

**Feb. 28, 1939.**

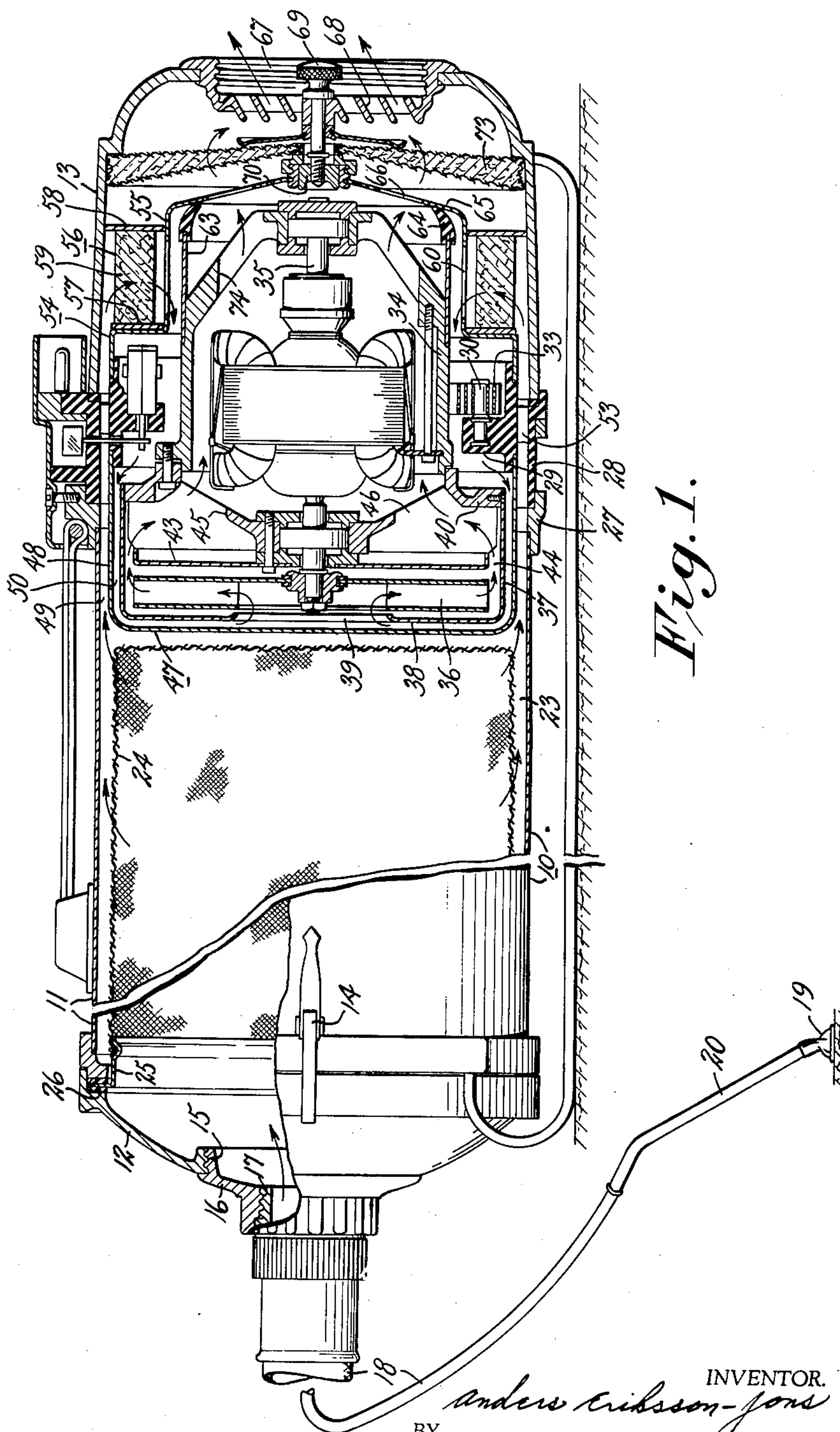
A. ERIKSSON-JONS

**2,149,135**

VACUUM CLEANER

Filed Dec. 31, 1936

2 Sheets-Sheet 1



*Fig. 1.*

INVENTOR.  
BY *Anders Eriksson-Jons*  
*Thomas C. Betts*  
his ATTORNEY.

