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Cordell

[11] **3,859,064**

[45] **Jan. 7, 1975**

[54] **DOUBLE-WALL VACUUM CLEANER FILTER BAG**

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[73] Assignee: **Studley Paper Company, Inc.,** Inwood, N.Y.

[22] Filed: **Aug. 16, 1973**

[21] Appl. No.: **388,896**

[52] **U.S. Cl.** **55/368,** 55/382, 229/55

[51] **Int. Cl.** **B01d 46/02**

[58] **Field of Search** ..... 55/368, 380–382; 229/53, 55, 62.5, 3.5 R

[56] **References Cited**

UNITED STATES PATENTS

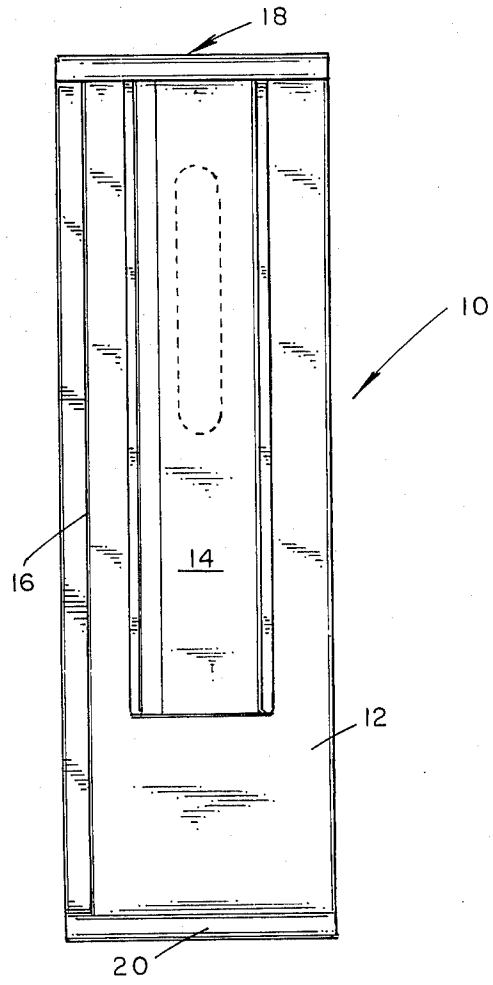
2,056,831	10/1936	Daniels et al.	55/381
2,826,265	3/1958	De Woody	55/523
3,297,233	1/1967	Meyerhoefer	55/381
3,404,515	10/1968	Fesco	55/381
3,479,802	11/1969	Fesco	55/381
3,491,522	1/1970	Fesco	55/380
3,559,381	2/1971	Fesco	55/381
3,728,091	6/1973	Fesco	55/381

Primary Examiner—Bernard Nozick
Attorney, Agent, or Firm—Friedman & Goodman

[57] **ABSTRACT**

A vacuum cleaner filter bag used particularly in upright type vacuum cleaners. The bag comprises a main receptacle portion of air pervious material and a tubular portion of air impervious material. The tubular portion is affixed to the main receptacle portion at facing openings in each portion such that air passing through the tubular portion and into the main receptacle portion does not directly impinge against adhesive junctions or seals made in the formation of the main receptacle portion. The main receptacle portion has a double-wall formed from two sheets of porous filter paper which are joined together and folded in the construction of the receptacle portion. Each of these sheets, if taken alone, being unable to effectively withstand the force of a direct stream of air from the tubular portion, but the combined sheets forming the double-wall is able to effectively withstand the force of such a direct stream of air without rupturing.

5 Claims, 10 Drawing Figures



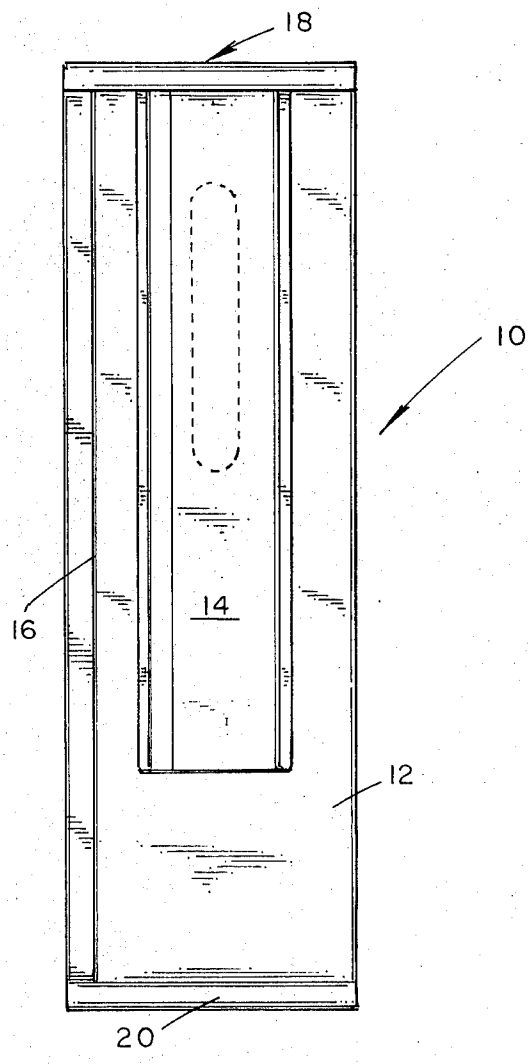
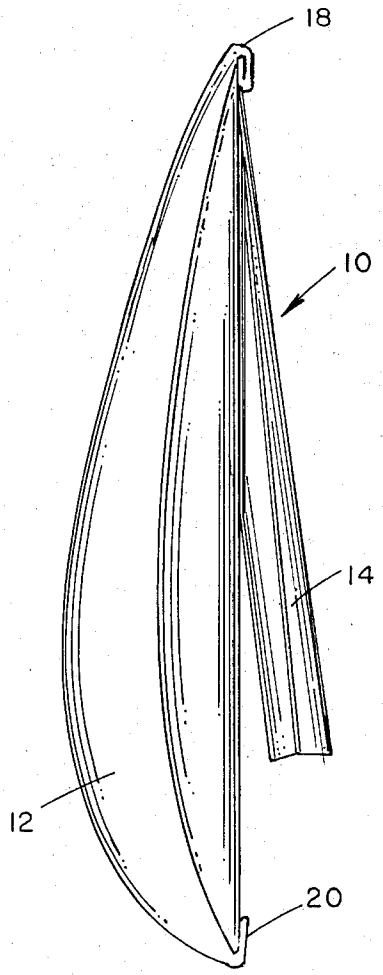


