directing the cleaner, and is therefore preferably attached to the cleaner so as to be free to swing vertically as shown to accommodate itself to the hand of the person operating the cleaner.

It is frequently desirable, however, in using the cleaner to lift the nozzle away from the floor as in passing over edges of rugs and in running over door sills or other obstructions, in picking up pieces of paper, etc. To enable the nozzle to be readily lifted, a chain 35 is provided secured to the plate 16 and adapted to be caught over a hook 36 on the handle bar. The chain will thus act as a stop device to limit the downward swinging of the handle bar relatively to the cleaner, so that if the handle is pressed downward beyond the position at which the chain becomes taut, the cleaner will be tilted backward on the running wheels to lift the nozzle as shown in Fig. 2. The effective length of the chain may be varied by simply catching a different link on the hook, and the angle of inclination of the handle at which the chain will become taut thus readily adjusted to suit the person operating the cleaner. The nozzle may also be lifted by pulling directly on the chain.

It will be noticed that in the cleaner shown the suction nozzle rests directly on the floor or surface to be cleaned and on which the cleaner is moved back and forth, that is, it rests with the edges of the intake slot in contact with the surface to be cleaned. It is especially desirable in a cleaner of this kind, in order to do satisfactory and uniform work, to provide for sufficient but not too great pressure of the nozzle on the surface to be cleaned, and to avoid any considerable variation of said pressure as the cleaner is used. An efficient working pressure of the nozzle on the surface to be cleaned is secured in the machine shown having the nozzle projecting downward in front of the fan casing by locating the running wheels back of the center of gravity of the machine but in position to bear the greater part of the weight of the machine; and uniform, or substantially uniform, and constant pressure of the nozzle on the surface to be cleaned is secured by having the operating handle pivotally connected to the machine to swing vertically. Having the operating handle connected to swing vertically, besides avoiding the variation in pressure of the nozzle on the surface to be

cleaned which would result in using the machine if the handle were rigidly connected thereto, is also of advantage from the standpoint of the convenience in operating the machine, and in avoiding the necessity of care in operating to maintain the nozzle in contact with the surface to be cleaned.

To provide the required suction, it is necessary to have the fan driven at a very high speed, and to avoid the use of gearing a high speed motor is used. This means liability of the motor becoming overheated in operation, and to avoid this difficulty an opening 40 is made near the center of the plate 16 through which the motor chamber is in communication with the central or suction portion of the fan chamber, and the motor case is made with an air inlet opening 41 at its rear end. By providing such openings a draft of air through the motor chamber will be maintained constantly during the operation of the motor and fan, the air being drawn from the motor chamber through the opening 40 into the fan chamber. In the drawings the motor 13 is shown as having a shell or casing which completely fills the central portion of the motor case 15, but this inner casing or shell of the motor is provided as shown with air openings 42 at each end and the cooling current of air will pass through these openings and inside the shell of the motor and effectually prevent any over-heating of the motor even with long sustained operation.

It is desirable that the fan be as light as possible while still having the necessary strength. A very light and very strong fan may be made, as shown in Figs. 7 and 8, by making the blades of strips of sheet metal bent in V shape to form two blades extending at an angle to each other dependent on the number of blades the fan is to have and attaching the blades to a hub by securing the intermediate portion or bend of the strips to the hub by screws or other suitable means.

What is claimed is:—

1. In a self-contained suction cleaner, the combination of a fan casing, a suction fan mounted within the casing to rotate about a horizontal axis extending in the direction of movement of the cleaner, an electric driving motor mounted immediately behind the fan casing and in axial alinement with the fan, a rigid suction nozzle extending downward from the front wall of the fan casing and having a horizontal bottom face with an elongated intake slot extending transversely of the direction of movement of the cleaner for engagement with the surface to be cleaned, said nozzle being in direct and free communication with the fan chamber through the front wall of the fan casing, and the length of the nozzle passage from the intake slot to the center of the opening

into the fan chamber being substantially the same as the distance of the fan axis above the floor, an operating handle pivotally connected to the cleaner to swing vertically, a porous receptacle hung from the operating handle, a discharge conduit opening from the fan casing and leading back to the porous receptacle, and running wheels for supporting the fan casing and motor close to the surface to be cleaned and normally in horizontal position.

2. In a self-contained suction cleaner, the combination of a fan casing, a suction fan mounted within the casing to rotate about a horizontal axis, an electric driving motor mounted immediately behind the fan casing and in axial alinement with the fan, a rigid suction nozzle extending downward from the front wall of the fan casing and having a horizontal bottom face with an elongated intake slot extending transversely of the direction of movement of the cleaner for engagement with the surface to be cleaned, said nozzle being in direct and free communication with the fan chamber through the front wall of the fan casing, an operating handle pivotally connected to the cleaner to swing vertically, a porous receptacle hung from the operating handle, a discharge conduit opening from the fan casing and leading back to the porous receptacle, and running wheels for supporting the fan casing and motor normally in horizontal position.