Feb. 28, 1939.

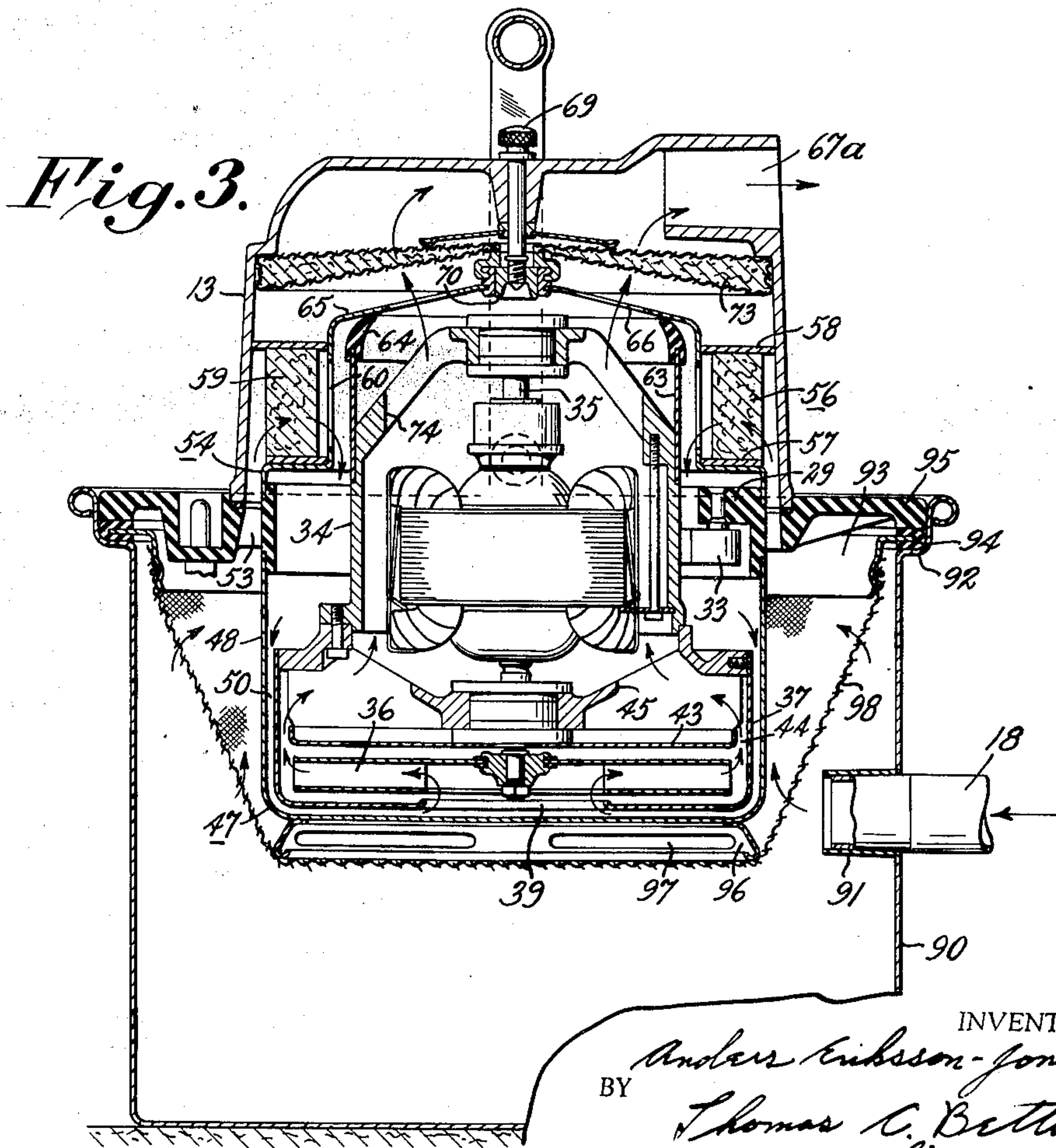