FIG. 1

FIG. 2



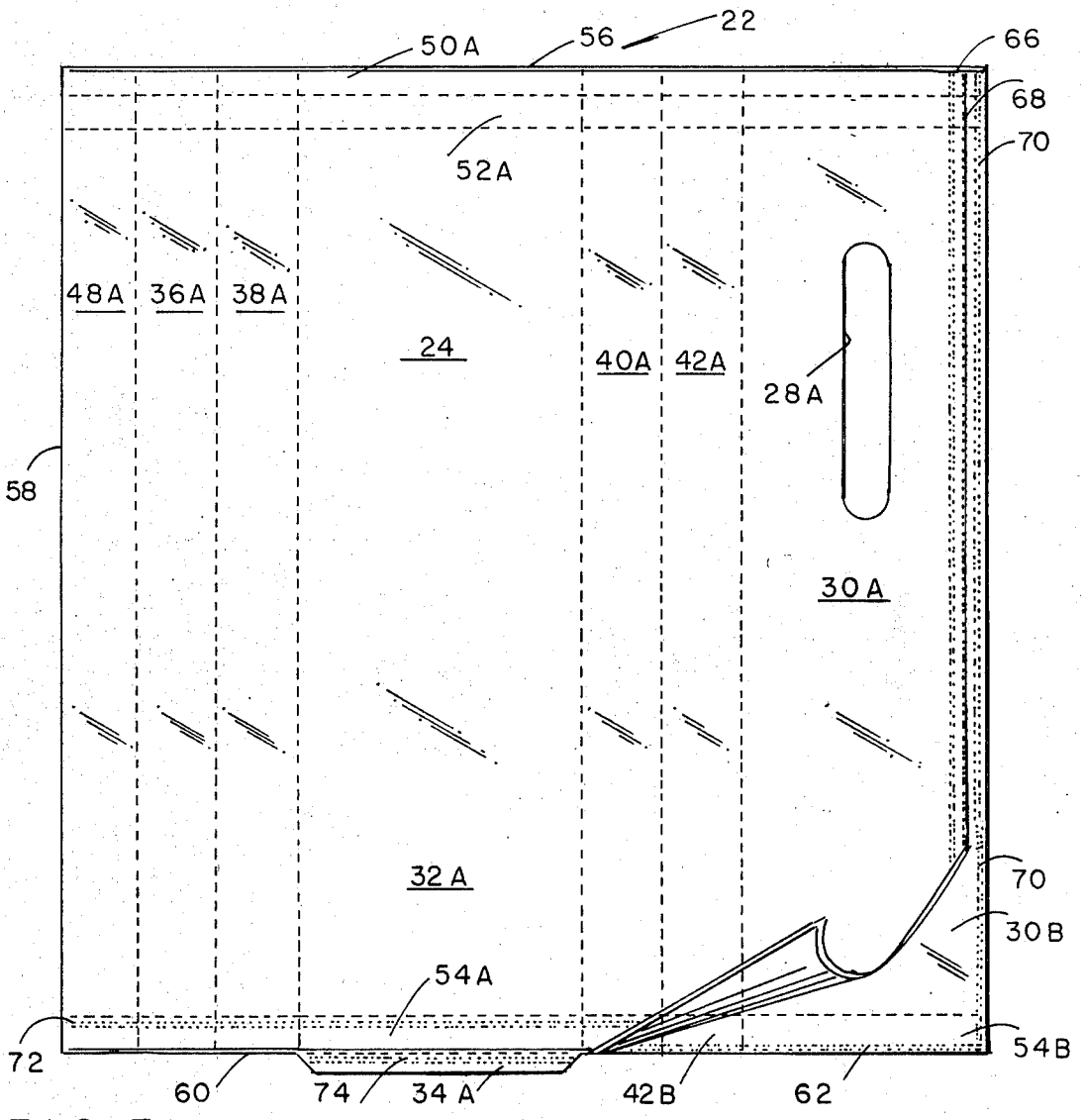

22
50A
56
66
68
70
52A
48A
36A
38A
24
40A
42A
28A
58
30A
32A
70