3. In a self-contained suction cleaner, the combination of a motor casing, a fan casing secured to the motor casing in front thereof with a partition wall separating the fan chamber from the motor chamber, a fan driving motor mounted in the motor casing with its shaft horizontal and extending in the direction of movement of the cleaner and projecting into the fan chamber, a suction fan mounted on the motor shaft within the fan chamber, a rigid suction nozzle extending downward from the front wall of the fan casing and having a horizontal bottom face with an elongated intake slot extending transversely of the direction of movement of the cleaner for engagement with the surface to be cleaned, said nozzle being in direct and free communication with the fan chamber through the front wall of the fan casing and the length of the nozzle passage from the intake slot to the center of the opening into the fan chamber being substantially the same as the distance the fan axis is above the floor, running wheels mounted on the motor casing to the rear of the center of gravity of the cleaner and supporting the motor casing and the fan casing close to the surface to be cleaned, and an operating handle pivotally connected to the cleaner to swing vertically, a porous receptacle hung from the operating handle, and a discharge

conduit opening from the fan casing and leading back to the porous receptacle.

4. In a self-contained suction cleaner, the combination of a suction fan, a driving motor therefor, a suction nozzle communicating with the fan chamber and projecting downward at the front of the machine, and having a horizontal bottom face with an elongated intake slot extending transversely of the direction of movement of the cleaner for engagement with the surface to be cleaned, a running support mounted to the rear of the center of gravity of the cleaner, an operating handle pivotally connected to the cleaner to swing vertically, and a stop device adjustable (a) to lock the operating handle in an upright position, (b) to permit a free swinging movement of the handle with a downward limit whereby downward movement beyond such limit will tilt the cleaner on said running support to raise the nozzle and (c) to permit the handle to be swung down substantially to horizontal position without lifting the nozzle.

5. In a self-contained suction cleaner, the combination of a suction fan, a driving motor therefor, a suction nozzle communicating with the fan chamber and projecting downward at the front of the machine and having a horizontal bottom face with an elongated intake slot extending transversely of the direction of movement of the cleaner for engagement with the surface to be cleaned, running wheels, an operating handle pivotally connected to the cleaner to swing vertically, and stop means extending between the body of the cleaner and the handle having a free swinging connection with one of said members and being in adjustable engagement with the other of said members, the adjustment of said stop means varying the angular position of the handle at which said means comes into operation.

6. In a self-contained suction cleaner, the combination of a suction fan, a driving motor therefor, a suction nozzle communicating with the fan chamber and projecting downward at the front of the machine and having a horizontal bottom face with an elongated intake slot extending transversely of the direction of movement of the cleaner for engagement with the surface to be cleaned, a running support mounted to the rear of the center of gravity of the cleaner, an operating handle pivotally connected to the cleaner to swing vertically, and a stop device for limiting the downward swinging movement of the handle whereby when the handle is moved downward beyond the point to which its movement relatively to the cleaner is limited by the stop device the cleaner will be tilted on the running support to raise the nozzle, said stop device be-

ing adjustable to vary the point in the downward movement of the handle at which the stop device comes into operation.

7. In a self-contained suction cleaner, the combination of a suction fan, a driving motor therefor, a suction nozzle communicating with the fan chamber and projecting downward at the front of the machine and having a horizontal bottom face with an elongated intake slot extending transversely of the direction of movement of the cleaner for engagement with the surface to be cleaned, a running support in position with the center of gravity of the cleaner between it and the nozzle, an operating handle pivotally connected to the cleaner to swing vertically, and a stop device for limiting the downward swinging movement of the handle, whereby when the handle is moved downward beyond the point to which its movement relatively to the cleaner is limited by the stop device the cleaner will be tilted on its running support to lift the nozzle, said stop device being adjustable to vary the point in the downward movement of the handle at which the stop device comes into operation, and being releasable to permit the handle to be swung downward to a substantially horizontal position without lifting the nozzle.

8. In a suction cleaner, the combination of a motor casing, a fan casing, a motor mounted in the motor casing, a fan mounted in the fan casing and driven by the motor, a main suction inlet to the fan casing, a suction nozzle communicating with said suction inlet, a suction inlet from the motor casing to the fan casing, and an air inlet to the motor casing located to cause the air entering such inlet and drawn from the motor chamber into the fan chamber to pass and cool the motor.

9. A pneumatic cleaner, having, in combination, a fan, a fan casing, an electric motor for driving the fan, a motor casing, a main air passage leading to and from the fan casing, a dust collector located in said air passage, and a second and independent air passage leading through the motor casing to the fan casing so that air may be drawn through the motor casing and into the fan casing to cool the motor, substantially as described.

10. A pneumatic cleaner, having, in combination, a fan, a fan casing, a dust collector connected with the fan casing, an electric motor for driving the fan, and a motor casing open at one end and communicating at the other end with the fan casing, so that the fan may cause air to pass through the motor casing to cool the motor, substantially as described.

11. In a suction cleaner, the combination of a motor casing, a fan casing, a motor

5 mounted in the motor casing, a fan mounted in the fan casing and driven by the motor, a suction inlet to the fan casing, a suction nozzle communicating with said suction inlet, an air inlet to the motor chamber, and a suction conduit from the motor chamber in operative relation to the fan casing, through which air entering the motor chamber through said air inlet will be

drawn past the motor and from the motor chamber by the suction of the fan. 10

In testimony whereof, I have hereunto set my hand, in the presence of two subscribing witnesses.

WILLIAM W. ROSENFELD.

Witnesses:

A. L. KENT,  
LEONA L. PERRINE.