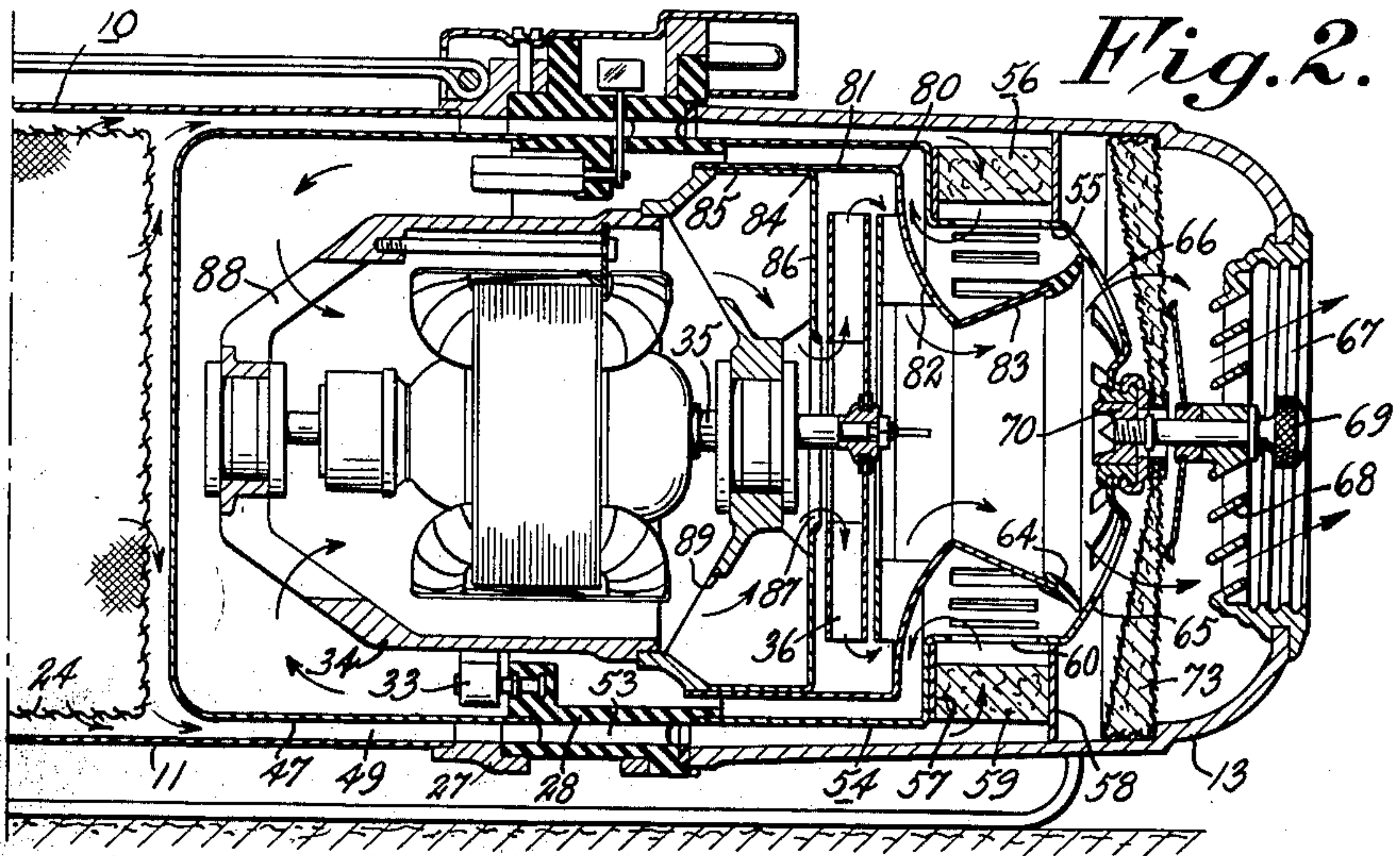
A. ERIKSSON-JONS