30B
54A
72
60
74
34A
42B
62
54B

FIG. 3

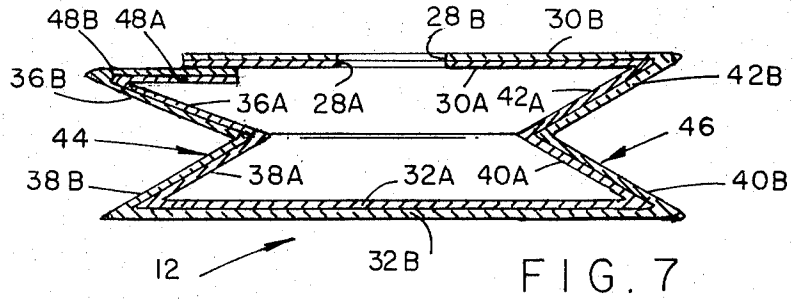
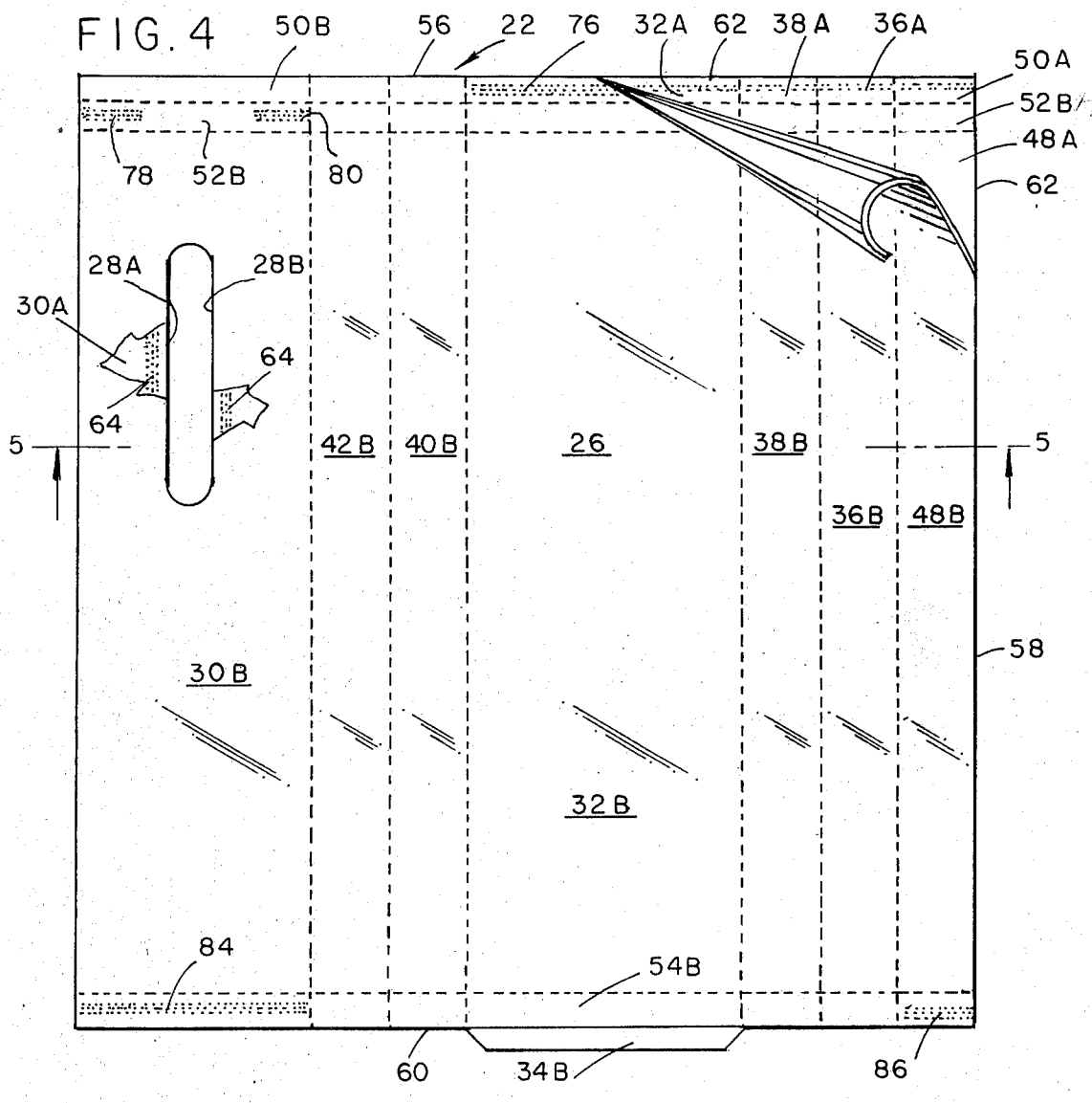

