March 3, 1959 A. B. BRADLEY 2,875,947

FLUID SUCTION DEVICE

Filed July 28, 1955 2 Sheets-Sheet 1

Fig. 1.

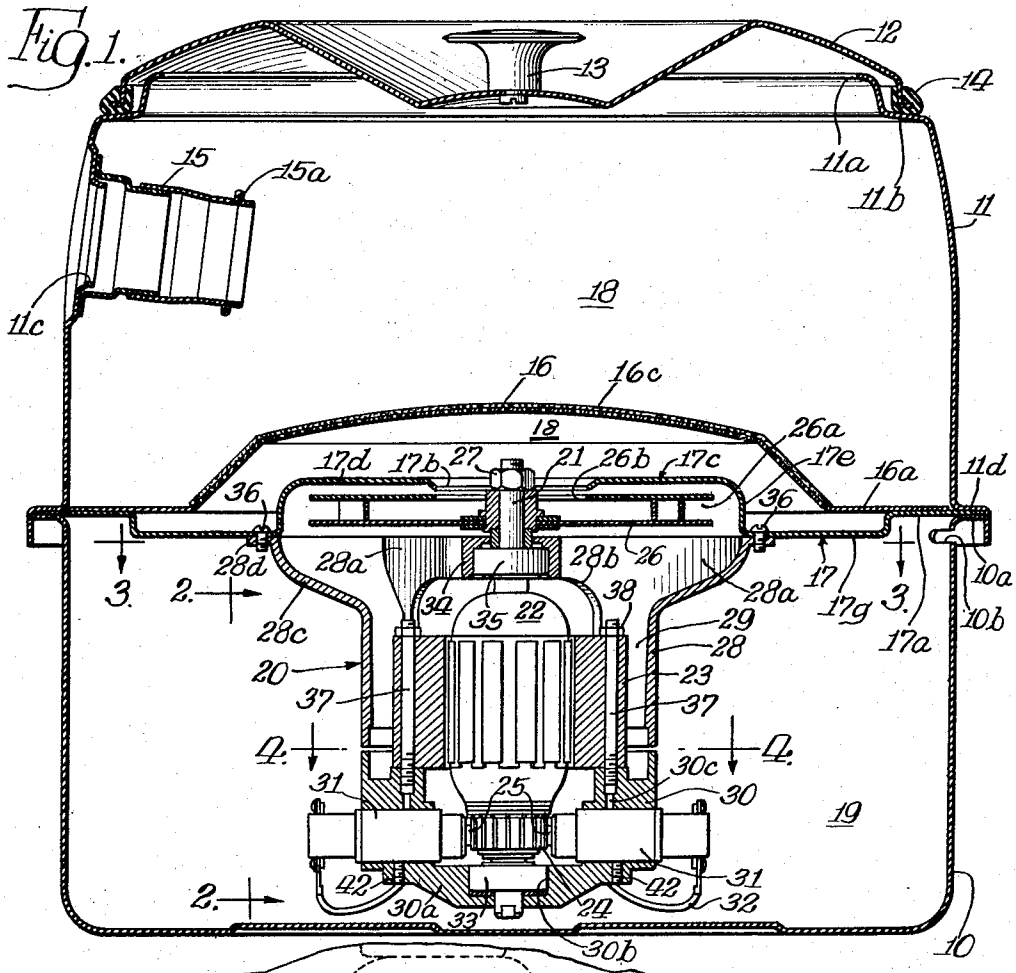
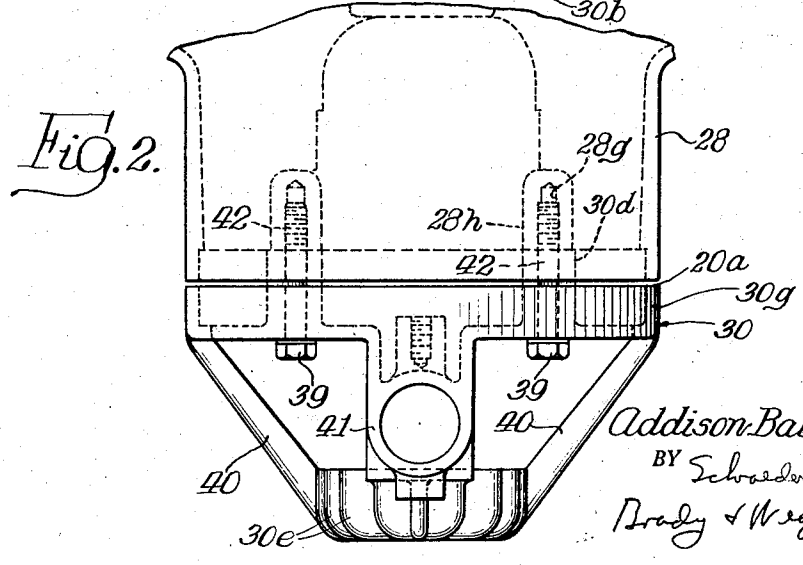