2,149,135

VACUUM CLEANER

Filed Dec. 31, 1936

2 Sheets-Sheet 2



INVENTOR.  
*A. Eriksson-Jons*  
BY *Thomas C. Betts*  
his ATTORNEY.



# UNITED STATES PATENT OFFICE

2,149,135

## VACUUM CLEANER

Anders Eriksson-Jons, Stockholm, Sweden, assignor to Electrolux Corporation, Dover, Del., a corporation of Delaware

Application December 31, 1936, Serial No. 118,504  
In Germany January 3, 1936

10 Claims. (Cl. 183—37)

My invention relates to vacuum cleaners and more particularly to an improved air purifying device used in connection therewith.

More specifically, my invention relates to vacuum cleaners of the type wherein a dust separating member, such as a dust bag, is located ahead of the fan with respect to the direction of air flow, whereby the dirt carried in by the air stream is separated therefrom before it reaches the fan. The usual dust bag is made of cloth or other porous material which is impervious with respect to most of the dirt, but which is pervious with respect to air and the finer particles of dirt. It has heretofore been proposed to place an additional filter between the dust bag and the fan for the purpose of removing these fine particles. However, this filter has been placed at the inner end of the dust bag chamber. In this location, it has been necessary to first remove the dust bag and then to reach into the dust bag chamber to remove the filter. This is inconvenient and is apt to result in the operator failing to take the trouble to change or clean the filter from time to time. It is also common practice to place a filter adjacent the exhaust opening from the vacuum cleaner where it is readily accessible upon the removal of an end member of the casing. However, in this position the air passes through the fan before it reaches the filter with the result that the fine dust may be deposited within the fan housing, particularly in damp climates. Also, it is desirable to pass the air through the fan motor for the purpose of cooling the same, and if this air has not previously been passed through the filter, the fine dust entrained therein is apt to be deposited within the air passages of the motor thus interfering with the cooling effect.

In accordance with my invention I propose to locate the filter in such a position that it is readily accessible upon removal of the end member of the casing, while providing means for guiding the air through this filter before admitting it to either the fan or the motor. Thus, the filter is easily accessible, while at the same time it removes all fine particles of dust from the air before the air reaches the fan or motor.

Further objects and advantages of my invention will be apparent from the following description, considered in connection with the accompanying drawings, which form part of this specification and of which:—

Fig. 1 is a cross sectional view of one embodiment of my invention;

Fig. 2 is a cross sectional view of another embodiment of my invention, and

Fig. 3 is a view, chiefly in cross section of a third embodiment of my invention.

Referring more particularly to Fig. 1, reference character 10 designates a hollow casing including a central portion 11 and end caps or closure members 12 and 13. Cap 12 is removably secured to central portion 11 by means of spring clips 14 and is formed with a central threaded inlet opening 15. A coupling member 16 is adapted to be screwed into inlet 15 and is formed with a central threaded bore 17 adapted to receive the threaded end of a flexible hose or the like 18. The other end of hose 18 is connected to a suction nozzle 19, a rigid handle member 20 being interposed between the hose and the nozzle, if desired.

The interior of casing 10 adjacent to cap 12 provides a dust separating chamber 23 within which is removably received a dust bag 24 or other dust separating member. Dust bag 24 includes a bag portion made of porous material, such as cloth, which is generally impervious with respect to dust and pervious with respect to air. The open mouth of the bag is secured to ring 25 having an outwardly extending flange preferably provided with a compressible packing ring 26 which is clamped between cap 12 and the end of central portion 11 of the casing.

The opposite end of central portion 11 is provided with a ring 27 to which is secured a ring 28, preferably made of insulating material such as "Bakelite". Rings 27 and 28 may be considered as part of the casing 10, and more specifically as forming part of the central portion 11. Ring 28 is provided with a plurality of inwardly extending lugs 29 which carry pins 30 for supporting one end of springs 33, the opposite ends of the springs being secured to motor housing 34. Thus, the motor housing is resiliently supported from the insulating ring 28.

The motor is provided with the usual armature shaft 35 to one end of which is secured a fan rotor 36. Rotor 36 is mounted within a fan housing which includes a cylindrical portion 37 and a forward wall portion 38 formed with an inlet opening 39. Cylindrical portion 37 is secured in air-tight relation to a flange 40 which forms part of the motor housing. The fan housing also includes a rear wall 43 carried by the motor housing. The outer periphery of wall 43 is spaced from the cylindrical portion 37 to form an angular discharge opening 44 from the fan. Opening 44 communicates with openings 45



formed in the motor housing. If desired, vanes 46 may be provided for changing the circular motion of the air which is discharged from the fan to axial motion.

