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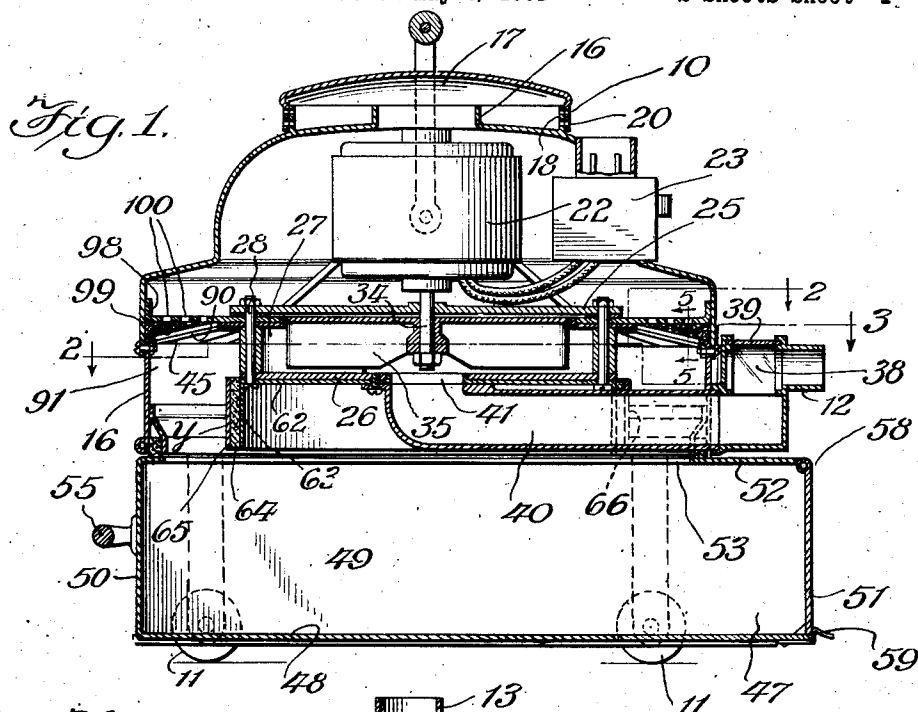
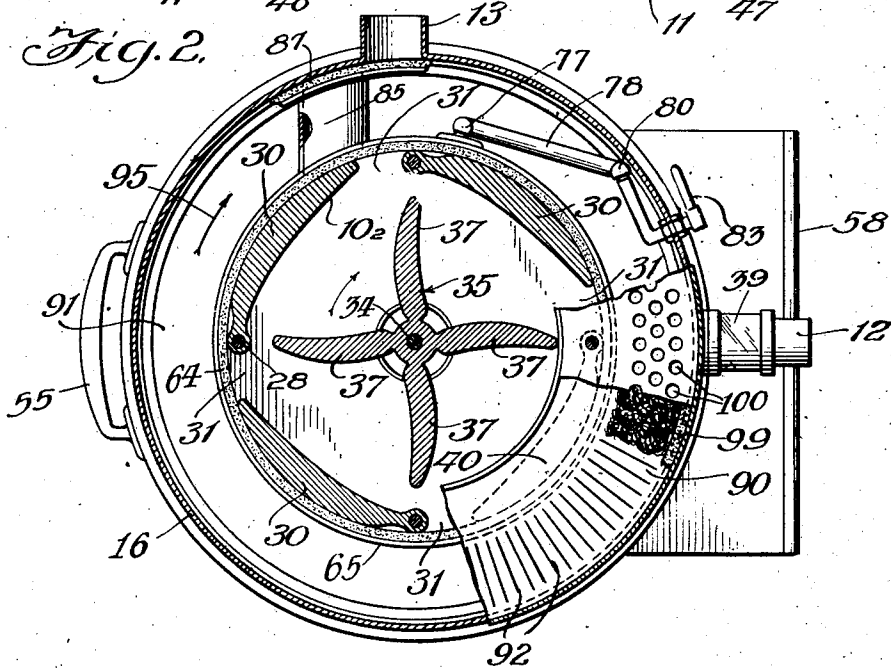
A. JUELSON

