

April 13, 1943.

D. M. DOW ET AL

2,316,674

VACUUM CLEANER

Filed May 29, 1940

4 Sheets-Sheet 1

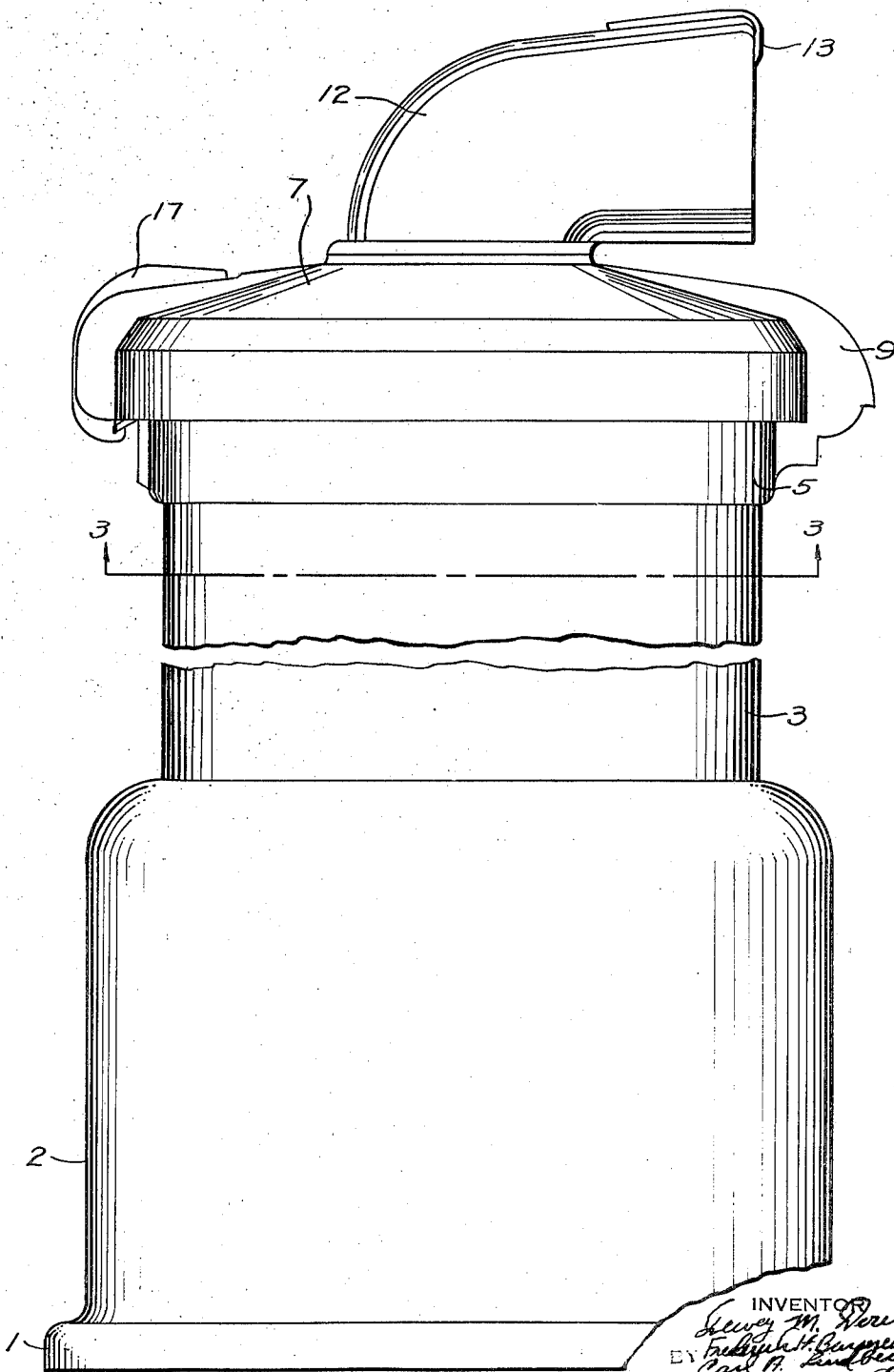


Fig. 1.