48B
48A
28B
30B
36B
42B
36A
28A
30A
42A
44
46
38B
38A
32A
40A
40B
12
32B

FIG. 7

FIG. 4


50B
56
22
76
32A
62
38A
36A
50A
52B
48A
62
78
52B
80
28A
28B
30A
64
64
5
42B
40B
26
38B
5
36B
48B
58
30B
32B
84
54B
60
34B
86

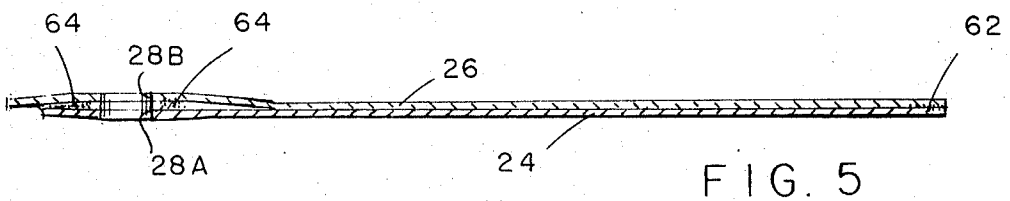

64
64
28B
26
62
28A
24

FIG. 5

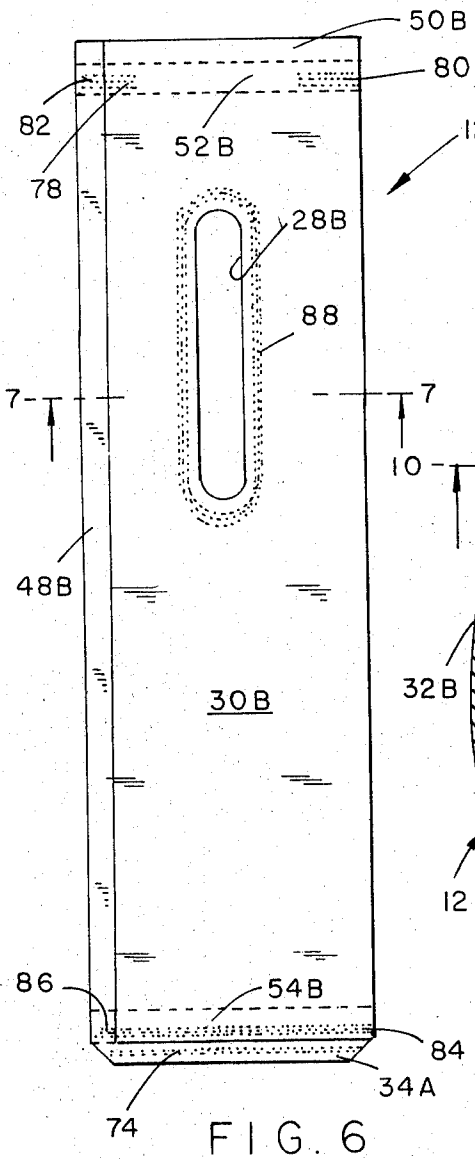


FIG. 6

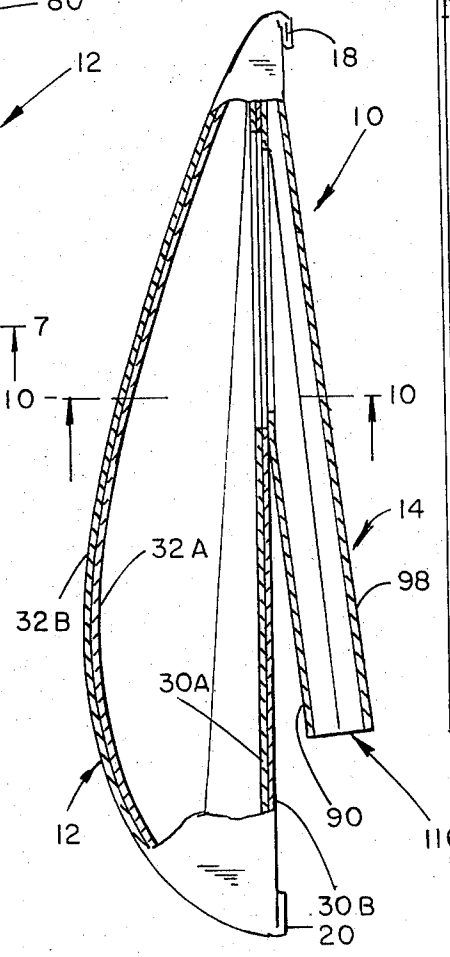


FIG. 9

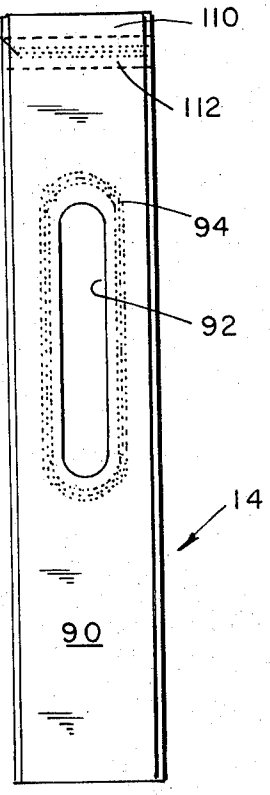


FIG. 8

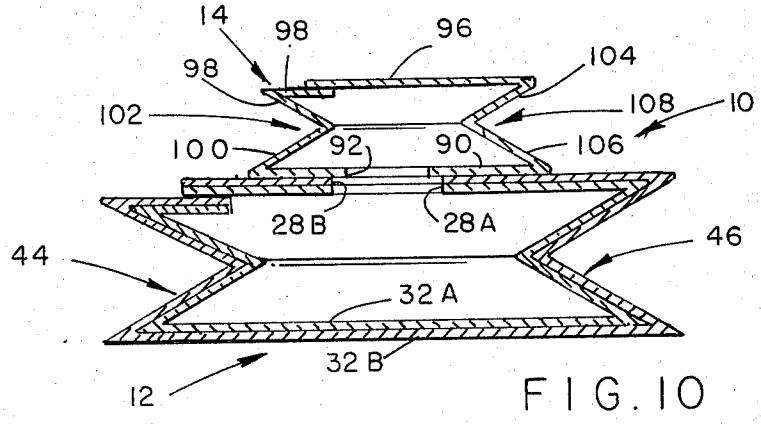


FIG. 10

DOUBLE-WALL VACUUM CLEANER FILTER BAG

BACKGROUND OF THE INVENTION

This invention relates to a vacuum cleaner filter bag, and more particularly to a double-wall vacuum cleaner filter bag useful for upright type vacuum cleaners.

U.S. Pat. No. 3,491,522 entitled VACUUM CLEANER FILTER BAG, granted to John J. Fesco on Jan. 27, 1970, discloses a similar bag comprising a main bag portion formed of a single sheet of porous or air pervious paper and a tubular portion of air impervious material. The main bag portion is formed of a single sheet of air pervious paper folded substantially in half along a top fold line and adhesively joined to define a receptacle structure having a bottom seam opposite the top fold line. The arrangement disclosed in this patent provides for the tubular portion to be affixed to the main bag portion at facing openings in each portion such that air passing through the tubular portion and into the main bag portion does not directly impinge against adhesive junctions or seals made in the formation of the main bag portion.

Unfortunately, the bag disclosed in the above-mentioned patent requires the single sheet of air pervious paper of the main bag portion to be considerably thick in order to effectively withstand the force of a direct stream of air from the tubular portion without rupturing. Accordingly, the cost of the thick porous paper makes this patented bag quite expensive. Additionally, because of the fold line along the top portion of the main bag portion, a large amount of adhesive is required in this patented bag to secure the tubular portion to the main bag portion. This adhesive is the only means used in connecting these two portions together.

SUMMARY OF THE INVENTION

