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Bryant, Jr.

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[11] **3,910,781**

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[54] **VERTICAL-TANK-TYPE VACUUM CLEANER**

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[52] **U.S. Cl.** ..... **55/305 BN**; 15/314; 15/347; 15/352; 55/429; 55/470; 55/478

[51] **Int. Cl.²** **B01D 41/00**

[58] **Field of Search** ..... 15/314, 327 D, 347, 352, 15/353, 327 R, 344; 55/300, 304, 366, 429, DIG. 3, 305, 478, 470

[56] **References Cited**

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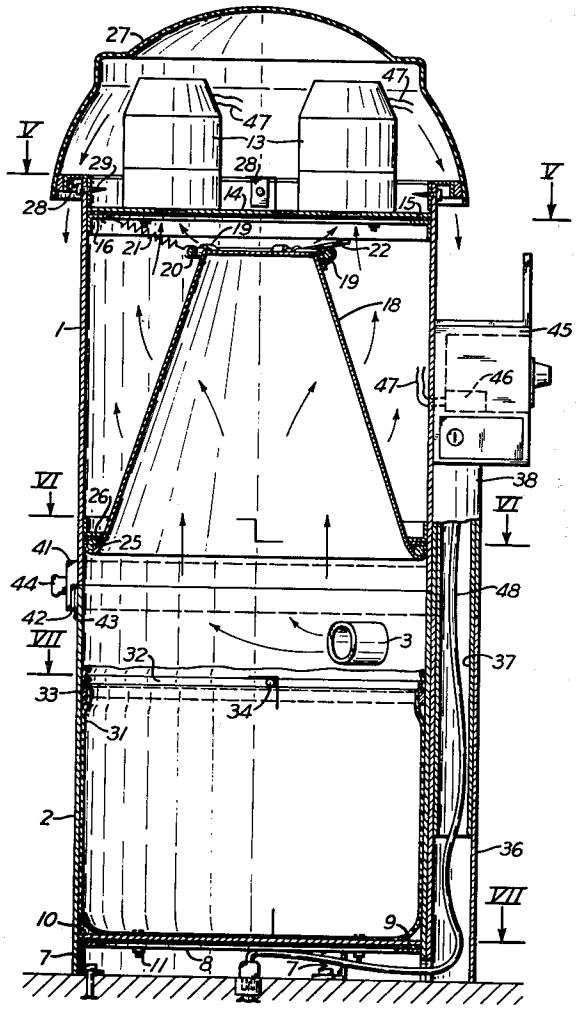
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Primary Examiner—Harvey C. Hornsby
Assistant Examiner—C. K. Moore
Attorney, Agent, or Firm—Brown, Murray, Flick & Peckham

[57] **ABSTRACT**

A vacuum cleaner tank has superimposed separate top and bottom sections and is provided in its side with an air inlet for connection to a hose. Electrically operated suction means at the top of the tank draw air in through the hose and inlet and discharge it at the top of the tank after it has passed through a filter in the top section of the tank. The bottom section is provided with means for removably holding an open-top collection bag beneath the filter in a position to receive dirt from the air inlet and the upstream surface of the filter. Vertical pivot means secured to the side of the tank permit its top section to be swung to the side to uncover its bottom section so that the dirt-collection bag can be lifted out of the bottom section.

