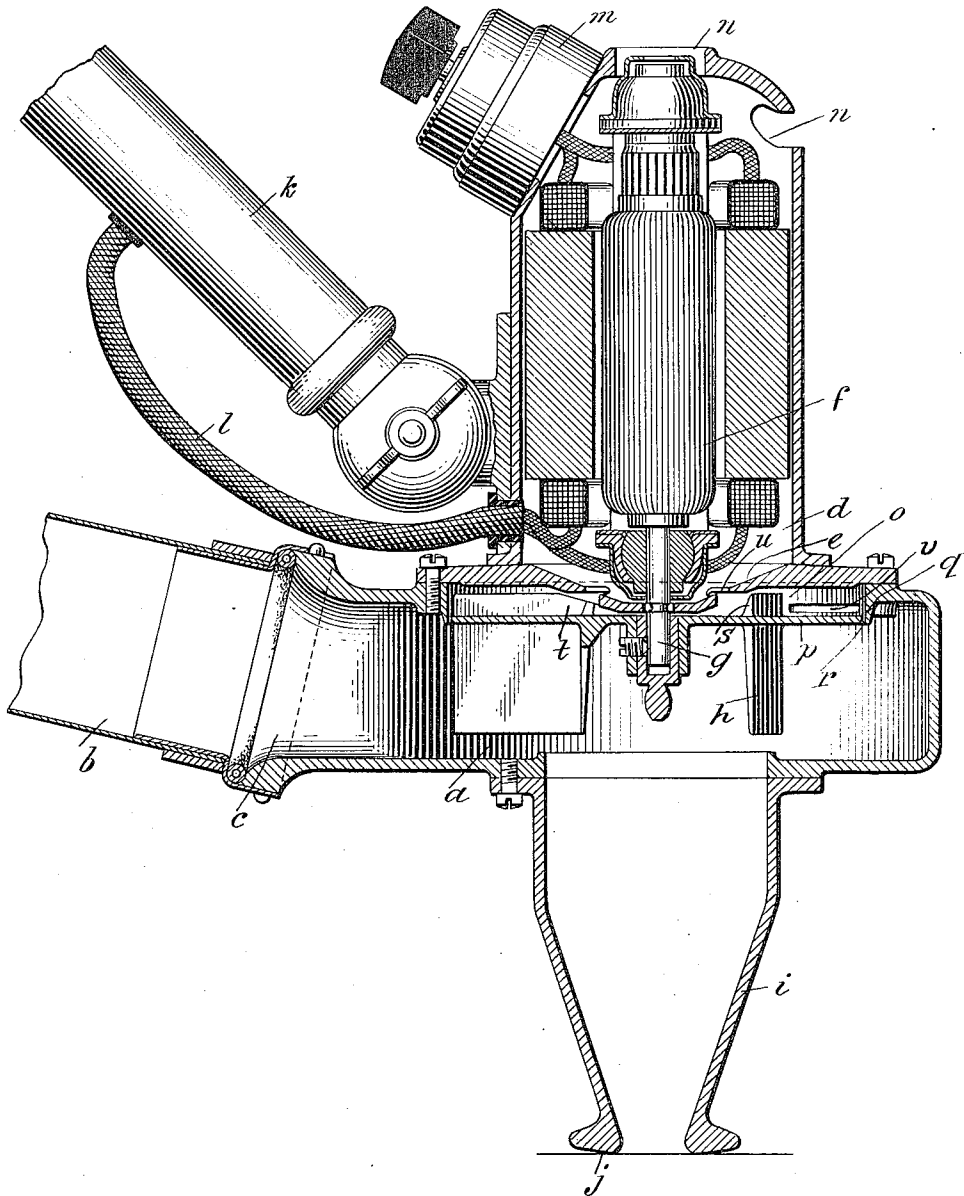


H. C. NIEMEYER.
 SUCTION PRODUCER.
 APPLICATION FILED APR. 27, 1911.

1,230,206.

Patented June 19, 1917.



Witnesses:
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UNITED STATES PATENT OFFICE.

HENRY C. NIEMEYER, OF RACINE, WISCONSIN, ASSIGNOR, BY MESNE ASSIGNMENTS,
TO RICHMOND RADIATOR COMPANY, OF NEW YORK, N. Y., A CORPORATION OF
DELAWARE.

SUCTION-PRODUCER.

1,230,206.

Specification of Letters Patent. Patented June 19, 1917.

Application filed April 27, 1911. Serial No. 623,590.