Fig. 2.



INVENTOR.
Addison Ballard Bradley
BY Schroeder, Hofgren, Brady & Wegner Attys

March 3, 1959 A. B. BRADLEY 2,875,947

FLUID SUCTION DEVICE

Filed July 28, 1955 2 Sheets-Sheet 2

Fig. 3.

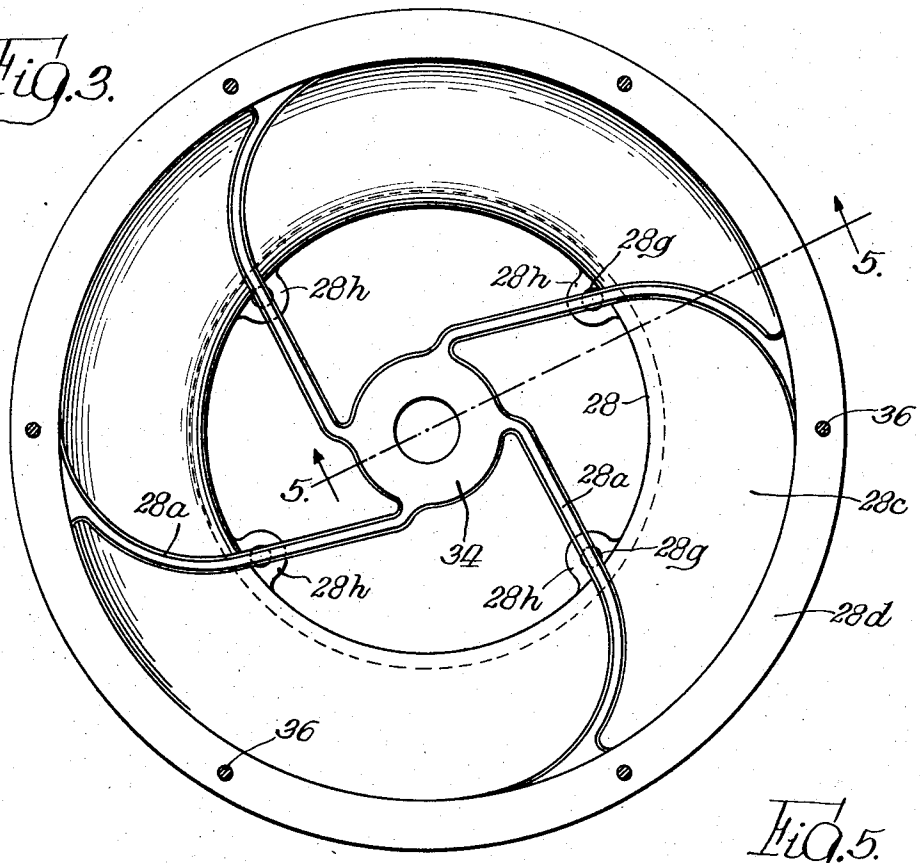


Fig. 5.