11 Claims, 7 Drawing Figures



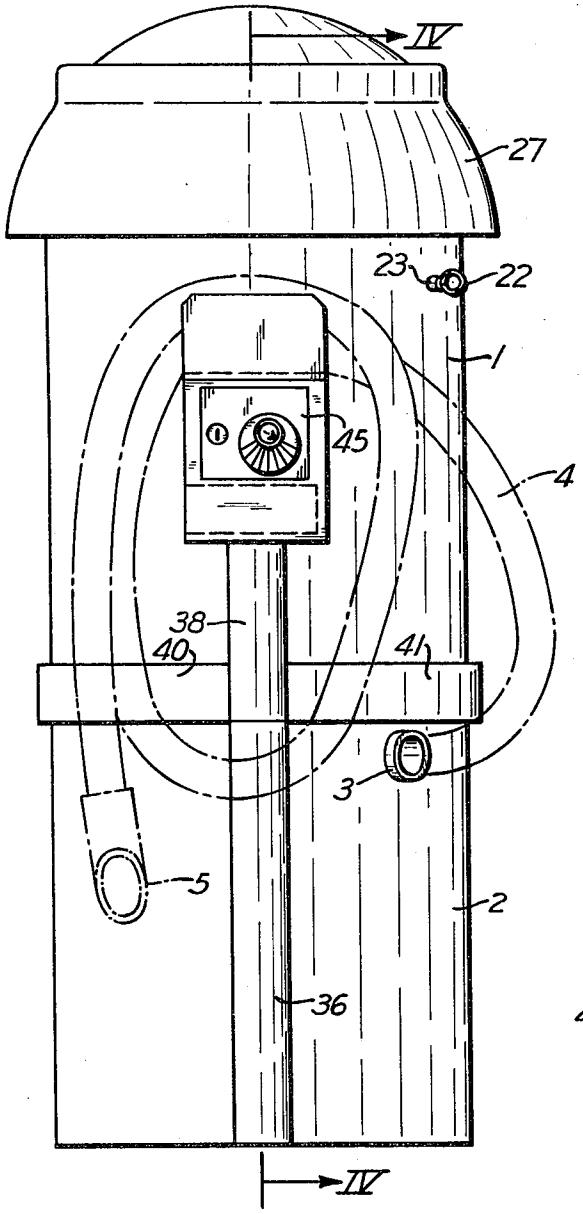


Fig. 1

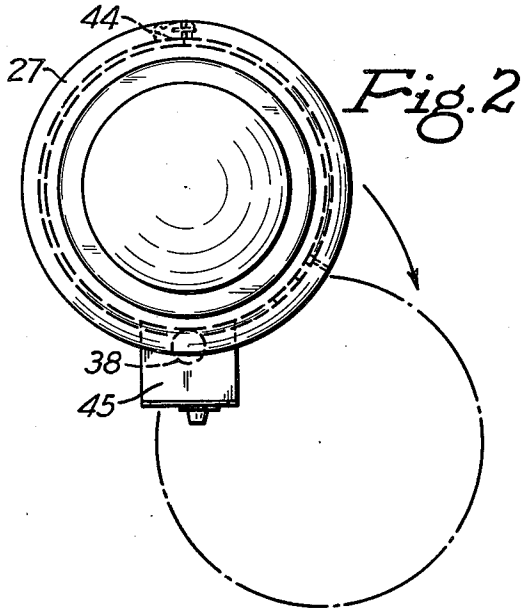


Fig. 2

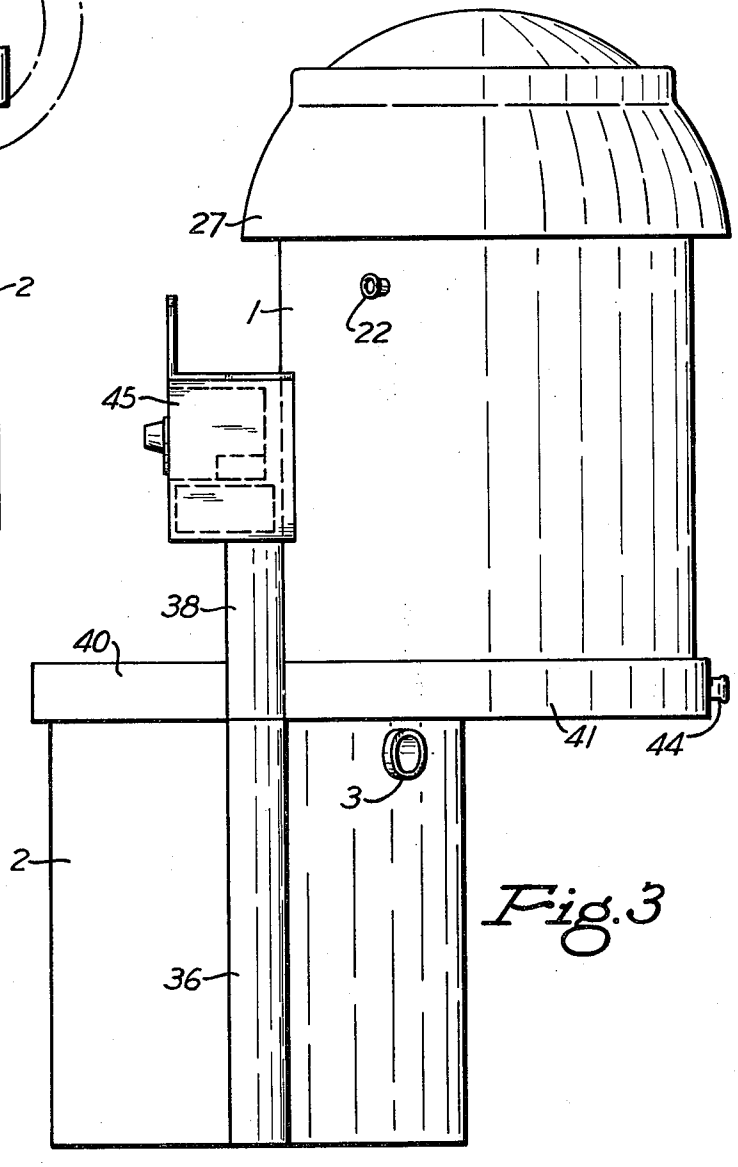


Fig. 3

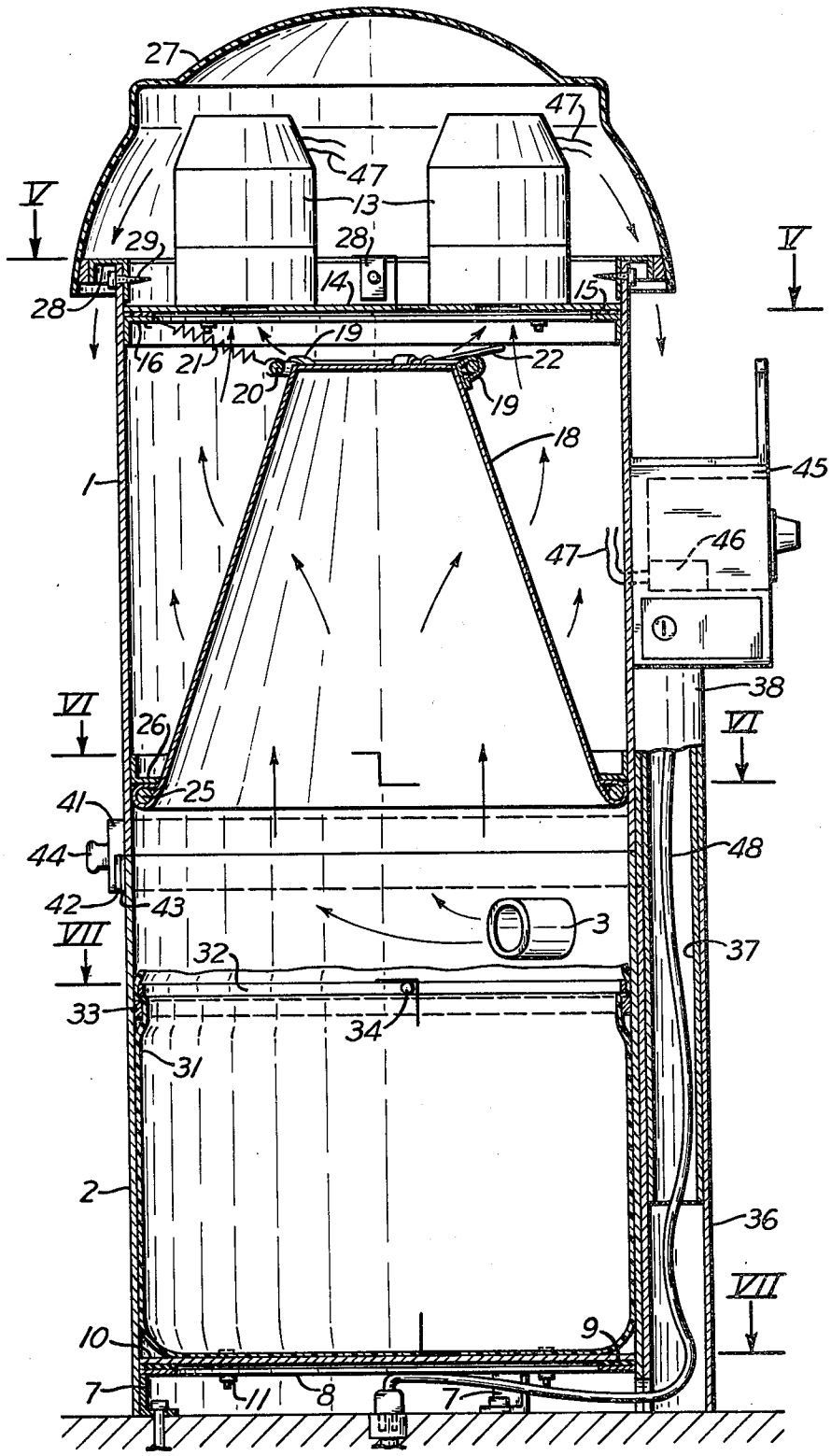

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Fig. 4

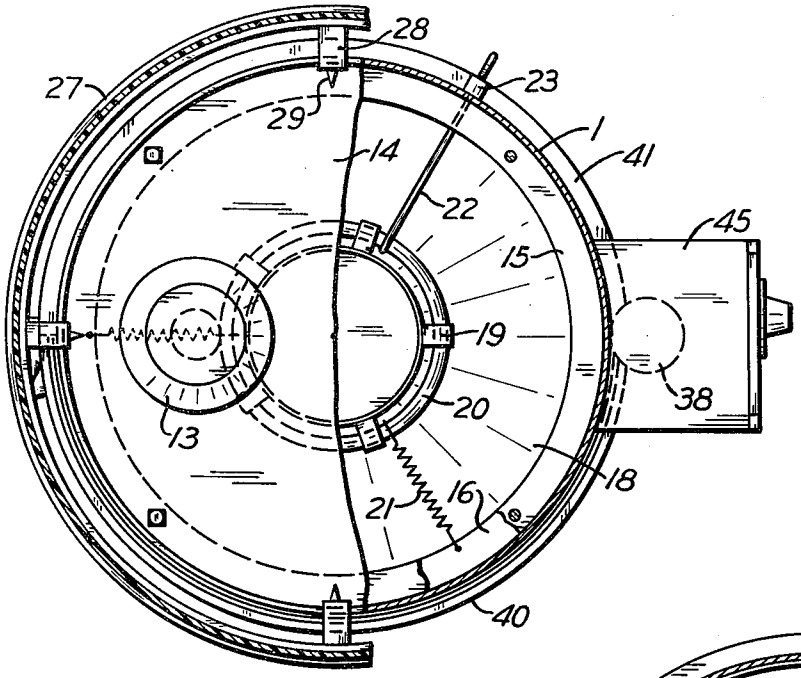


Fig. 5

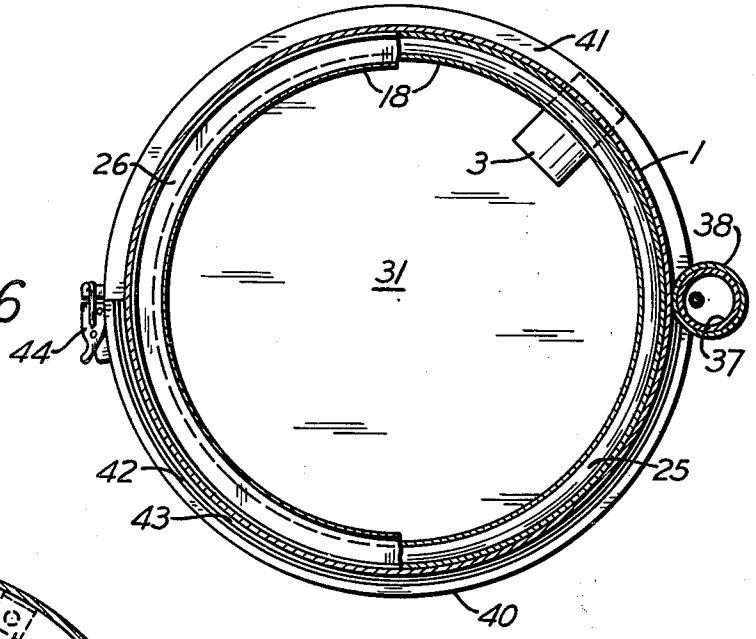


Fig. 6

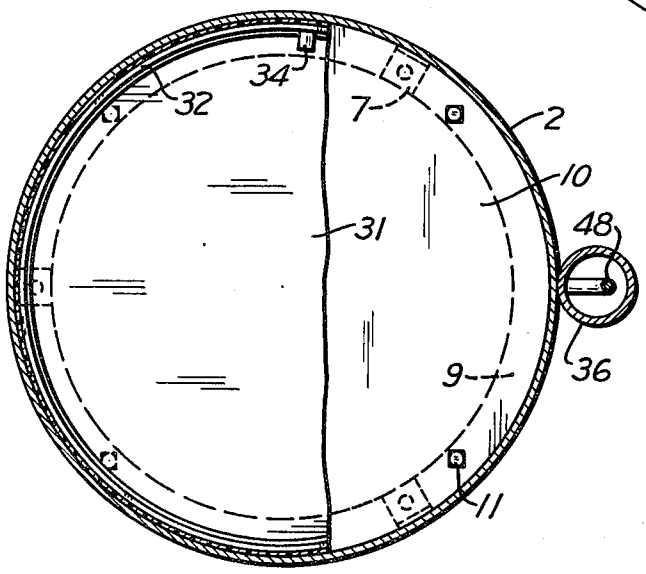


Fig. 7

VERTICAL-TANK-TYPE VACUUM CLEANER

Large vertical tank-type vacuum cleaners, generally coin operated, are used at car washes and other locations. Air is drawn into the tank through a flexible hose with a suitable nozzle and flows through a filter before being discharged at the top of the tank. Vacuum cleaners of this type now in use have doors in the sides of their lower portions, through which the dirt that is