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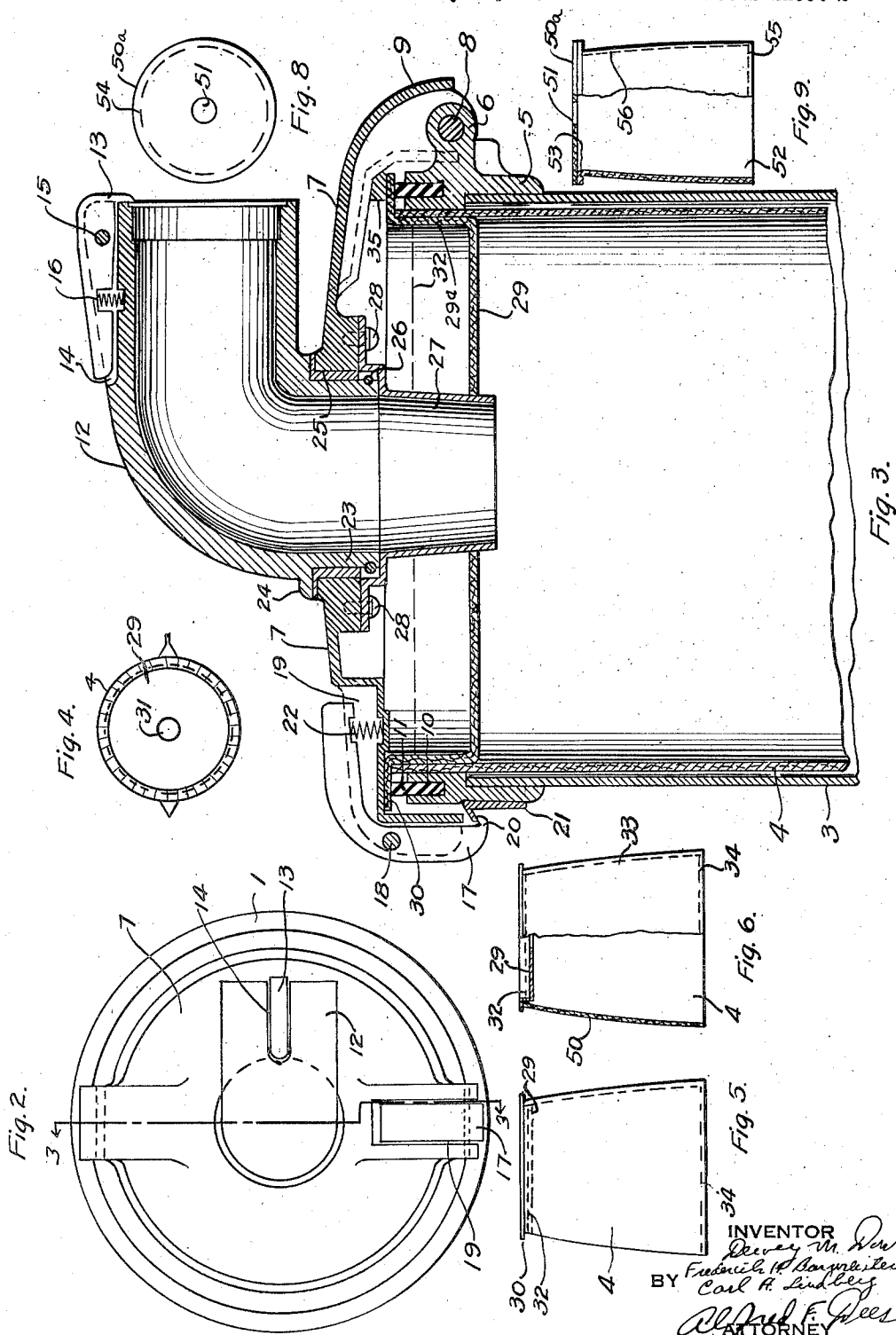
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4 Sheets-Sheet 2