This invention provides a vacuum cleaner filter bag comprising a main receptacle portion of air pervious material and a tubular portion of air impervious material, the tubular portion being affixed to the main receptacle portion at facing openings in each portion such that air passing through the tubular portion and into the main receptacle portion does not directly impinge against adhesive junctions or seals made in the formation of the main receptacle portion, the main receptacle portion including a double-wall formed from two sheets of porous filter paper which are joined together and folded to construct the receptacle portion, the combined sheets being able to effectively withstand the force of a direct stream of air from the tubular portion without repturing, whereby each of the sheets if taken alone being unable to effectively withstand such a force, the main receptacle portion including a longitudinally extending seam, a top folded seam and a bottom folded seam, the top folded seam closes the top portion of the tubular portion and also joins this top portion of the tubular portion to the top portion of the main receptacle portion.

Accordingly, an object of the present invention is to provide an improved vacuum cleaner filter bag which overcomes the disadvantages of the prior art bags.

Another object of the present invention is to provide a filter bag which is readily adaptable to or modifiable for use in any upright vacuum cleaner.

A further object of the present invention is to provide a filter bag which is durable and inexpensive.

A still further object of this invention is to provide a filter bag having a double-wall main receptacle portion formed from two sheets of porous filter paper which is able to effectively withstand the force of a direct stream of air from the tubular portion of the filter bag without rupturing.

Yet another object of this invention is to provide a filter bag with a tubular portion affixed to a main receptacle portion whereby a top folded seam closes the top portions of both the tubular portion and main receptacle portion, and also joins these top portions together.

And yet another object of this invention is to provide a filter bag in which the adhesive bag seals are not readily ruptured by air passing through a tubular portion of the bag and into a main bag portion thereof.

And still yet an additional object of the present invention is to provide a filter bag having the objectives as mentioned which may be readily and efficiently manufactured at low cost.