1,939,705

VACUUM CLEANER

Filed May 8, 1931

2 Sheets-Sheet 1



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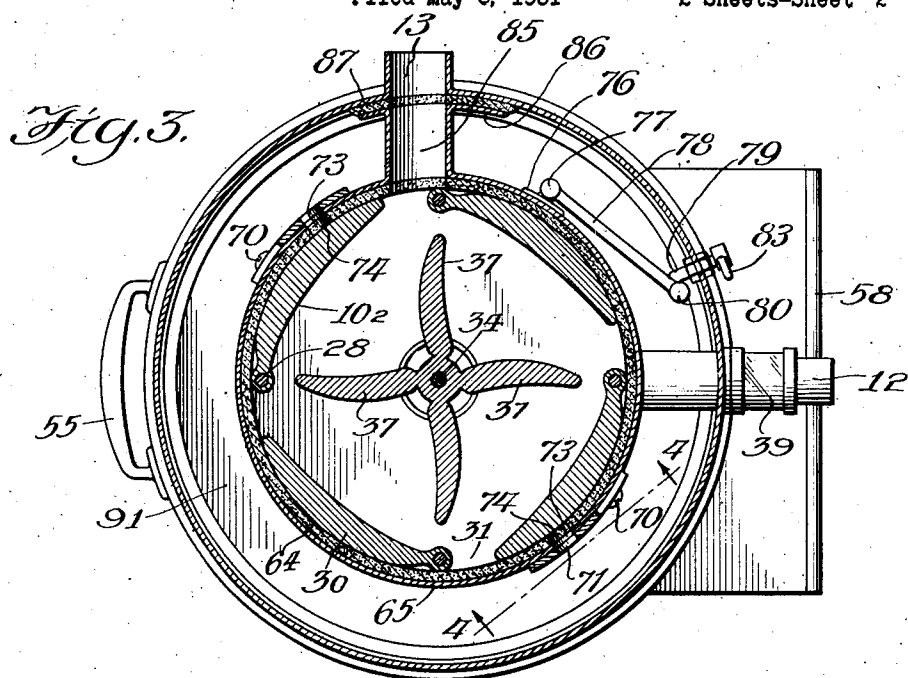
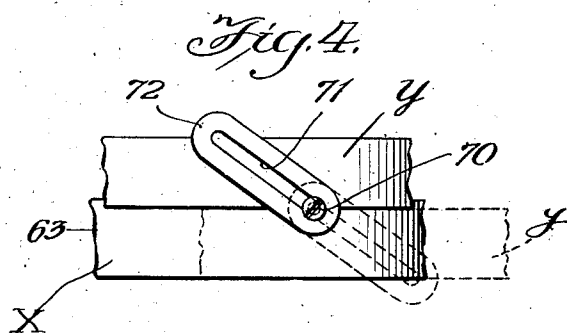
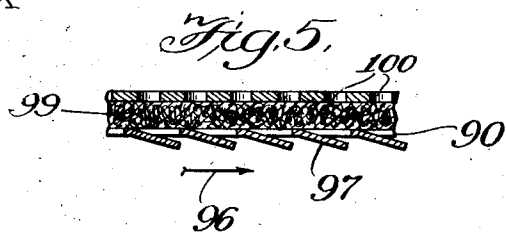
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UNITED STATES PATENT OFFICE

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VACUUM CLEANER

Agnes Jackson, Chicago, Ill.

Application May 8, 1931. Serial No. 536,911

8 Claims. (Cl. 183—36)

The invention relates to vacuum cleaners, and has for its primary object the provision of improved devices of the kind described which are efficient, durable and simple in construction.

A particular object of the invention is to provide improved means for separating the dirt and dust from the air, which means may be embodied in substantially any type of vacuum cleaner.

10 Another particular object of the invention is to provide improved means for advancing air through a vacuum cleaner so that the vacuum cleaner will operate efficiently.