To all whom it may concern:

Be it known that I, HENRY C. NIEMEYER, a citizen of the United States, and a resident of Racine, county of Racine, State of Wisconsin, have invented certain new and useful Improvements in Suction-Producers, of which the following is a specification.

This invention relates to apparatus for removing dust and dirt from floors, floor coverings and the like by means of an air suction produced by an electric motor driven fan or pump, and particularly to that type of apparatus wherein the several parts are arranged to move together over the surface being cleaned.

The object of my invention is to provide for such apparatus as above mentioned, suitable means for producing a current of air through the air spaces between the motor parts sufficient in amount to prevent those parts from becoming overheated.

The drawing forming a part of this specification represents a type of a vacuum or suction cleaner as above mentioned with an embodiment of my invention and more particularly a view mostly in central sectional elevation of the apparatus (with my invention embodied) shown and described in the application for Letters Patent of George C. Schmitz, filed Mar. 1, 1910, and bearing Serial Number 546,640.

The several features of this apparatus are a motor casing and a fan or pump casing separated from each other by a partition wall; a motor within the motor casing having its shaft extending through the partition wall into the fan chamber and a fan mounted on the extended end within the fan chamber to be driven by the motor. The fan chamber is in communication with a suction nozzle, affording an inlet for air and a dust receiving bag affording an outlet for the air. The motor is adapted to be connected with a source of electric current supply by a sufficiently slack cable to facilitate the apparatus being moved over a considerable area to be cleaned. An adjustable handle is provided for drawing the apparatus over the surface to be cleaned, the suction nozzle being continually in contact with the surface being cleaned.

Referring more particularly to the drawing showing an embodiment of these parts:—

The fan casing *a* is preferably given, in

horizontal section, a convolute form, opening into a dust receiving porous bag *b* suitably removably attached to the opening *c* of the convolute like chamber or casing. Upon this casing is rigidly secured a second casing *d* separated therefrom by the wall *e* and containing a motor *f*, having its shaft *g* projecting downwardly into the fan chamber for receiving the fan *h*. Below the fan its casing *a* opens into a suction nozzle *i* having a suitably rounded mouth *j* to facilitate its being drawn to and fro over the surface to be cleaned. A suitably adjustable handle *k* is provided for operating the apparatus.

To the motor are connected the supply wires *l*, which as shown may pass through the handle which is made hollow for that purpose, and be connected to the usual means supplying the current. The motor is also provided with the electric switch *m* for controlling it. Its casing is provided with ventilating orifices *n* but these have been found inadequate for properly ventilating the motor chamber at all times and it has happened that the motor has become overheated to the permanent injury of the apparatus.

It is the purpose of my invention to prevent any possibility of this overheating. The method I pursue is to provide an independent fan or pump for causing a sufficient current of air to pass through the air spaces between the motor parts to keep them at normal or safe temperatures. By independent is meant independent in that the primary (or only) function of the fan thus used is to cool the motor and that it is not relied upon in assisting the cleaning of the surface. This fan is driven by the motor so that part of the current there consumed is transformed into cooling means for the otherwise overheated motor parts.

The fan, as is obvious, may be arranged in any suitable manner to produce the desired results. It can moreover be used in any type of motor driven vacuum cleaning apparatus or in fact whenever it is desired to maintain an incased motor at a safe temperature.

I have preferred however to show my invention embodied in the vacuum cleaner as already described, for here it is of particular value. I have accordingly shown a preferred construction of my cooling means

wherein it is sought to meet the requirements with as little change in the construction of the specific vacuum cleaner here shown as possible. I have preferred to
 5 place the cooling fan outside and below the motor chamber or more specifically within a chamber *o* intermediate the motor and fan chambers, where it is not interfered with by the intruding air and dust coming from the
 10 surface being cleaned.

It is necessary to adequately separate this cooling fan from the main vacuum chamber, for as the bag *b* is filling with dust it continually becomes less capable of passing
 5 the intruding air through its texture to the atmosphere. Therefore there is a possibility, when the nozzle is lifted free from the surface being cleaned, that such a large quantity of air will enter the vacuum chamber that the bag cannot take care of it. In
 20 such case this inrush of air would offset the currents coming from the motor chamber and result in forcing itself out through the motor chamber thus filling the chamber and motor with dust with the evident disastrous results. It is therefore necessary,
 25 as before remarked, that the cooling fan be separated from the dust chamber. I have found however all that is needed for this separation is to use the back *p* of the fan *h* as the separating wall and to inclose the sides with the circular flange *q*. The clearance space *r* has not proven detrimental to the ends sought.