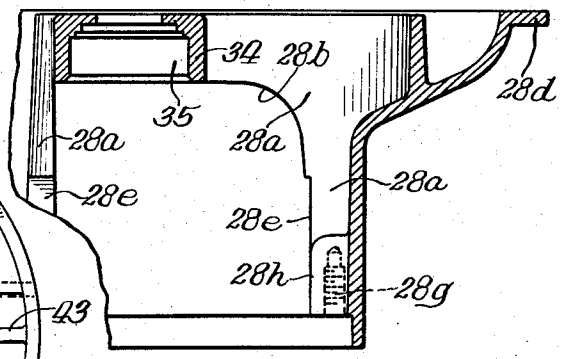
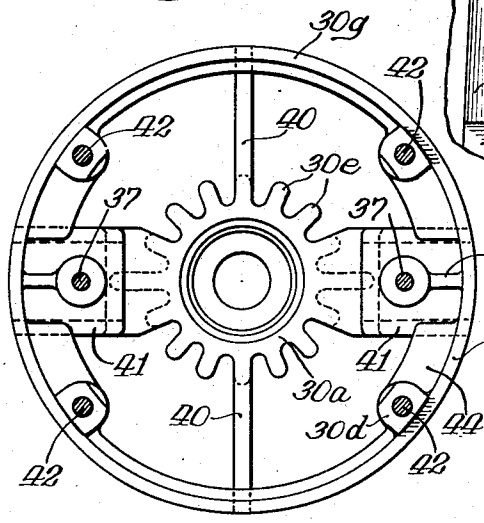


Fig. 4.



INVENTOR.
Addison Ballard Bradley,
BY Schroeder, Hofgren,
Brady & Wegner
Atty's.

United States Patent Office 2,875,947 Patented Mar. 3, 1959

2,875,947

FLUID SUCTION DEVICE

Addison Ballard Bradley, Glenview, Ill., assignor, by mesne assignments, to Whirlpool Corporation, a corporation of Delaware

Application July 28, 1955, Serial No. 524,962

8 Claims. (Cl. 230—117)

This invention relates to a fluid suction device.

The principal object of this invention is to provide a fluid suction device such as a canister type vacuum cleaner in which an improved structure is employed to reduce the cost, weight, and number of necessary parts of the device. In achieving this and other objects, the improved device of this invention employs simple yet lightweight parts, some of which perform a number of functions, and arranges these parts in an easily assembled organization.

Other objects and advantages of the invention will be apparent from the following description of one embodiment thereof taken in conjunction with the accompanying drawings. Of the drawings:

Figure 1 is a vertical section through a canister type suction cleaner embodying the invention, but with the dirt separating member or bag removed.

Figure 2 is a fragmentary vertical elevational view taken substantially along line 2—2 of Figure 1, but showing only the motor housing and attached lower end cap member.

Figure 3 is a transverse sectional view of the upper portion of the motor housing only taken substantially along line 3—3 of Figure 1.

Figure 4 is a transverse sectional plan view taken along line 4—4 of Figure 1 illustrating the bottom end cap member and omitting the other elements of the motor.

Figure 5 is a fragmentary sectional elevation taken substantially along line 5—5 of Figure 3.

The vacuum cleaner illustrated in the accompanying drawings is of the well known canister type and comprises a lower pan-shaped casing portion **10** and an upper casing portion **11** cooperating with the lower casing portion to complete the enclosing casing. The upper portion **11** is provided with a top opening **11***a* and an outwardly spaced rim **11***b*. In order to close this opening **11***a*, the canister includes a removable cover **12** provided with a central handle **13** and an outer edge bead **14** of resilient rubber or the like. As shown in Figure 1, this resilient bead **14** engages the rim **11***b* to make sealing contact therewith when the cover **12** is in its normal position over the opening **11***a*.

The upper casing portion **11** is provided with an intake opening **11***c* into which may be inserted, in the customary manner, the end of a flexible suction hose (not shown) of usual construction.

Extending inwardly and surrounding the opening **11***c* is an essentially tubular horn **15** provided with a raised annular flange **15***a* adjacent to its inner end. This flange **15***a* operates to retain a dust bag or similar dust separating member on the horn **15** in the customary manner. These dirt separating members are preferably porous paper bags having an opening in one wall provided with a rubber diaphragm which can be slipped over the end of the horn **15** and over the flange **15***a* in order to make sealing engagement with the horn. This construction and this use of a dirt separating member is purely conventional and forms no part of the present invention.