15 Other objects and advantages will become apparent as the following detailed description progresses, reference being had to the accompanying drawings wherein:

20 Figure 1 is a vertical central section taken through a vacuum cleaner which embodies the invention;

Fig. 2 is a section taken on line 2—2 of Fig. 1;

Fig. 3 is a section taken on line 3—3 of Fig. 1, the improved vacuum cleaner being adjusted to function as a blower;

25 Fig. 4 is an enlarged section taken on line 4—4 of Fig. 3, and

Fig. 5 is an enlarged section taken on line 5—5 of Fig. 1.

Referring to the drawings wherein a preferred form of the invention is shown, the reference character 10 designates, generally, a housing in which the moving parts of the improved vacuum cleaner are preferably enclosed. The housing 10 is preferably mounted upon casters 11 so that it may be rolled from place to place. The housing is provided with an intake tube 12 and a blower tube 13. A flexible hose (not shown) may be attached to either the intake tube 12 or the blower tube 13. When the flexible hose (not shown) is connected to the intake tube 12, the other end of the flexible hose (not shown) is preferably provided with the usual collecting nozzle (not shown). When the vacuum cleaner is employed as a blower to clean furniture, etc., the free end of the flexible hose (not shown) is preferably provided with one of a plurality of nozzles (not shown) provided for this purpose.

It will be readily understood that the housing 10 remains stationary most of the time the vacuum cleaner is in use, as the attendant may readily move the collecting nozzle (not shown) or the blower nozzle (not shown) over a relatively large area without moving the housing 10. Vacuum cleaners of this type are sometimes called "can
55 type" vacuum cleaners.

The housing 10 preferably comprises a dome-shaped housing member 15 which is riveted or otherwise secured to the upper part of an annular housing member 16. The upper end of the housing member 15 terminates in a neck 16a 60 through which air may be discharged into a cap 17 seated upon an annular flange 18 projecting upwardly from the housing member 15. The cap 17 and the annular flange 18 have aligned apertures 20 through which air drawn into the housing by way of the intake tube 12 may be 65 discharged.

Disposed within the housing member 15 is an electric motor 22 which may be connected to any suitable source of electrical energy. The motor 22 is controlled by a switch 23 of any suitable construction. 70

The motor 22 is supported from a disk 25 which is rigidly secured and spaced from a disk 26, the disks 25 and 26 being utilized to form a fan chamber 27. Bolts 28, or the equivalent, are preferably provided for securing the disks 25 and 26 to each other. 75

The lateral walls of the fan chamber 27 are preferably formed by a plurality of blades 30 80 which are spaced from each other to provide a plurality of discharge openings 31 in the fan chamber. It will be noted that the bolts 28 project through the blades 30 and that the blades 30 serve as spacers between the disks 25 and 26. In this instance, four blades 30 are provided and, therefore, four discharge openings 31, but it will be readily understood that a smaller or greater number of blades 30 may be employed if it is so desired with a corresponding decrease 90 or increase of the discharge openings 31.

The shaft of the motor 22 is designated by the reference character 34, and it will be noted that it projects through the disk 25 into the fan chamber 27 and has a fan 35 rigidly secured to it at its lower end. The fan 35 comprises four blades 37. The construction of these blades and also of the blades 30 will be explained below. 95

The inner end of the intake tube 12 communicates with an indicating chamber 38 which has one of its walls formed by a sheet 39 of transparent material. The lower part of the chamber 38 opens into a passage 40, the inner end of which communicates with the fan chamber 27 through an aperture 41 provided in the disk 26, the construction being such that the opening 41 is disposed concentrically with respect to the axis of rotation of the fan 35. Obviously, air laden with dirt and dust may be drawn into the hous- 100
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ing through the intake tube 12, to pass through the indicating chamber 20 and the passage 40 into the fan chamber 27, whereupon the fan 37 will drive it through the openings 31 and up into the housing member 15 through improved means for separating the dirt and dust from the air, which improved means is designated generally by the reference character 45. The air, cleaned of all of its impurities, travels up around the motor 22 to cool it and then passes through the neck 16 and the cap 17 to be discharged through the apertures 20.