BRIEF DESCRIPTION OF THE DRAWINGS

Having in mind the above and other objects that will be evident from an understanding of this disclosure, the invention comprises the devices, combinations and arrangements of part as illustrated in the presently preferred embodiment of the invention which is hereinafter set forth in such detail as to enable those skilled in the art readily to understand the function, operation, construction and advantages of it, when read in conjunction with the accompanying drawings, in which:

FIG. **1** is a front elevational view of the constructed double-wall vacuum cleaner filter bag in accordance with the present invention, showing the apertures in dotted lines;

FIG. **2** is a side elevational view of the bag in an expanded condition;

FIG. **3** is a plan view of the blank of the receptacle portion of the bag, showing the inner surface thereof;

FIG. **4** is a plan view of the blank of the receptacle portion of the bag, showing the outer surface thereof;

FIG. **5** is a sectional view of the blank taken along line **5—5** of FIG. **4**;

FIG. **6** is a front elevational view of the receptacle portion of the bag, stippled for adhesive;

FIG. **7** is a sectional view of the receptacle portion of the bag taken along line **7—7** of FIG. **6**;

FIG. **8** is a rear elevational view of the connecting tube portion of the bag, stippled for adhesive;

FIG. **9** is a front elevational view, partially sectional and fragmented, illustrating the bag in an expanded condition; and

FIG. **10** is a sectional view of the bag taken along line **10-10** of FIG. **9.**

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the figures of the drawings in detail for purposes of illustration, FIGS. **1** and **2** show the invention in an assembled condition to define a vacuum cleaner filter bag **10.** The bag **10** includes a receptacle portion **12** joined to a connecting tube portion **14** of air impervious material. The receptacle portion **12** includes a double-wall formed from two sheets of porous filter paper which are joined together and folded in such a manner, as will be set forth in more detail hereinafter below, to provide a longitudinally extending seam **16,** a top folded seam **18** and a bottom folded

seam **20**. The top folded seam **18** also closes the top portion of the connecting tube portion **14** and joins same to the receptacle portion **12**. FIG. **2** shows the bag in an expanded condition, with the receptacle portion **12** ready to receive and hold the dust and dirt particles therein, the particles being obtained from the dust-laden air forced through the tube portion **14** by the air-directing means of the vacuum cleaner (not shown).

FIGS. **3** and **4** show the blank **22** used to form the receptacle portion **12**, with FIG. **3** showing the inner surface thereof and FIG. **4** showing the outer surface thereof. A sheet **24** of porous filter paper is superposed over a sheet **26** of porous filter paper to form the blank **22**. The sheet **24**, which forms the inner surface or lining of the receptacle portion **12**, is preferably not as strong as the sheet **26**, which forms the outer surface or layer of the receptacle bag **12**. Accordingly, inner sheet **24** can be made from a less-expensive porous paper, and can be made thinner in cross-section than the outer sheet **26**, where the outer sheet **26** can also be made from a less-expensive porous paper which is more porous. The combined sheets **24** and **26** will effectively withstand the air pressure or force within the receptacle portion **12** when in use, by retaining the dust and dirt particles therein without a rupture, break or tear. It is noted that the combination of sheets **24** and **26** is less porous than each of these sheets **24, 26** taken separately.

The thinner inner sheet **24**, if taken alone, would not be able to withstand this air pressure or force without rupturing. Though the thicker outer sheet **26** may be able to withstand this air pressure or force without rupturing, the outer sheet **26** by itself would not be effective because of its increased porosity. Accordingly, the above-mentioned air pressure would force the dust and dirt particles through the single sheet **26**, if taken alone, making this sheet **26** ineffective. This is particularly true each time the vacuum cleaner is started, at which time the air pressure or force is at its greatest.

However, it should be noted that both the inner and outer sheets **24** and **26** can be made from the same type or quality of porous paper, wherein the combined thickness of these two sheets would effectively withstand the air pressure or force exerted in the bag **10**, and still provide a blank that is less expensive than and just as effective as a similar blank having the same cross-sectional thickness but made from a single sheet of porous paper. The cost of the porous paper used in vacuum cleaner filter bags is not directly proportional to its thickness, where the cost of the paper increases exponentially in relationship to the thickness of the porous paper. For example, doubling the thickness of the paper may increase the cost thereof four times the amount of the original cost. Therefore, the cost of two of these sheets combined would be only half the cost of a single sheet having the same thickness and effectiveness as the combined sheets. Additionally, a single sheet of porous paper may have a higher cost than the combined sheets of porous paper having a greater thickness than the single sheet, where each of the combined sheets is thinner than the single sheet. It should also be noted that each of the combined sheets, if taken alone, would not be able to effectively withstand the air pressure or force of a direct stream of air which impinges against the inner walls of the bag **10**, for the reasons stated above.

Each of the sheets **24** and **26** is provided with an elongated opening **28A** and **28B**, respectively, in the longitudinally extending front panels **30A** and **30B**, respectively, thereof. Each of the longitudinally extending rear panels **32A** and **32B** of the sheets **24** and **26**, respectively, is provided with a transversely extending bottom tab member **34A** and **34B**, respectively. Longitudinally extending panels **36A** and **38A** of the inner sheet **24** and longitudinally extending panels **36B** and **38B** of the outer sheet **26** together form one gusseted side wall **44** of the receptacle portion **12**. Longitudinally extending panels **40A** and **42A** of the inner sheet **24** and longitudinally extending panels **40B** and **42B** of the outer sheet **26** together form the other opposing gusseted side wall **46** of the receptacle portion **12**, as best shown in FIG. **7**. Additionally, both the inner sheet **24** and the outer sheet **26** are provided with a longitudinally extending front connecting panel **48A** and **48B**, respectively, the purpose of which will be set forth below.