The bottom edge of the upper casing section **11** is provided with an annular flange **11***d* that extends first outwardly and then downwardly. This flange **11***d* may be attached in any manner desired, such as by a plurality of screws (not shown) to an outwardly extending lower flange **10***a* on the upper edge of the lower casing portion **10**. As is illustrated in Figure 1, the flange **10***a* is enclosed within the flange **11***d* of the upper casing portion.

Extending across the casing formed by the portions **10** and **11** is an upwardly arched perforated sheet metal screen **16** that is covered by thin fabric felt member **16***c*. The outer edge **16***a* of the screen **16** is attached to the outer edge of a transverse partition **17** that is located beneath the screen **16**. The outer edge portion **17***a* of the partition **17** to which the outer edge **16***a* of the screen **16** is attached extends outwardly between the flanges **10***a* and **11***d* of the casing portions **10** and **11** and is attached thereto.

The upper portion of the lower casing portion **10** is provided with a series of openings **10***b* for the escape of air from the casing. These openings are horizontally elongated and extend a portion of the way around the circumference of the casing. The openings are so located that they are at least partially hidden by the downwardly extending portion of the flange **11***d*.

The partition **17** divides the casing formed by the casing portions **10** and **11** into an upper low pressure suction side **18** above the partition and a high pressure side **19** beneath the partition. In order to provide communication between these sides of the partition, there is provided a central opening **17***b* in the partition.

In order to maintain a flow of air through the suction device of this invention, there is provided a motor and fan unit **20**. In the embodiment shown, this unit comprises a motor adjacent to the partition **17** including a rotatable motor shaft **21**, an armature **22** mounted thereon, a field including laminations **23**, a commutator **24**, and brushes **25** engaging the commutator **24** in the customary manner. The motor is so arranged that the shaft **21**, which extends well beyond the armature **22**, is substantially perpendicular to the partition **17** with the motor being substantially entirely beneath this partition. The upper end of this shaft **21** is adjacent to the opening **17***b* in the partition **17***c* and is provided with a centrifugal fan **26** mounted on the shaft **21** by means of a nut **27**. The fan **26**, which is of ordinary construction, is positioned within an upwardly extending inverted cup-shaped section **17***c* in which the partition opening **17***b* is located. This cup-shaped section **17***c* has a top part **17***d* adjacent to a side of the fan **26** and a substantially circular side portion **17***e* that is adjacent to the edge of the fan **26**.

The part **17***g* of the partition **17** that is adjacent to the side portion **17***e* is spaced downwardly beneath the outer edge portion **17***a* of this partition. This construction provides a plurality of flat portions **17***a*, **17***c*, and **17***g* that are located in different horizontal planes. This serves to strengthen the partition **17** so that it may be constructed of relatively thin, lightweight sheet metal without excessive sacrifice of strength.

The motor and fan unit **20** includes a housing **28** surrounding the field laminations **23** but spaced therefrom to provide an air flow space **29**. This air flow space communicates with the outlet **26***a* of the fan **26** while the inlet **26***b* of the fan communicates with the low pressure suction side **18** of the unit through the partition opening **17***b*. The air flow space **29** communicates by way of the bottom of the motor and fan unit **20** with the high pressure side **19** of the device.

The housing **28** is provided with a plurality of fins **28***a* extending inwardly from the sides of the housing to the field laminations **23**. The upper inner edges **28***b* of these fins are spaced from the armature **22** and above the field laminations **23**.

The motor fan unit **20** also includes a bottom end cap member **30** that carries the brush holders **31** for the brushes **25** which are connected in the electric system to the motor by wires **32**. The lower cap member **30** is also provided with an integral wall portion **30***a* formed with a circular cavity **30***b* for retaining a bearing **33** for the lower end of the motor shaft **21**.

The upper portions of the integral fins **28***a* are provided with a similar integral wall **34** forming a cavity for a similar bearing **35** for the upper end of the motor shaft **21**.