The dirt and dust separated from the air passing through the machine fall into a receptacle or drawer 47 removably positioned in the bottom portion of the housing 10. The drawer 47 preferably comprises a bottom wall 48, side walls 49, a front wall 50, a back wall 51 and a top wall 52, the top wall 52 being provided with a relatively large aperture 53 through which the dirt and dust fall into the drawer 47. The drawer 47 is preferably slidably mounted in the housing 10 and is provided with a handle 55 whereby it may be withdrawn from the housing. The back wall 51 is preferably hinged to the top wall 52, at 58. A spring catch device 59 normally holds the back wall 51 in its closed position. However, if the attendant does not wish to withdraw the drawer 47 from the housing 10, the back wall 51 may be opened and the entire machine may be tipped to permit the contents of the drawer 47 to fall out through the opening normally closed by the back wall 51.

Secured to the bottom surface of the disk 26 by the bolts 28 is a cup-shaped member 62 which is preferably formed of metal and has a depending angular flange 63. Slidably journaled upon the outer surface of the flange 63 is a gasket 64 formed of yielding material, the gasket 64 being secured to a surface of a ring 65. The gasket 64 and the ring 65 are provided with a notch 66 (see Fig. 1) which accommodates the tube forming passage 40 when the gasket and the ring are in the positions wherein they are shown in full lines in Fig. 1.

Projecting from the outer surface of the flange 63 are a plurality of pins 70 which ride in slots 71 formed in guide members 72 which are rigidly secured to the ring 65. The pins 70 also ride in slots 73 and 74 formed in the gasket 64 and the ring 65, respectively, (see Figs. 3 and 4). A bracket member 76 secured to the outer surface of the ring 65 is connected by a ball and socket joint 77 to one end of a link 78 which has its other end connected to a crank pin 79 by a ball and socket 80. The crank pin 79 is journaled in and projects into the housing member 16 and is provided with a lever 83 at its outer end. The construction is that that the crank pin may be rotated manually through the medium of a lever 83 to angularly displace the gasket 64 and the link 65. When the gasket 64 and the ring 65 are rotated through a relatively short distance in this manner, the pins 70 riding in the slots 71 cause the gasket 64 and the ring 65 to be displaced upwardly so that gasket 64 will close the discharge passages 31 of the fan chamber 27 (see Fig. 3).

Formed integral with or secured to the ring 65 is a tube 85 which is brought into alinement with the blower tube 13 when the gasket 64 and the ring 65 are angularly displaced in the manner described above. The outer end of the tube 85 is provided with a flange 86 which carries a gasket 87 engaging the interior surface of the housing member 16 to form a substantially fluid tight

seal at this point when the tube 85 and the blower tube 13 are alined.

It will be readily understood that when the apparatus is adjusted as illustrated in Fig. 3, a flexible tube may be attached to the blower tube 13 and the usual blower nozzle may be attached to the free end of the flexible tube to permit it to be used in the usual manner. The fan drives the air through the tubes 85 and 13 and through the flexible tube (not shown) with sufficient force to dislodge dirt and dust from furniture, etc.

Obviously, the lever 83 may be manipulated at any time to retract the gasket 64 and the ring 65 in their lower positions so that the apparatus will function as a vacuum cleaner to draw in air through the intake nozzle tube 12.

As stated above, the improved means for separating dust and dirt from the air passing through the housing 10 is designated, generally, by the reference character 45. The main feature of this means is the slotted plate 90 which, in this instance, is formed integral with the housing member 16 and is of frusto-conical shape. It will be noted that the slotted plate 90 encircles the fan chamber 27 and forms the upper wall of an annular chamber 91 surrounding the fan chamber 27, the air being discharged from the fan chamber 27 into the annular chamber 91. The slots in the plate 90 are indicated at 92 and are preferably formed by slitting the plate 90 along a plurality of lines extending radially from the axis of rotation of the fan 35. The portions of the plate intermediate the slots 92 are then bent, as in Fig. 5, the result being the provision of numerous relatively long slots which are relatively narrow. I have had good results with slots which were about 1/64th of an inch in width or less, but, in some instances, it may be desirable to make the slots 92 somewhat wider. The width of the slots depends to some extent upon the volume and the velocity of the air advanced through the annular chamber 91. The air advanced into the annular chamber 91 through the discharge opening 31 of the fan chamber travels through the annular chamber 91 in the direction indicated by the arrow 95 in Fig. 2, the air being advanced in this annular chamber 91 in the same direction that the fan 35 travels in the fan chamber 27.