The construction shown facilitates an easy formation of the cooling fan *s*. This fan is formed with the same back *p* as the fan *h* from which are projected the blades *t*. The
 35 holes *n* are used for the air inlets to the motor chamber and other holes *u* are provided in the wall *e* as the outlets for the air from the motor chamber. The air is sucked, so to speak, into the fan chamber by the fan from
 40 the holes *u* and one or more outlet orifices *v* are formed in the flange through which it passes to the dust chamber from where it passes with the dust laden air coming from the nozzle *i* and finally enters the dust bag *b*.

It is necessary in forming the orifice (or orifices) *v* that it be placed substantially
 50 diametrically opposite the bag *b*, otherwise there is a possibility under the peculiar conditions as already described, that a reverse current of dust laden air will be sent
 55 through the motor.

When properly working, the motor cooling air enters the motor chamber through the orifices *n*, passes down the air spaces between the motor parts, is sucked out through
 60 the orifices *u* into the cooling fan chamber by the cooling fan and is finally forced out of the orifice *v* where it mingles with the dust laden air on its passage to the dust bag.

I have obtained especially good results
 65 from this construction and from the ar-

rangement of the orifice *v* (which is preferably of a length equal to about the distance between consecutive blades) without any definite apparent reason unless possibly the
 70 peculiar positioning of the orifice relative to the dust bag and the currents of air existing in the two chambers and the fact that a different degree of vacuum exists in the respective chambers.

Having thus described my invention I
 75 claim—

1. In a suction producing apparatus, the combination with a casing, of a wall separating said casing into two chambers, suction producing mechanism in one of said
 80 chambers, a motor casing in communication with the other of said chambers, means in said other chamber for causing air to pass through said motor casing, and a motor in
 85 said motor casing operatively connected to drive said mechanism and said means.

2. In a suction producing apparatus, the combination with a casing having an inlet orifice and an outlet orifice and an additional orifice, of a motor placed in the current of air passing through said additional
 90 orifice, a wall in the casing in position to form a chamber in free communication with said inlet and outlet orifices and a chamber in communication with said additional orifice but not in direct communication with
 95 said outlet orifice, and a fan in each chamber driven by said motor.

3. In a suction producing apparatus, the combination with a casing having an inlet orifice and an outlet orifice and an additional orifice, of a motor placed in the current of air passing through said additional
 100 orifice, a wall in the casing in position to form a chamber in free communication with said inlet and outlet orifices and a chamber in communication with said additional orifice but not in direct communication with
 105 said outlet orifice, and a fan in the first mentioned chamber driven by said motor.

4. In a suction producing apparatus, the combination with a casing having an inlet orifice and an outlet orifice and an additional orifice, of a motor placed in the current of air passing through said additional
 110 orifice, a wall in the casing in position to form a chamber in free communication with said inlet and outlet orifices and a chamber in communication with said additional orifice and with the first mentioned chamber
 120 only at a region remote from said outlet orifice, and a fan in each chamber driven by said motor.

5. In a suction producing apparatus, the combination with a casing having a main inlet orifice and an outlet orifice and an additional inlet orifice, of a motor placed in the current of air passing through said additional orifice, a wall in the casing in position to form two partially separated cham-
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bers one of which is in free communication with said main inlet and outlet orifices and the other of which is in communication with said additional inlet orifice and with the first mentioned chamber, and a fan in each chamber driven by the motor.

6. In a suction producing apparatus, the combination with a casing having a main inlet orifice and an outlet orifice and an additional inlet orifice, of a motor placed in the current of air passing through said additional orifice, a wall in the casing composed of a fixed part provided with a port and a rotary part, said wall being in position to divide the casing into two chambers one of which is in free communication with said main inlet and outlet orifices and the other of which is in communication with said additional inlet orifice and with the first mentioned chamber through said port, and fan blades secured to the opposite sides of said rotary part of the wall, forming a fan in each chamber which is driven by said motor.

7. In a device of the class described, the

combination of a fan casing having an inlet in the underside, an outlet on another side and a flanged opening in the top, a wall closing the top opening and having an orifice therein, a motor casing mounted on said wall and having a ventilating orifice spaced from said wall, a fan positioned in said fan casing, and including a wall extending toward the flange for separating the fan casing into two compartments, one of said compartments forming a conduit between the inlet and outlet and the side wall of the other compartment having an outlet orifice for the air passing through the ventilating orifice and the orifice in the first mentioned wall, said fan having blades on opposite sides of said wall in both of said compartments and a motor for driving the fan positioned in said motor casing and in line with the currents of air passing through said ventilating orifice.

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Witnesses:

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