collected in the tank can be removed. In some cleaners the dirt falls into a rigid container that can be pulled out through the door and then emptied and replaced, while in others there is no such container, so the dirt has to be shoveled out through the door and into a disposable container. Both of these ways of emptying vacuum cleaners are messy and are objectionable.

It is among the objects of this invention to provide a vertical tank-type vacuum cleaner in which the tank has no door in its side, in which all of the dirt is collected in a disposable bag inside the tank, in which the tank can be opened easily to permit the dirt-collecting bag to be lifted out of the bottom of the tank, and in which a filter bag can be shaken manually to remove dirt from it.

The preferred embodiment of the invention is illustrated in the accompanying drawings, in which

FIG. **1** is a side view of the vacuum cleaner;

FIG. **2** is a reduced plan view;

FIG. **3** is a side view showing the tank partly open;

FIG. **4** is an enlarged vertical section taken on the line IV—IV of FIG. **1**; and

FIGS. **5, 6,** and **7** are horizontal sections taken on the lines V—V, VI—VI, and VII—VII, respectively, of FIG. **4.**

Referring to the drawings, a vertical cylindrical tank is divided more or less centrally along a horizontal plane into top and bottom sections **1** and **2** that normally rest on each other in axial alignment. The side of the tank is provided near the joint between the two sections with an air inlet in which a short tube **3** is welded. This tube receives one end of a flexible hose **4,** at the other end of which there is a suitable suction nozzle **5.** Inside the bottom of the tank circumferentially spaced lugs **7** are welded to it and are provided with vertical holes so that the tank can be bolted down to a foundation. A flat metal ring **8** on top of the lugs also is welded to the inside of the tank. On this ring there is a sealing gasket **9** that is compressed between the ring and a bottom plate **10** resting on the gasket and secured to the ring by bolts **11.** At the top of the tank are means for drawing air into the tank through the hose and discharging it from the top of the tank. For this purpose one or more electric suction blowers **13** are used, two being shown in the drawings. The blowers are rigidly mounted on a top plate **14** over openings through it. The plate rests on a sealing gasket **15** that seats on a flanged ring **16** encircling the inside of the tank and welded to it. The plate is bolted to the ring.