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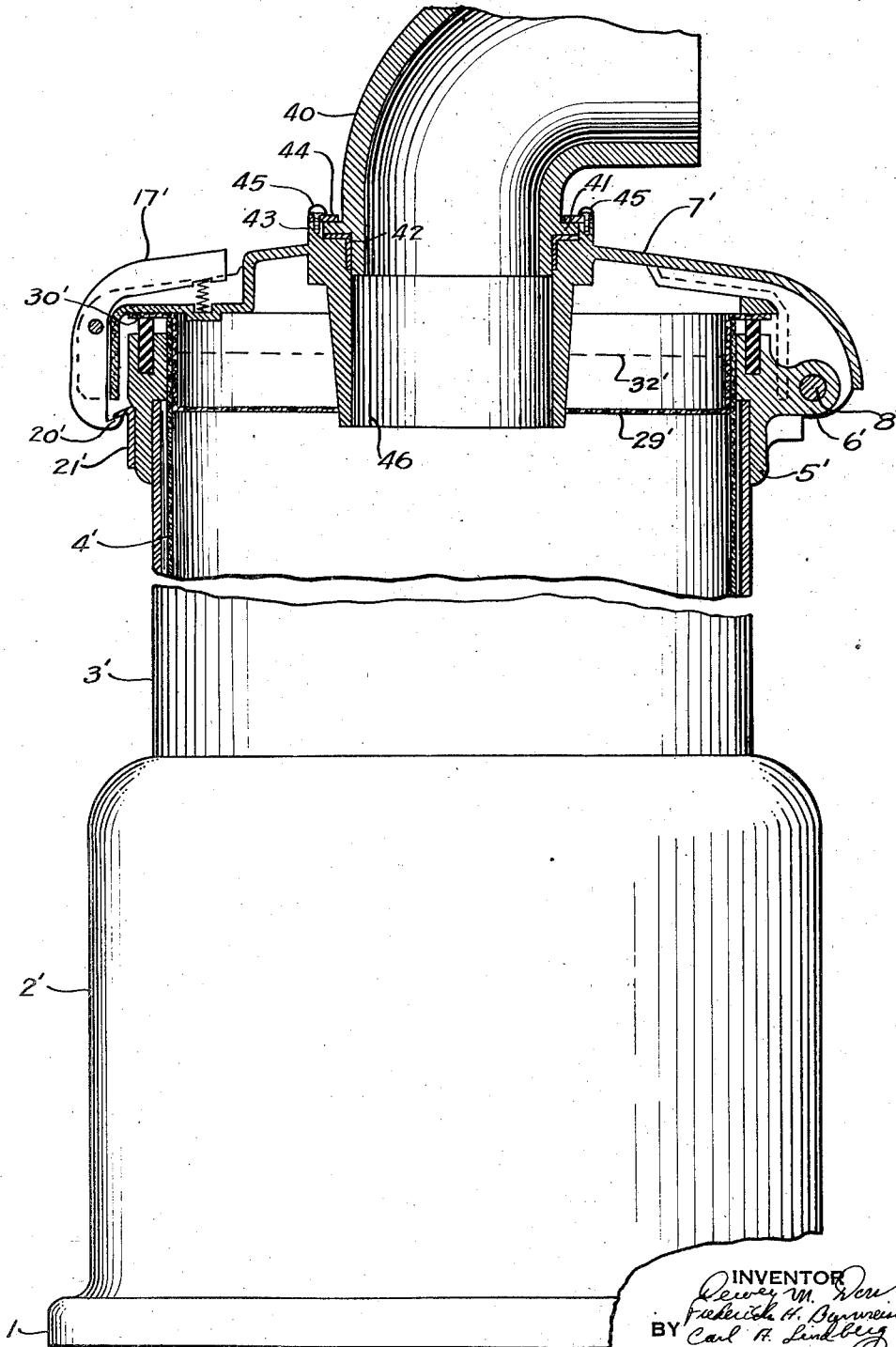
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VACUUM CLEANER