5 The fan housing is enclosed within a hood member 47, the open end of which is secured in air-tight relation to ring 28. The cylindrical part 48 of the hood member is spaced from both the casing 10 and the cylindrical portion 37 of the fan housing so as to form annular channels or passages 49 and 50, respectively. Ring 28 is provided with a plurality of passages 53 which communicate with the annular passage 49. A filter supporting member 54 is secured to the opposite end of ring 28 and includes a portion 55 of reduced diameter. A filter, designated generally by reference character 56, is supported on this portion of reduced diameter and comprises end discs 57 and 58 between which is supported suitable filtering material 59. The portion of reduced diameter 55 is provided with a plurality of openings 60 which communicate with the interior of the filtering material 59. A cylindrical sleeve 63 is secured to the rear of motor housing 34 and is spaced from portion 55. The end of sleeve 53 is provided with a flexible packing ring 64 which seals against the end wall 65 of filter supporting member 54. This end wall is provided with a plurality of openings 66, these openings being wholly within the circumference of sealing ring 64.

Closure member 13 is provided with an exhaust opening 67, across which extend vanes 68 for deflecting air upwardly. A bolt 69 is rotatably mounted in an enlarged central vane and is adapted to engage a threaded member 70 secured to end wall 65, thus removably holding the closure member in place. The inner circumference of discs 57 and 58 of the filter 56 is such that they closely engage the portion 55 of reduced diameter. The outer circumference of disc 58 is such that it closely engages the inner surface of closure member 13 while the outer circumference of disc 57 is such as to leave an annular space between it and the closure member.

If desired, an additional filter 73 may be located within closure member 13 immediately adjacent to exhaust opening 67, whereby the motor-fan unit is isolated from the atmosphere by filters.

The operation of the above described device is as follows:

Rotation of fan rotor 36 by the motor serves to draw air in through nozzle 19, hollow handle 20, hose 18 and coupling 16 to the interior of dust bag 24. If the nozzle is passed over a surface to be cleaned, dust and dirt will be removed from the surface by this air stream and carried into the dust bag. The dust bag removes all except the very finest particles of dirt from the air stream, while permitting the air and these fine particles to pass through the material of the bag. This air then flows through the channel formed by annular passage 49 between hood 47 and casing 10, and the passages 53 in ring 28 to the outer surface of the filtering material 59 of filter 56. The air passes through filtering material 59, but the fine particles of dirt are unable to pass through the filtering material and are thus removed from the air stream. The air now free from all dust and dirt, passes through openings 60, flows through the channel formed along the outside of motor housing 34 and by annular passage 50 between hood member 47 and the fan housing to the inlet 39 of the fan. The

fan rotor 36 acts upon this air and discharges it through the annular passage 44 to the inlet openings 45 of the motor housing. The air thus passes within the motor housing where it cools the windings and is discharged through openings 74 formed in the opposite end of the motor housing. From here, the air passes through openings 66 and through filter 73, if one be provided, to the exhaust opening 67.

Thus all of the air which passes through the fan and the motor has been thoroughly cleaned and all particles of dust removed therefrom by the filter 56. The filter 73 serves to remove any particles of carbon worn from the brushes of the motor and also serves to reduce noise.

In order to remove filter 56, either for the purpose of cleaning it or replacing it with a new filter, it is merely necessary to unscrew bolt 69 and remove closure member 13. Thereupon, filter 56 is freely accessible and may be removed by slipping it off the reduced portion 55.

In the embodiment shown in Fig. 2, the fan rotor 36 is placed at the opposite end of the motor. Hood member 47 is supported from ring 28 as previously described and is spaced from casing 10 to provide the annular passage 49. Likewise, member 54 is supported from ring 28 and is formed with a reduced portion 55 on which is mounted the filter 56. The end wall 65 is formed with openings 66 and carries at its central portion the threaded member 70 which is engaged by the bolt 69 of closure member 13.