Inside the top section of the tank is an air filter, preferably in the form of an inverted filter bag **18,** the bag being closed at its top and open at its bottom, from which it tapers upwardly. As shown in FIGS. **4** and **5,** the top of the bag is connected by loops **19** to a rigid horizontal ring **20** supported at circumferentially spaced points, 120° apart for example. With three points of support, coil springs **21** are hooked onto the ring at two points, with the outer ends of the springs hooked into the flanged ring **16** that supports the top

plate. These springs are inclined from the ring downwardly so that they exert an upward pull on the bag. The third point of the ring is connected to the inner end of a rod **22** that extends out through a hole in the side of the tank. The outer end of the rod is formed into a loop to serve as a handle. Between this loop and the tank a short rubber sleeve **23** is mounted on the rod as a bumper. A large rigid ring **25** with a diameter nearly as great as the inside of the tank is sewed into the bottom of the filter bag. This ring is disposed directly below a ledge formed by an annular angle bar **26** secured to the inside of the tank as shown in FIGS. **4** and **6.** The springs **21** at the top of the filter bag pull ring **25** upwardly to clamp the bag against the bottom of the ledge to form a seal. Consequently, air entering the tank through its inlet flows up into the bag and through its sides and top and then, the dirt having been filtered out of the air, is drawn up through the blowers and blown out into the atmosphere, all as indicated by the arrows in FIG. **4.** The top of the tank should be covered by a dome **27,** the lower portion of which encircles the top of the tank and is provided with inwardly extending brackets **28** that rest on the tank and that are fastened to it by screws **29** as shown in FIGS. **4** and **5.** The filtered air leaving the blowers is deflected by the dome downwardly between its bottom and the top of the tank.

Resting on the bottom plate **10** of the tank is the bottom of a dirt-collection bag **31,** which may be a plastic bag like those used for garbage cans and grass clippings. As shown in FIGS. **4** and **7,** the top of the bag is hold open by means of a flexible metal ring **32** disposed inside the top of the bag and pressing it outwardly against the side wall of the tank a short distance below the inlet. To prevent this ring from slipping downwardly in the tank, it is placed directly above supporting means projecting inwardly from the side of the tank, such as an annular ledge formed by a metal bar **33** extending around the inside of the tank and welded to it. At one point the flexible ring is provided with an inwardly projecting knob **34,** which can be pulled to flex it inwardly in order to release it from the bag so that the bag can be removed from the tank. As long as the bag is in place, dirt drawn into the tank through the hose will either fall directly into the bag or cling to the inside of the filter bag, which is its upstream surface, until shaken loose by manually pulling or releasing shaker rod **22,** wherefrom the loosened dirt will fall into the collection bag.

It is a feature of this invention that when the dirt-collection bag has become filled with dirt and debris it can be lifted out of the bottom section of the tank and disposed of. The removal of the bag is accomplished by first swinging the top section **1** of the tank laterally to one side as indicated in dotted lines in FIG. **2** to uncover the bottom section **2.** In order to permit this to be done, the two sections of the tank are connected by vertical pivot means. Preferably, such means include a vertical sleeve secured to one of the tank sections and a vertical post secured to the other tank section and rotatably mounted in the sleeve. Most suitably, the sleeve **36** is welded to the bottom section of the tank and the post **37** is secured to the top section, such as by rigidly mounting the upper end of the post in a vertical sleeve **38** welded to the top section of the tank and seated on the lower sleeve in alignment with it as shown in FIG. **4.** When the top section of the tank is swung to the side,

as shown in FIG. 3, the post turns in the lower sleeve and also serves to support the top section in its swung-out position. The collection bag then can be easily lifted out of the exposed open top of the bottom section of the tank and replaced by a new bag, after which the top section is swung back over the bottom section again to form the tank. There is no door in the side of the tank, no container to remove and empty and return to the tank, and no shoveling of loose dirt from the tank.

To maintain the two sections of the tank in alignment while the vacuum cleaner is being used, and also to seal the joint between the tank sections, metal bands extend from the upper sleeve **38** in opposite directions around the tank and meet at its opposite side. One of these bands **40** is welded to the top of the bottom section of the tank and overlaps the top section. The other band **41** is welded to the bottom of the top section and overlaps the bottom section. When the upper section of the tank is swung out to the side, it will move away from band **40** and carry band **41** away from the lower section **2.** The projecting inner surface of each band is covered by a resilient sealing strip **42,** which is compressed between the tank and the band when the tank is closed. Preferably, the exposed surface of each strip is covered by a strip of fabric **43** so that there will be no danger of the sealing strips sticking to the adjoining surfaces of the tank. The free ends of the two bands are pulled toward each other by a suitable toggle latch **44** of well-known construction in order to press the sealing strips tightly against the tank so that the joint will not leak air.