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4 Sheets-Sheet 3



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VACUUM CLEANER

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4 Sheets-Sheet 4

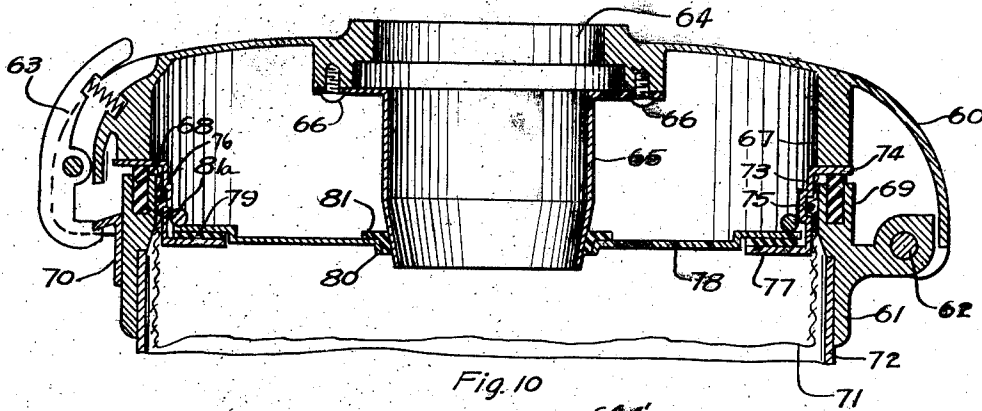


Fig. 10

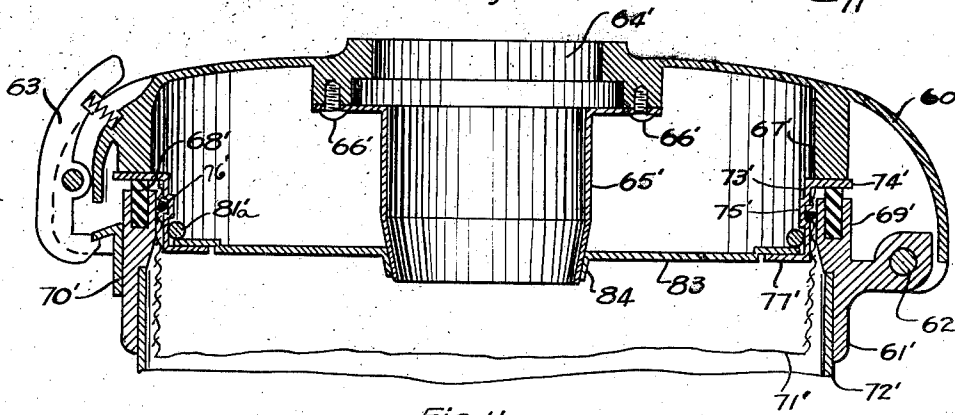


Fig. 11.

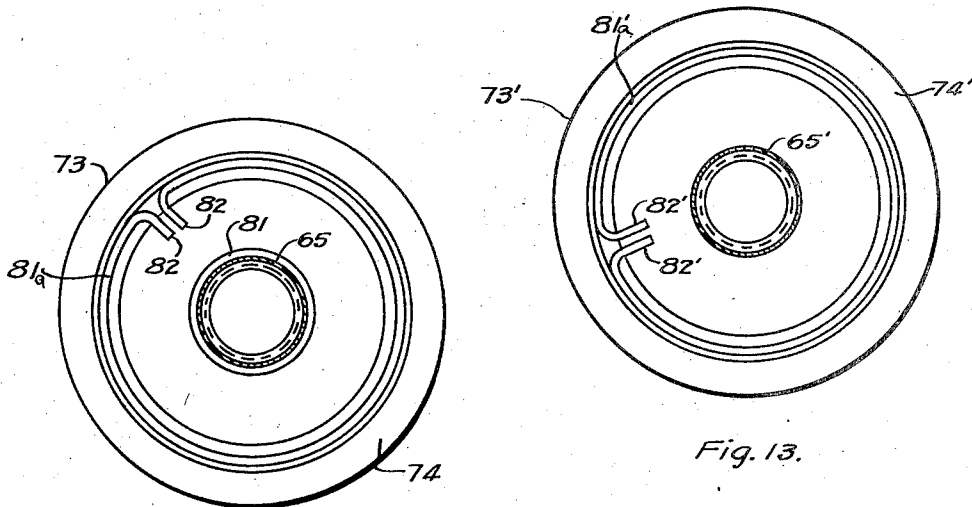


Fig. 12.