The fan housing comprises a member 80 carried by the motor housing and including a cylindrical portion 81, an inwardly extending portion 82, and a funnel shaped portion 83. As a matter of fact, however, funnel shaped portion 83 actually forms no part of the fan housing, but is conveniently made integral with portion 82. Sealing ring 64 is carried by portion 83 and contacts end wall 65. The fan housing also includes a member 84 having a cylindrical portion 85 which fits snugly within cylindrical portion 81 and to which is secured an end wall 86 having a central intake opening 87. Motor housing 34 is formed with a plurality of inlet openings 88 and a plurality of outlet openings 89, the latter communicating directly with inlet 87 of the fan. The flow of air through this embodiment is as follows:—

After the air and fine particles of dirt have passed through the dust bag 24, they pass through the annular passageway 49 to the passages 53 formed in ring 28. From here they pass through the annular passage formed by the member 54 and end closure 13 to the outer surface of filter 56. This filter removes the fine particles of dirt and the purified air passes through the openings 60 to the space bounded by walls 82 and 83, from where it passes along the outer surface of the fan housing and the motor housing to within hood member 47. From here the air passes into the motor housing through inlet openings 88 and is discharged therefrom through openings 89 to the inlet 87 of the fan. The air discharged from the periphery of fan rotor 36 is guided by walls 82 and 83 to openings 66 from where it passes through filter 73, if one be provided, to the exhaust openings 67.

The filter 56 in this embodiment may be removed in the same manner as that described in connection with the embodiment shown in Fig. 1.

Fig. 3 illustrates my invention as applied to a "pot" type vacuum cleaner. Reference character



90 designates a preferably cylindrical container having an inlet opening 91 which is adapted to receive the end of hose 18. The upper end of container 90 is formed with a bell-mouth 92. A flanged ring 93 having a compressible packing 94 secured to its flange is supported in the bell-mouth. A ring 95 rests on packing 94 and is secured to the container 90 in any suitable manner.

Ring 95 is in many respects similar to ring 28 shown in the first two embodiments, except that it is removable from container 90. It serves to support the motor by means of pins 30 and springs 33.

The motor fan unit in this embodiment, including the hood member 47, member 54, and filter 56 are the same as that shown in Fig. 1 and hence the description need not be repeated. The corresponding parts are given the same reference characters in the two figures.

Hood member 47 carries a flange 96 formed with perforations 97. A dust separating member 98 is secured to ring 93 and held in distended position by means of flange 96.

The operation of this embodiment is as follows:

Rotation of the fan 36 causes air and entrained dirt to be drawn into container 90 through the hose 18 and inlet opening 91. Most of the dirt is separated from the air stream by dust separator 98 and is retained in the lower part of container 90. The air and very fine particles of dust pass through the dust separator 98 and through passages 53 in ring 95 to the outer surface of filter 56. This filter removes the finest particles of dust and the purified air passes through openings 60 and flows along the outside of motor housing 34 to annular passage 50 between hood member 47 and the fan housing. This air enters inlet opening 39 of the fan, is acted upon by rotors 36 and discharged through passage 44 to the openings 45 in the motor housing. The air passes through the motor housing and out through openings 74, through openings 66, the filter 73, if one be provided, to the exhaust opening 67a. It will thus be seen that the flow of air, after it has passed through the dust separating member 98 is the same in this embodiment as it is in the embodiment shown in Fig. 1. Access to filter 54 may be had by removing closure member 13 in the same manner as previously described.

While I have shown and described several more or less specific embodiments of my invention, it is understood that this has been done for purposes of illustration only and that the scope of my invention is to be determined by the appended claims when interpreted as broadly as the prior art permits.

What I claim is:

1. In a vacuum cleaner, a casing having an inlet opening at one end and including a removable closure member at the opposite end, said closure member having an outlet opening air purifying means located in said casing adjacent to said closure member whereby said means is accessible upon removal of said member, a fan disposed in said casing, and means for guiding air from said inlet opening to said air purifying means and from said air purifying means to said fan and from said fan to the outlet opening in said closure member.

2. In a vacuum cleaner, a casing including a removable closure member at one end and hav-

ing an inlet opening at the opposite end, air purifying means located in said casing adjacent to said closure member whereby said means is accessible upon removal of said member, a fan disposed in said casing, a dust separating member in said casing between said fan and said inlet opening, and means for guiding air from said inlet opening through said dust separating member and past said fan to said air purifying means and from said air purifying means to said fan.