The vacuum cleaner disclosed herein will usually be used as a coin-operated machine. In such a case a conventional coin operated meter is mounted in a box secured to the top of the upper pivot sleeve **38** and the adjoining side of the tank. This meter includes an electric switch **46** that is connected by wires **47** to the two blowers **13.** The switch receives its power through an electric cord **48** that extends down through the pivot post **37,** which is hollow for this purpose, and through the lower sleeve **36** and then in beneath the bottom plate **10** of the tank, where the cord can be plugged into an electric outlet in the foundation.

According to the provisions of the patent statutes, I have explained the principle of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. A vacuum cleaner comprising a tank having superimposed separate top and bottom sections and provided in its side with an air inlet for connection to a flexible hose, electrically operated suction means at the top of the tank for drawing air in through said inlet and discharging it at the top of the tank, a filter mounted in said top section in the path of air flowing from said inlet to said suction means and having an upstream surface and an opposite downstream surface, means in said bottom section for removably holding an open-top collection bag therein beneath said filter in a position to receive dirt from the upstream surface of the filter, and vertical pivot means secured to the side of the tank to permit its top section to be swung laterally to uncover its bottom section, whereby a dirt-filled collection bag can be lifted out of said bottom section.

2. A vacuum cleaner according to claim **1,** in which said pivot means include a vertical sleeve secured to one of said tank sections, and a vertical post secured to the other tank section and extending into said sleeve, the post and sleeve being rotatable relative to each other on a vertical axis.

3. A vacuum cleaner according to claim **1,** in which said pivot means include a vertical sleeve secured to said bottom tank section, and a vertical post secured to the top tank section and extending down into the sleeve, the post being rotatable in the sleeve to permit said lateral swinging of the top section.

4. A vacuum cleaner according to claim **3,** including a vertical sleeve secured to said top section and aligned with said first-mentioned sleeve below it, the post being tubular and rigidly mounted in the upper sleeve, an electric switch at the top of said upper sleeve, electric wires connecting the switch with said suction means, and electric wires extending from said switch down through said sleeves and post for connection to a source of electricity.

5. A vacuum cleaner according to claim **1,** including a first metal band extending from said pivot means substantially half way around the tank in one direction, the band being secured to the top of said bottom section and extending above it, a second metal band extending from said pivot means around the tank in the opposite direction to said first band, the second band being secured to the bottom of said top section and extending below it, and a resilient sealing strip secured to the exposed inner surface of each band and compressed against the outer surface of the tank section carrying the other band when said sections are in vertical alignment.

6. A vacuum cleaner according to claim **1,** in which said filter is a bag open at its bottom and closed at its top, the vacuum cleaner including means in said top section of the tank supporting the top of the filter bag, and means forming a seal between the bottom of the filter bag and the side of said top section, said air inlet being disposed below the bottom of the filter bag but above said means for holding a collection bag.

7. A vacuum cleaner according to claim **6,** said sealing means including a ledge extending around the inside of the lower portion of said top section, a ring extending around the open bottom of the filter bag directly beneath said ledge and secured to the bag, and said bag-supporting means pulling the bottom of the filter bag tightly against said ledge.

8. A vacuum cleaner according to claim **6,** in which said filter bag supporting means include springs and manually operable means extending slidably through the side of said top section for shaking the filter bag.

9. A vacuum cleaner according to claim **1,** in which said collection bag supporting means includes a ring adapted to fit in the open top of a collection bag and hold it against the side of said bottom section, and means projecting inwardly from the side of said bottom section directly beneath said ring to support it, said ring being adapted to be flexed inwardly to remove it from the collection bag.

10. A vacuum cleaner according to claim **1,** including lugs extending inwardly from the bottom of said bottom section and provided with vertical holes to receive fasteners for mounting the tank on a base, and a bottom plate removably mounted in said bottom section above said lugs.

11. A vacuum cleaner according to claim **10,** including a ledge extending around the inside of said bottom section above said lugs, a sealing gasket on said ledge, and means fastening said bottom plate to the ledge with said gasket between them.

* * * * *