Fig. 13.

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2,316,674

VACUUM CLEANER

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Application May 29, 1940, Serial No. 337,836

7 Claims. (Cl. 183—37)

This invention relates to the air filtering and dust collecting mechanism of a vacuum cleaner of the type wherein the filtering and collecting receptacle is supported within an imperforate casing in which subatmospheric pressure is developed so that dust laden air may be drawn into the receptacle.

An object of this invention is to construct a vacuum cleaner that has an easily insertible filtering receptacle and which is locked in position in the cleaner in such manner that leakage will be prevented between the end of the filtering receptacle, and the casing closure.

Another object of the invention is to provide an air filtering and dust collecting mechanism of the type indicated, wherein the casing is provided with a closure embodying a nozzle adapted to make a sealing connection with the inlet of the filtering receptacle and embodying clamping means adapted to simultaneously clamp and seal the inlet end of the receptacle to the mouth of the casing.

Another object of the invention is the provision of a paper filtering receptacle particularly adaptable for use in connection with a cleaner of the type indicated above.

A still further object of the invention is the provision of a filtering receptacle and casing construction which will prevent the accumulation of dust and dirt between the inlet end of the receptacle and the casing closure.

A still further object of the invention is to provide a filtering receptacle of relatively inexpensive construction that will resist rupture when installed in the cleaner.

Other and further objects are to increase the efficiency of the cleaner, its cleaning effectiveness, to simplify the design and reduce the cost of manufacture thereof.

Other and further objects of the invention will occur to those skilled in the art to which this invention appertains but the disclosure and description following is not to be taken as a limitation of the invention, which is only illustrative thereof, and any and all modifications, alterations and variations of structure coming within the spirit and scope of the appended claims, which define the limits of the invention, are intended to be included herein.

In the drawings:

Fig. 1 is a vertical view of a cleaner incorporating the invention.

Fig. 2 is a top plan view of the cleaner in a reduced scale.

Fig. 3 is a cross sectional view of the upper part

of the cleaner of Fig. 1 taken substantially along the lines 3—3 of Figs. 1 and 2.

Fig. 4 is a top plan view of the filter employed in the cleaner shown in Fig. 1.

Fig. 5 is a vertical elevational view thereof.

Fig. 6 is a view similar to Fig. 5 but with a portion broken away to show the construction.

Fig. 7 shows a modification of the structures set forth in Figs. 1 and 3.

Fig. 8 shows a top plan view of a modified form of the filter.

Fig. 9 shows a side elevational view thereof with a portion broken away to show the construction.

Fig. 10 is a section view similar to Fig. 3 of another modification of the cleaner.

Fig. 11 is another section view similar to Fig. 3 of still another modification of the cleaner.

Fig. 12 is a plan view of the filter incorporated in the modification of Fig. 10 including a section of the funnel mechanism.

Fig. 13 is a plan view of the filter incorporated in the modification of Fig. 11, including a section of the funnel mechanism.

The invention finds its preferred embodiment in a tank or rigid casing type of cleaner more specifically set forth in Fig. 1. 1 indicates generally any appropriate form of a base for supporting the cleaner on the floor. 2 is a housing which encases the suction unit comprising a conventional fan and motor assembly (not shown) and which rests upon and is secured to the base 1 in any appropriate manner. Mounted upon and secured to the housing 2 in any convenient manner is a casing 3 which encases a filtering receptacle generally designated by the numeral 4.

At its upper end the casing has a rim defining an opening through which the filtering receptacle may be inserted into the casing. The rim is preferably in the form of a separate ring 5 secured to the tubular wall of the casing. The opening is closed by a cover 7 which is hinged to the ring 5 by means of a hinge comprising ears 6 and 9 on the ring and cover respectively, and a pintle 8 extending therethrough.