3. In a vacuum cleaner, a casing including a removable closure member at one end and having an inlet opening at the opposite end, said closure member being formed with an outlet opening, a fine dust filter located in said casing adjacent to said closure member whereby said filter is accessible upon removal of said member, a motor-fan unit disposed in said casing, the fan being between the motor and the inlet opening and having its discharge opening communicating with the interior of the motor housing which in turn communicates with said outlet opening, and means for guiding air from said inlet opening past the motor-fan unit to said filter and from the filter to the intake of said fan.

4. In a vacuum cleaner, a casing including a removable closure member at one end and having an inlet opening at the opposite end, said closure member being formed with an outlet opening, a fine dust filter located in said casing adjacent to said closure member whereby said filter is accessible upon removal of said member, a motor-fan unit disposed in said casing, the fan being between the motor and the outlet opening, the intake opening of said fan being in communication with the interior of the motor housing and the exhaust opening of the fan being in communication with said outlet opening, and means for guiding air from said inlet opening to said filter and from said filter to the interior of said motor housing.

5. In a vacuum cleaner, an elongated casing including a removable closure member at one end and having an inlet opening at the opposite end, a motor-fan unit supported in and spaced from said casing adjacent to said member, said unit including a fan housing and a motor housing secured in air-tight relationship, said unit having an intake opening and an exhaust opening, means dividing the space between said unit and said casing into two channels, and a filter located in said casing within said closure member whereby said filter is accessible upon removal of said member, one of said channels connecting the inlet opening of said casing with said filter and the other channel connecting said filter with the intake opening of said unit.

6. In a vacuum cleaner, an elongated casing including a removable closure member at one end and having an inlet opening at the opposite end, a motor-fan unit supported in and spaced from said casing adjacent to said member, the portion of said casing between said unit and said inlet opening constituting a dust separating chamber, a dust separating member in said chamber, said unit having an intake opening and an exhaust opening and including a fan housing and a motor housing secured in air-tight relationship, means dividing the space between said unit and said casing into two channels, and a filter located in said casing within said closure member so as to be accessible upon removal of said



member, one of said channels connecting said dust separating chamber with said filter and the other channel connecting said filter with the intake opening of said unit.

- 5 7. In a vacuum cleaner, a casing including a central portion having an inlet opening at one end and a closure member removably secured to the other end, filter supporting means secured to said central portion and extending into said  
10 closure member, a filter supported on said means within said closure member whereby said filter is accessible when said member is removed, a fan in said casing, and means for conducting air from said inlet to said filter and from said filter  
15 to said fan.

8. In a vacuum cleaner, a casing including a central portion having an inlet opening at one end and a closure member removably secured to the other end, filter supporting means secured  
20 to said central portion and extending into said closure member, a filter supported on said means within said closure member whereby said filter is accessible when said member is removed, a motor-fan unit supported from said central portion and having a part extending into said closure  
25 member, said part being enclosed by said filter supporting means, a hood enclosing part of said unit which is within said central portion, and means including said hood and said filter supporting means defining channels for conducting  
30 air from said inlet to said filter and from said filter to said motor-fan unit.

9. In a vacuum cleaner, a casing including a central portion having an inlet opening at one

end and a closure member removably secured to the other end, a motor-fan unit supported within said central portion and extending in part into said closure member, means forming an enclosure around said motor-fan unit and spaced from said casing to provide an outer channel and spaced from said unit to provide an inner channel, and a filter member supported by said means within said closure member so as to be accessible when said closure member is removed, said outer channel establishing communication between said inlet and said filter and said inner channel establishing communication between said filter and motor-fan unit.

10. In a vacuum cleaner, a casing including a central portion having an inlet opening at one end and a closure member removably secured to the other end, filter supporting means secured to said central portion and extending into said closure member, a filter supported on said means within said closure member whereby said filter is accessible when said member is removed, a motor-fan unit in said casing, said unit having an intake opening and an exhaust opening, means for conducting air from the inlet of said casing to said filter and from said filter to the intake of said unit, said closure member being formed with an outlet opening, and a second filter disposed in said closure member in the line of airflow between the exhaust opening of said unit and the outlet opening of said closure member, whereby said second filter is accessible upon removal of said closure member.

ANDERS ERIKSSON-JONS.