The upper wall **28***c* of the housing **28** is flared outwardly and upwardly with the extreme upper edge provided with an outwardly extending flange **28***d*. This upper edge describes a circle having a diameter substantially greater than the diameter of the fan **26**. The flange **28***d* is attached to the bottom of the partition **17** by means of a plurality of screws **36** that pass through the partition into the flange **28***d*. As can be seen in Figure 1, the flange **28***d* is located adjacent to the side portion **17***e* of the partition. The outwardly flared portion **28***c* of the housing **28** and the upwardly inverted cup-shaped portion **17***d* of the partition **17** cooperate to form a confining housing for the fan **26**. The upper edges of the fins **28***a* are substantially aligned in a horizontal plane which is parallel to and below the bottom of the fan **26**.

As can be seen in Figure 3, the outer edges of the fins **28***a* adjacent to the flange **28***d* are smoothly curved so that air circulation set up by the rotating fan **26** is directed in a substantially streamlined flow into and through the space **29** between the housing **28** and the motor itself. As viewed in Figure 3, the fan would rotate in a counter-clockwise direction relative to the fins **28***a*.

The field laminations **23** are held in position on the end cap member **30** by means of a pair of bolts **37** that extend down through the edges of the field and engage threaded openings **30***c* in the cap member **30**. The upper ends of these bolts **37** are provided with nuts **38**. As shown in Fig. 5, the field laminations **23**, therefore, are mounted on the end cap member **30** but extend up into the housing **28** with the inner edges **28***e* of the lower portions of the fins **28***a* being adjacent to these field laminations.

The end cap member **30**, and thus the field laminations **23**, are attached to the housing **28** by means of a plurality of bolts **39**. In the embodiments shown, there are four of these bolts **39**. Each bolt extends upwardly through a raised boss **30***d* and engages a threaded opening **28***g* in an aligned enlarged portion **28***h* at the bottom of a fin **28***a*. The bosses **30***d* and portions **28***h* are so dimensioned that when the end cap member **30** is fastened in position by the bolts **39**, there is an annular space **20***a* between the bottom of the housing **28** and the top edge of the cap member **30**.

The bottom **30***a* of the cap member **30** surrounding the bearing cavity **30***b* is provided with a plurality of outwardly extending heat radiating fins **30***e*. This bottom wall portion **30***a* is supported from an annular rim portion **30***g* by means of a spider made up of a pair of diametrically opposed downwardly extending arms **40** and a pair of diametrically opposed thickened portions **41**, which house the above described brush holders **31**. Each brush holder **31** is held in place by means of a set screw **42**.

As is shown in Figure 4, each boss **30***d* of the cap member **30** is reinforced by section **44** of metal positioned on the inner surface of the rim portion **30***g*.

These sections **44** of adjacent bosses **30***d* extend from the bosses toward each other and toward a web of metal **43** that extends inwardly from a rim portion **30***g* toward an opening **33**, in which a bolt **37** is engaged.

The structure shown and described has a number of new and unobvious advantages. Thus, the entire unit is a very lightweight unit because of its simple construction and because of the light weight of the parts used and because many parts serve a plurality of functions. Thus, the essentially horizontal partition **17** may be a simple sheet metal stamping that is very strong yet light in weight, with this stamping serving as a support for the motor and to divide the casing into a low pressure suction zone **18** and a high pressure air exhaust zone **19**. Furthermore, this partition **17** may be shaped as indicated at **17***c* to provide a portion of a fan casing.

Another very important advantage of the construction shown and described is the provision of the motor housing **28** which serves to direct air from the fan over the motor parts to keep them cool. Thus, the air flows within the housing **28** past the brushes **25**, the commutator **24**, and the lower bearing **33**. Furthermore, the housing is of simple construction with the inward extended fins **29** serving a plurality of functions as earlier described.

Having described my invention as related to the embodiment shown in the accompanying drawings, it is my intention that the invention be not limited by any of the details of description, unless otherwise specified, but rather be construed broadly within its spirit and scope as set out in the accompanying claims.