The top folded seam **18** is formed from the transversely extending panels **50A** and **52A** of inner sheet **24** and the transversely extending panels **50B** and **52B** of outer sheet **26**. The bottom folded seam **20** is formed from the transversely extending panel **54A** of the inner sheet **24** and the transversely extending panel **54B** of the outer sheet **26**, together with the tab members **34A** and **34B**. As clearly shown in FIG. **3**, the outer front panel **30B** is transversely wider than the inner front panel **30A** to conceal the inner panel **30A**, as will be shown hereinafter below.

As shown in FIG. **5**, the sheet **26** is superposed over sheet **24** in such a manner that the openings **28B** and **28A** are in facing alignment with each other. Preferably, the sheets **24** and **26** are secured together, at least along three of the edges thereof, such as the top edge **56**, the side edge **58** and the bottom edge **60**, to prevent the sheets from shifting relative to each other during the forming of the receptacle portion **12**. A commercially available water-resistant adhesive **62**, well known in the art, is used to join the panels at these edges. Additionally, the inside portions around the opening **28A** are secured to the inside portions around the opening **28B** by a commericially available water-resistant adhesive **64**, as shown in FIGS. **4** and **5**. The tight seal around the openings **28A** and **28B** prevents air from going inside between the sheets **24** and **26** when the bag **10** is in use, which could cause the receptacle portion **12** to break or tear from this air pressure between the sheets, or which could allow the dust and dirt particles to escape from the bag **10**.

Prior to folding the blank **22** into the receptacle **12**, commercially available water-resistant adhesive stripes are provided on the blank **22** so that suitable pressure or other means can be utilized to firmly adhesively secure the panels of the blank **22** together to form the receptacle **12**. Three closely spaced, longitudinally extending adhesive stripes **66, 68** and **70** are provided, the stripes **66** and **68** being on the inner front panel **30A**, and the stripe **70** being on the outer front panel **30B**, as best shown in FIG. **3**. A transversely extending adhesive stripe **72** is provided across panel **54A**. Additionally, a transversely extending adhesive stripe **74** is provided across tab portion **34A**, as shown in FIG. **3**.

As shown in FIG. **4**, an adhesive stripe **76** is provided transversely across the rear panel **32B** at a top portion thereof within the panel **50B**. Two transversely spaced

apart adhesive stripes **78** and **80** are provided at a top portion of the front panel **30B** within the panel **52B**. Each of the stripes **78** and **80** are approximately a third of the width of the front panel **30B**. Additionally, a stripe of adhesive **82** is provided across an upper portion of front connecting panel **48B** within the panel **52B**, as best shown in FIG. **6.** A transversely extending adhesive stripe **84** is provided across a bottom portion of the front panel **30B** within panel **54B**, and an additional adhesive stripe **84** is provided across a bottom portion of panel **48B** within the panel **54B**.

To form the receptacle portion **12** of the bag **10,** the blank **22** is folded into the configuration shown in FIGS. **6** and **7.** Accordingly, the blank **22** is folded to form the gusseted side walls **44** and **46,** with the front panels **30A** and **30B** overlying the front connecting panels **48A** and **48B.** The panels **30A** and **30B** are pressed against the panels **48A** and **48B** so that the adhesive stripes **66, 68** and **70** join these panels together, and conceals the inner panel **30A,** as shown in the drawings, to define the seam **16.** At the same time, the adhesive stripe **72** joins the bottom portions of the inner panels together to close the bottom of the receptacle portion **12,** thereby maintaining the side walls **44** and **46** in a gusseted condition.

The panels **54B** and **54A** and tab members **34A** and **34B** are folded upwardly onto front panels **30B** and **48B** to provide an additional sealing of the bottom of the receptacle bag **12,** wherein the adhesive stripes **84, 86** and **74** secure these panels together to form the bottom fold **20,** as shown in FIG. **9.** An additional adhesive stripe **88,** preferably water-resistant, is provided around the opening **28B** of the front panel **30B** for joining the connecting tube portion **14,** as set forth hereinbelow.

FIG. **8** shows the connecting tube portion **14,** formed from an air impervious material such as paper, in a folded condition ready for attachment to the receptacle portion **12.** As best shown in FIGS. **9** and **10,** the connecting tube portion **14** includes a rear panel **90** provided with an elongated opening **92** for association with the openings **28A** and **28B** of the receptacle portion **12.** The opening **92** may be the same size as the openings **28A** and **28B,** or may be slightly smaller thereof, as shown in FIGS. **9** and **10,** to prevent the stream of air from impinging against the sides of the openings **28A** and **28B.** An adhesive stripe **94,** preferably a water-resistant adhesive, is provided around the opening **92** of the rear panel **90** of the connecting tube portion **14** for joining the connecting tube portion **14** to the receptacle portion **12.**

The connecting tube portion **14** also includes a pair of longitudinally extending front panels **96** and **98,** which are joined together in an overlapping arrangement by a commercially available water-resistant adhesive disposed longitudinally therebetween. Longitudinally extending side panels **98** and **100** form one gusseted side wall **102,** with longitudinally extending side panels **104** and **106** forming the other opposing gusseted side wall **108** of the connecting tube portion **14.** Transversely extending panels **110** and **112** form a portion of the top folded seam **18** as will be set forth hereinafter below.