In Fig. 5, the arrow 96 indicates the direction in which the air travels with respect to the slotted plate 90. It will be noted that the air impinges up the inclined bottom surfaces 97 of the bent portions of the plate and is deflected downwardly. However, the pressure obtaining within the chamber 92 causes the air to escape through the slots 92 while the dirt and dust drop into the drawer 47.

Disposed above the slotted plate 90 is a plate 98 which is secured to the disks 25 and 26 by the bolts 28. The plate 98 is preferably flat and cooperates with the slotted plate 90 to form an annular chamber 99 which, in this instance, is filled with mineral wool 99a adapted to strain from the air passing through it any dirt or dust which may escape through the slots 92. The plate 98 is provided with apertures 100 through which air passes after it leaves the mineral wool 99a. The air passes from the apertures 100 directly into the dome-shaped housing member 15.

It is contemplated that the mineral wool 99a may be omitted in some forms of the invention as the slotted plate 90 is very efficient in its work of separating the dirt and dust from the air advanced through the apparatus.

The slots 92 may be of any desired shape. Thus they need not extend radially with respect to the axis of rotation of the fan 35, nor is it necessary that the slots be straight.

5 The fan 35 and the blade 30 co-operate to provide improved means for advancing the air through the vacuum cleaner. The fan 35 rotates in a clockwise direction (Fig. 2), and it will be noted that the surfaces of the fan blades 37 are concave, the back surfaces of these fan blades being convex. The back surfaces of the fan blades are preferably parabolic curves so that they offer substantially no resistance to the flow of air from the center of the fan along the back surfaces of the blades to the discharge openings 31, the air being drawn up through the aperture 41 provided in the disk 26.

15 The inner surfaces of the blades 30 are designated by the reference character 102 and are also preferably parabolic curves so that they offer substantially no resistance to air which is traveling in a clockwise direction (Fig. 2) in the fan chamber 27.

25 The provision of a plurality of discharge openings 31 prevents back pressure from being built up and also aids in preventing the building up of low pressure area or partial vacuum in back of the fan blades 37 as they rotate. Of course, this condition only obtains when the vacuum cleaner is utilized to draw air through the intake tube 12 as only a single discharge opening is provided for the fan chamber 27 when the machine functions as a blower to blow air through the blower tube 13.

35 Briefly, the operation of the above described apparatus is as follows: When the machine is to be employed as a vacuum cleaner, it is adjusted so that the gasket 64 and the ring 65 occupy the positions wherein they are shown in full lines in Fig. 1. The machine is then connected to any suitable source of electrical energy so that the motor 22 drives the fan 35. A flexible hose (not shown), or the equivalent, is connected to the intake tube 12 and a collecting nozzle (not shown) is attached to the free end of the flexible tube to be used in the usual manner. The air drawn into the housing 10 through the collecting nozzle (not shown) passes from the fan chamber 27 into the annular chamber 91 where the dust and dirt are separated therefrom, the dirt and dust dropping into the drawer 47 and the clean air passing up through the slots 92 and the mineral wool 99a into the dome-shaped housing member 15 from which it is discharged through the apertures 20.

55 The operation of the apparatus can be checked by inspecting the air flowing through the indicating chamber 38 to see whether it is carrying the usual amount of dust, etc.

60 Then, if at a later time it is desirable to use the machine as a blower, the handle or lever 83 is manipulated to raise the gasket 64 and the ring 65 to bring the tube 85 into alinement with the blower tube 13. A flexible tube is then connected to the blower tube 13, as described above, and suitable blower nozzles may be attached to the free end of the flexible tube.