I claim:

1. A fluid suction device, comprising: a casing; a partition therein dividing the casing into a low pressure suction side and a high pressure side; a motor adjacent to said partition including a rotatable shaft and a field; a suction fan on said shaft having an outlet, and an inlet communicating with said low pressure side; a housing for the motor surrounding said field but spaced therefrom to provide an air flow space, the space communicating with said fan outlet and said high pressure side causing air flow through said space into said high pressure side; a plurality of longitudinal fins integral with the housing extending inwardly from said housing to said field; an open end cap member on the end of the housing opposite to said fan; means attaching said field to said cap member; and means attaching said cap member to said housing.

2. The suction device of claim 1 wherein the fan end of said housing is flared outwardly to an extremity beyond the outer edge of said fan.

3. The suction device of claim 1 wherein said cap member is provided with an integral wall forming a chamber for housing a bearing for said shaft and said housing is provided with an integral wall adjacent to said fan forming a second chamber for housing a second bearing for said shaft.

4. A fluid suction device, comprising: a casing; a partition therein dividing the casing into a low pressure suction side and a high pressure side; a motor adjacent to said partition including a rotatable shaft and a field; a suction fan on said shaft adjacent to said partition having an outlet, and an inlet communicating with said low pressure side through an opening in said partition; a housing for the motor attached to said partition surrounding said field but spaced therefrom to provide an air flow space, the space communicating with said fan outlet and said high pressure side causing air flow through said space into said high pressure side; a plurality of longitudinal fins integral with the housing extending inwardly from said housing to said field; an open end cap member on the end of the housing opposite to said fan; means attaching said field to said cap member; and means attaching said cap member to said housing.

5. The suction device of claim 4 wherein the fan end of said housing is flared outwardly to an extremity beyond

the outer edge of the fan and the section of said partition adjacent to said fan is of generally cup-shape to enclose the side of the fan opposite to said housing, said cup-shape section and flared housing end cooperating to provide a fan casing for the fan.

6. The suction device of claim 5 wherein said partition is normally substantially horizontal in said casing with said low pressure suction side being above and the high pressure side below the partition, and said motor is substantially vertical and suspended from said partition.

7. A suction cleaner, comprising: a casing; a generally transverse one-piece sheet metal stamping partition thereacross dividing the casing into a low pressure suction side and a high pressure side; a motor suspended in its entirety from said transverse sheet metal partition and including a housing having a rim portion attached to said partition, the rim portion and a section of said one-piece partition being spaced apart to define a fan chamber; a rotatable motor shaft having one end within said fan chamber; and a fan on said shaft within the fan chamber, said partition section being generally of cup-shape enclosing one side and an edge portion of said fan and having an inlet opening communicating with the fan chamber.

8. A suction cleaner, comprising: a casing; a generally transverse one-piece sheet metal stamping partition thereacross dividing the casing into a low pressure suction side and a high pressure side; a motor suspended in its entirety from said transverse partition and including a housing having a rim portion attached to said partition, the rim portion and a section of said one-piece partition being spaced apart to define a fan chamber; a rotatable motor shaft having one end within said fan chamber; and a fan on said shaft within the fan chamber, said housing that includes the rim portion being flared outwardly, said partition section extending outwardly from adjacent to said rim portion and being generally cup-shaped to enclose one side and an edge of said fan.

References Cited in the file of this patent

UNITED STATES PATENTS

956,148	Bennett	Apr. 26, 1910
993,985	Harker	May 30, 1911
1,320,224	Garman	Oct. 28, 1919
1,860,883	Bilde	May 31, 1932
1,940,260	Ljungquist	Dec. 19, 1933
2,025,946	Wenner-Gren	Dec. 31, 1935
2,172,180	Schellens	Sept. 5, 1939
2,336,716	Clements	Dec. 14, 1943
2,394,953	Waterfill	Feb. 12, 1946
2,670,896	Ardito	Mar. 2, 1954
2,780,826	Coons et al.	Feb. 12, 1957
2,781,103	Daiger et al.	Feb. 12, 1957

FOREIGN PATENTS

554,074	France	Feb. 23, 1923