An additional transversely extending stripe of adhesive **114,** preferably a water-resistant adhesive, is provided transversely across the rear panel **90** and the front panels **96** and **98** (not shown) at a top portion of each within the panel **112.** The lower end of the connecting tube portion **14** is left open at **116** for connection to a conventional vacuum cleaner discharge fitting (not shown). In accordance with convention practice, a spring-clamp, elastic ring or the like (not shown) can be used to ensure a close fit of the lower end of the connecting tube portion **14** around the end of the discharge fitting.

To join the connecting tube receptacle portion **12,** the tube rear panel **90** is placed against the receptacle front panel **30B** with the openings **92, 28A** and **28B** in facing alignment, as best shown in FIGS. **9** and **10.** Pressure is then applied against these panels so that the adhesive stripes **88** and **94** join these panels together around the openings therein. Additionally, adhesive stripe **114** joins the top portion of panel **90** to the top portion of panel **30B.** Top receptacle panels **50A** and **50B** and top tube panel **110** are folded over the top receptacle panels **52A** and **52B** and the tube panel **112,** so that the adhesive stripes **78, 80, 82** on receptacle panels **30B** and **48B** and the adhesive stripe **114** on tube panels **96, 98** hold these panels in a folded condition. These panels are then again folded over to form the top folded seam **18,** being held in the folded condition by the adhesive stripe **76** on the top portion of receptacle panel **32B.** Accordingly, the connecting tube portion **14** is held within the top folded seam **18** as best shown in FIG. **9,** wherein the vacuum cleaner filter bag **10** is now in its assembled configuration.

As shown above, in addition to the provision in the filter bag of this invention of placing the apertures in such a position so that an incoming air stream does not directly impinge against a structurally weaker portion of the bag such as an adhesive junction, this invention permits the use of thinner and less expensive porous paper for the formation of the receptacle portion. Though each of these sheets individually might not be able to effectively withstand the air pressure or force of a direct stream of air directly impinging thereagainst, the combination of these thinner sheets would effectively withstand such a force of a direct stream of air struck against the receptacle bag walls of this invention, as set forth above. The cost of these combined sheets is far less expensive than the cost of a single sheet of porous paper of the same thickness. It should also be noted that the increased cost for the manufacture of a double-wall bag is far less expensive than the saving in the cost of the porous paper.

Numerous alterations of the structure herein described would suggest themselves to those skilled in the art. However, it is to be understood that the present disclosure relates to a preferred embodiment of the invention which is for purposes of illustration only, and not to be construed as a limitation of the invention.

What is claimed is:

1. A vacuum cleaner filter bag comprising a receptacle portion of air pervious material and a connecting tube portion of air impervious material;

said receptacle portion including two sheets of said air pervious material joined together to define a double-wall front panel, a double-wall rear panel, double-wall side panels and top and bottom ends;

said double-wall front panel being provided with an opening extending through both of said two receptacle sheets;

first sealing means closing said bottom end of said receptacle portion;

said tube portion including a front wall, a rear wall, side walls, and top and bottom ends;

said rear wall being provided with an aperture therethrough;

joining means securing said tube rear wall against said receptacle front panel with said tube aperture in facing communication with said receptacle opening;

said bottom end of said tube portion being open for connection to a vacuum cleaner discharge fitting;

second sealing means joining said top ends of said receptacle and tube portions together and also closing both of said top ends;

said second sealing means being a double-folded seam provided with an adhesive for retaining said tube top end within said receptacle top end in a folded condition to close both of said top ends;

said two receptacle sheets together being able to effectively withstand a force of a direct stream of air passing through said tube portion into said receptacle portion while retaining dust and dirt particles without rupturing, each one of said two receptacle sheets taken alone being more porous than said two receptacle sheets together and being unable to effectively withstand said force;

one of said receptacle sheets, defining an inner lining of said receptacle portion, being thinner than the other one of said receptacle sheets which defines an outer layer of said receptacle portion; and

said inner lining taken alone being unable to withstand said force without rupturing.

2. A vacuum cleaner filter bag as claimed in claim **1**, wherein one panel of said other outer receptacle sheet is wider than a corresponding panel of said one inner receptacle sheet to conceal said one panel within a longitudinally extending seam of said receptacle portion.

3. A vacuum cleaner filter bag as claimed in claim **1**, wherein adhesive means are disposed between said two receptacle sheets to secure said receptacle sheets together and to prevent said receptacle sheets from shifting relative to each other.

4. A vacuum cleaner filter bag as claimed in claim **3**, wherein said adhesive means are disposed at least along three outer edges of said receptacle sheets on inner facing portions of said receptacle sheets.

5. A vacuum cleaner filter bag as claimed in claim **4**, wherein said adhesive means are also disposed on inside facing portions of said receptacle sheets around said opening extending through both of said two receptacle sheets to prevent air from going inside between said receptacle sheets.

* * * * *