The ring 5 is further provided with a circular groove or slot 10 in which an annular receptacle seat 11 of rubber or other appropriate resilient material is inserted. The function of insert 11 will be more specifically outlined in connection with the more detailed description of filter 4.

Cover 7 is provided with a coupling 12 to which an appropriate conventional hose (not shown) may be attached and retained by means of a spring pressed latch 13 mounted in a slot 14

milled in the coupling 12. The latch 13 is pivoted on a pintle 15 and urged toward latching position by means of a spring 16.

Diametrically opposite the hinge pintle 8 is a cover latch 17 that is adapted to lock the cover 7 to the ring 5 and to firmly clamp the inlet end of a filtering receptacle against the resilient seat 11. The latch 17 is pivotally mounted on a pintle 18 in a slot 19 formed in cover 7. Latch 17 has a hook portion 20 thereon which engages with a cooperating hook 21 rigidly secured to ring 5 by welding or any other appropriate means. The latch 17 is normally retained in its latched position by means of a spring 22. A manual depressing of the spring pressed end of the latch 17 will disengage the latch from the hook 21 and permit the cover to be opened.

Coupling 12 is rotatably mounted in the cover 7 and to this end is provided with a reduced end 23 which extends through the cover 7. A flange 24 on coupling 12 provides a lateral bearing surface engaging and a flanged bearing bushing 25 inserted between coupling 12 and cover 7 to reduce friction, noise and simultaneously provide a more or less air tight connection. An appropriate circular groove is provided on the lower end of the reduced end portion of coupling 12 into which a hair pin spring 26 is inserted to keep the coupling 12 and cover 7 in operative relation and by the removal of which coupling 12 may be withdrawn from cover 7 for replacement, inspection or repair.

Secured to the cover 7 and closely fitting over the reduced end portion of coupling 12 is nozzle element 27 which is secured to the cover 7 by a plurality of screws 28.

The filtering receptacle of the instant invention comprises a bag having an inlet end member 29 of a manila paper or equivalent material which is flanged as at 30 and which has an inlet 31 centrally thereof with which the nozzle 27 is adapted to establish sealing connection when the cover is closed. The sealing connection may be established, for example, by the snug fitting of the tapered outer surface of the nozzle 27 in the inlet 31. The flange 30 is joined to the central portion of the end member 29 by an offset portion 29a. The filtering receptacle 4 further comprises a wall section 50 which is preferably of a paper formed in accordance with the description set forth in U. S. Reissue Patent 18,797, sewed to the offset portion of end member 29 by means of stitching 32. The wall sections then are appropriately folded at adjoining edges and sewed by means of stitching 33 and in order to close the bottom of the receptacle stitching 34 is run through the appropriately folded lower edges of the filter.

The filter cover and walls are so proportioned that when the filter is inflated it will substantially fill the entire volume of casing 3.

It will be observed that the flange portion 30 of the end member 29 rests directly upon the seat 11. The cover 7 interiorly thereof is provided with a faced portion 35 which bears directly upon the flange 30. At the slot 19 the bottom wall of the cover bears directly upon the flange 30. The seat 11 is sufficiently high so that when the cover bears down upon the flange 30 it will slightly compress the seat and provide an effective seal to prevent the leakage of air from the atmosphere between the cover and the casing and thence into the filter or between the filter and casing. Unless this leakage is prevented, dirt will get into the space between the cover 7 and end mem-

ber 29. The principal function of the nozzle 27 is to insure the entry of all dirt and air entering through the coupling going into the filter. The primary object of the seal is to prevent leakage of air from the atmosphere to the casing 3. Leakage at the seat 11 would lower the negative pressure at the coupling 12, thus reducing the suction and air flow through the coupling 12. The extension 27 firmly and snugly fits within inlet 31 thereby positively insuring that all dust and dirt will be admitted to the bag.

The bag may be removed by simply depressing latch 17, then tilting the cover back and then lifting the bag from casing 3. Since the bag is formed of paper, it and its contents may be destroyed and replaced with a new one. While a paper bag is shown and described, any efficient filtering material may be employed in lieu thereof.