70 While I have disclosed my invention in connection with a vacuum cleaner of the "can type", it is to be understood I am limited to such use only to the extent indicated in the appended claims, as it is obvious to one skilled in the art that the invention may be embodied in vacuum cleaners of substantially any type.

75 My improved means for advancing air may be

utilized for various purposes, but it is particularly adapted for use in vacuum cleaners. Each of the blades 37 has back and front surfaces which correspond to the top and bottom surfaces, respectively, of aeroplane wings of well known construction. The parabolic curves preferably employed on the back surface of each of said blades 37 correspond to the parabolic curves employed on the top surfaces of aeroplane wings of a preferred type.

85 While I have shown and described certain embodiments of my invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as disclosed in the appended claims, in which it is my intention to claim all novelty inherent in my invention as broadly as possible, in view of the prior art.

95 What I claim as new and desire to secure by Letters Patent, is:

1. In apparatus of the kind described, a fan chamber having a plurality of discharge openings therein, a driven fan in said fan-chamber, a housing surrounding and spaced from said fan-chamber to form an annular chamber around said fan-chamber, and a plate forming one wall of said annular chamber, said plate being provided with numerous narrow apertures through which air must pass on its way through said housing.

2. Apparatus of the kind described comprising a fan-chamber, a fan in said fan-chamber, a housing surrounding said fan-chamber and forming an annular chamber therearound, said fan-chamber being provided with discharge openings communicating with said annular chamber, a blower tube carried by said housing, a plate having numerous narrow slots therein and forming one wall of said annular chamber, said slotted plate being adapted to separate dust and dirt from air passing through said annular chamber, and means for closing all but one of said discharge openings and for connecting said one discharge opening to said blower tube.

3. A vacuum cleaner comprising a housing having a chamber therein for holding dust separated from air, a fan mounted for rotation in a substantially horizontal plane, said fan being disposed above said chamber, means forming a partition wall between said fan and said chamber, said chamber communicating with the space around the periphery of said fan whereby dust may gravitate into said chamber, and a motor disposed in said housing above said fan for driving it, said housing forming a passageway around said motor whereby the cleaned air will escape to the atmosphere.

4. A vacuum cleaner comprising a housing having a chamber therein for holding dust separated from air, a fan mounted for rotation in said housing in a substantially horizontal plane, said fan being disposed above said chamber, means forming a partition wall between said fan and said chamber and leaving a space whereby said fan communicates with said chamber, a plate disposed in said housing at a higher elevation than said fan, said plate being provided with a slotted annular area, a motor for driving said fan, and an intake passage leading to said fan.

5. A vacuum cleaner comprising a housing having a chamber therein for holding dust separated from air, a fan mounted in said housing

- for rotation in a substantially horizontal plane, said fan being disposed at a higher elevation than said chamber, means in said housing forming a partition wall between said fan and said chamber, said means having a space therearound inside said housing whereby dust may gravitate to said chamber from air displaced by said fan, a plate having an annular slotted area through which air is driven by said fan, a motor for driving said fan, and an intake passage leading to said fan. 80
6. A vacuum cleaner comprising a housing having a chamber therein for holding dust separated from air, a fan mounted in said housing, a plate having an annular slotted area through which air is driven by said fan, said fan being disposed between said plate and said chamber, a motor for driving said fan, and an intake passage leading to said fan. 85
7. A vacuum cleaner comprising a housing having a chamber therein for holding dust separated from air, a fan mounted for rotation in said housing, a plate disposed in said housing and provided with a plurality of narrow slots through which air is driven by said fan, said fan being disposed between said plate and said chamber, a motor for driving said fan, and an intake passage in said housing leading to said fan. 90
8. A vacuum cleaner comprising a housing having a chamber therein for holding dust separated from air, a fan mounted in said housing for rotation in a substantially horizontal plane, means forming a partition wall between said fan and said chamber and providing a passage between itself and said housing whereby dust may gravitate into said chamber, a plate having an annular slotted portion through which air is driven by said fan, said fan being disposed between said chamber and said plate, a motor disposed in said housing for driving it, an outlet passage in said housing whereby air escapes from it, and an intake passage in said housing leading to said fan. 95

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