A modification of the preferred embodiment of the invention is set forth in Fig. 7. The parts 1', 2', 3', 4', 20', 21', 29', and 30' are identical with those previously described. The cover 7' is hinged to the cylindrical casing 3' by means of hinge parts 6' and 8' through the medium of ring 5', and is latched by means of latch 17' to ring 5' through latch hook 20' all as previously set forth.

In the modified structure the elbow connection or coupling 40 is swivelled to the cover 7' by means of a flange 41 which bears directly on bearing insert 42 which is snugly fitted into a counterbore provided in the cover 7'. The cover 7' is further equipped with an extended portion 43 forming part of the counterbore which closely fits the counter flange 41. Ring 44 fits over the extension 43 and flange 41 to hold the elbow coupling 40 in place and is firmly held to the extension 43 by a plurality of screws 45 or other appropriate holding means.

The fitting 27 has been replaced by a tapered tube construction 46, preferably integral with the cover 7', which fits snugly into the central opening provided in the end member 29' of filter 4'. The foregoing construction provides a single efficient construction, prevents the accumulation of dust about the cover and the movement of outside air to the interior of the casing. The coupling 40 may be provided with a hose securing device similar to that disclosed in Fig. 3.

A modified form of the filtering receptacle is set forth in Figs. 8 and 9. In this form the end member 50a comprises a plain circular disc of manila paper or other similar material. The cover has an inlet 51 therein adapted to receive nozzle 27. The body part of the bag is flanged as at 53 and is stitched to the end member 50a by means of stitching 54. The sides and bottom of the bag are closed by stitching 55 and 56 in the same manner as stitching 33 and 34 shown in Fig. 6.

Another modified form of the cleaner is set forth in Figs. 10 and 12. The cover 60 in modified form is hinged to a casing ring 61 on a hinge pintle 62. Diametrically opposite from the hinge pintle 62 is a latch 63 pivotally mounted on the cover 60. The cover has a centrally disposed opening 64, which is adapted to receive a swivelable coupling (not shown), similar to that shown in Figs. 1, 3 and 9.

Concentrically disposed relative to the opening 64 is a nozzle 65 secured to the cover 60 by a plurality of screws 66. The cover 60 is further provided with an integral downwardly facing internal ring 67 which is concentric with the re-

ceptacle seat 68 mounted in a ring 69 forming a part of ring 61. The function of each of the foregoing is identical to corresponding structure previously described. Latch 63 holds the cover in closed position by engaging latching element 70 secured to ring 61.

A more or less conventional cloth type of filtering receptacle 71 is arranged within the casing 72 to which the ring 61 is secured. A flanged ring 73 is provided, to which filter 71 is secured. The ring 73 has a flange 74 adapted to fit in between the seat 68 and the bottom face of ring 67. The offset portion of ring 73 is provided with a channel 75 into which an appropriate element 76 is adapted to be fitted clamping the filter 71 securely to the ring 73. The ring 73 is further provided with an inwardly disposed flange 77.

The end member of the filtering receptacle comprises the cover portion 78 and a ring portion 73 which is adapted at its outer circumference to rest upon the flange 77. The cover portion is made fairly rigid and there is provided a rubber ring 79 which is interposed between flange 77 and cover 78. The purpose of ring 79 is to provide resiliency between the two parts.

Centrally, the cover portion 78 is provided with an inlet into which the nozzle 65 is fitted. The cover portion 78 may be flanged slightly as shown at 80, so as to support a second rubber ring 81. The ring 81 is interposed between the cover portion 78 and its flange 80, and the nozzle 65. The ring 81 is adapted to provide resiliency and assist in preventing noise and leakage as well as ring 79. The engagement of the nozzle 65 in the inlet also aids in centering the cover portion relative to the ring portion 73.

Means have been provided whereby the cover portion 78 is firmly retained in the ring 73. This means may assume most any form but in its simplest embodiment comprises an expansible ring 81a, which fits underneath or firmly against the channel 75. The ring is equipped with a pair of handle portions 82, which when pressed together enable the ring to be removed and thereby permitting the removal of the cover portion.

The above construction permits the use of a covered filter involving a cloth bag. In the paper bags above described and exemplified in Figs. 4 and 5, the entire bag is destroyed when filled but this is not a feasible expedient with cloth bags. The construction set forth in Figs. 10 and 12 accomplishes for the cloth filter all of the advantages detailed in connection with the paper filters.

A further modification of the invention is set forth in Figs. 11 and 13. The primed numbers designate identical parts previously described. The essential distinction between the construction of Figs. 11 and 13, from Figs. 10 and 12, resides in the cover organization. In Figs. 11 and 13 the cover 83 is of a metal construction preferable one having a high degree of resiliency. It will be observed that there are no rubber rings interposed between the flange 77' and cover 83, or between cover 83 and fixture 65'. Cover 83 is flanged at 84 to provide a snug fit with the fixture 65'. Ring 81a serves the function described above.

The above is considered to so fully set forth the gist of the invention that anyone studying the principles thereof may reproduce the structure. That which is considered new, novel and useful and which is sought to be protected by Letter Patent of the United States, is as follows:

1. In a vacuum cleaner, a casing having an opening and an annular seat at said opening, an air filtering and dust collecting receptacle receivable in said casing through said opening, said receptacle including a flange adapted to engage said seat and including an attached end member having an inlet, and an openable closure for said casing, said cover having an annular portion adapted, when the closure is in closed position, to releasably clamp said flange against said seat in sealing contact therewith and having a nozzle adapted to simultaneously releasably engage said inlet and to make sealing connection therewith, for delivering a dust laden air stream into said receptacle.

2. A vacuum cleaner as defined in claim 1, wherein said top is of flexible material and is dished inwardly, and wherein said nozzle has a tapered region for engagement in said inlet, whereby to increase the sealing engagement with said inlet as the nozzle is pressed there into.

3. An air filtering and dust collecting receptacle for a vacuum cleaner including a casing provided with an opening and an annular seat at said opening and an openable closure for said opening, said closure being provided with a cooperating annular clamping region and a nozzle for delivering dust-laden air to the receptacle, said receptacle comprising a body portion of air porous material and an end member of sheet material secured to said body portion, said end member being extended beyond the side wall of the body portion to form a flange adapted to be clamped between said seat and said clamping region, and having a central portion provided with an inlet with which said nozzle is adapted to make sealing connection when the closure is in clamping position.

4. In a vacuum cleaner, a casing having an opening and a yielding supporting seat at said opening, a filtering receptacle including an end member having a peripheral region engaging said seat and a porous body portion attached to said end member, said end member having a central region provided with an inlet, and a closure for said opening, said closure having a peripheral clamping region and a centrally disposed delivery nozzle respectively adapted, when the closure is in position closing said opening, to clamp and seal said end member against said seat and to establish sealing connection with said inlet for delivering a dust laden air stream into said receptacle.

5. A disposable air filtering and dust collecting receptacle as defined in claim 3, wherein said body portion is of air porous paper and said end member comprises a one-piece disc of relatively stiff, non-porous paper.

6. An air filtering and dust collecting receptacle for a filtering mechanism including a casing provided with an opening through which said receptacle may be inserted into the casing and provided with a seat at said opening, and a closure for said opening having a clamping region for cooperation with said seat and a nozzle for delivering dust laden air to said receptacle; said receptacle comprising a body portion of air porous material and an end member of sheet material including a peripheral flange adapted to be clamped between said clamping region and said seat, a central portion disposed in a plane spaced inwardly from said flange and having an inlet adapted, when the flange is thus clamped, to communicate with said nozzle, and an offset portion joining said flange and central portion, said

body portion of the receptacle being stitched to said offset portion of the end member.

7. A disposable air filtering and dust receptacle as defined in claim 3, wherein said end member comprises two separable portions one of which includes said flange and the other of which comprises a central portion in which said inlet

is formed, said body portion of the receptacle being secured to said portion including the flange, and means for releasably attaching said central portion to said portion including the flange.

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CERTIFICATE OF CORRECTION.

Patent No. 2,316,674.

April 13, 1943.

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It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, second column, line 8, claim 1, for "cover" read --closure--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 6th day of July, A. D. 1943.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.