Dec. 21, 1965 K. L. WADE 3,224,586

BAG ASSEMBLAGE

Filed Nov. 14, 1961 5 Sheets-Sheet 1

Fig. 1.

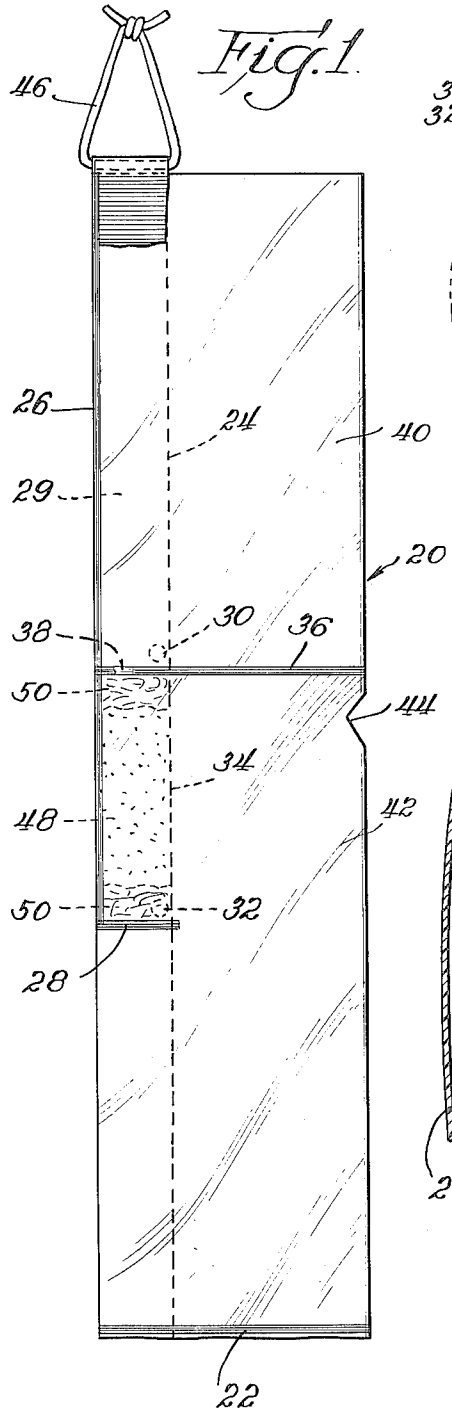


Fig. 2.

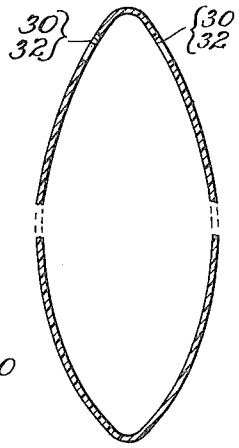


Fig. 3

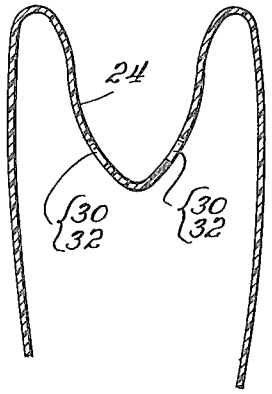


Fig. 4.

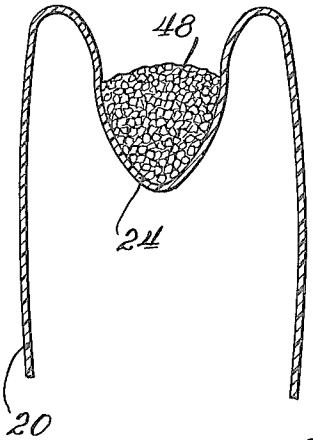
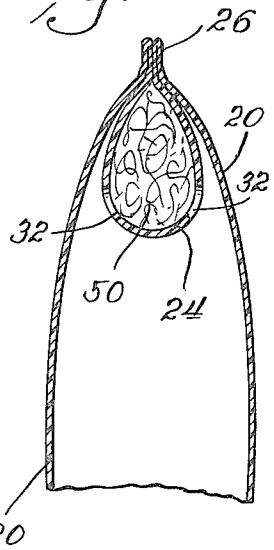


Fig. 5



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BAG ASSEMBLAGE

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Fig. 6.

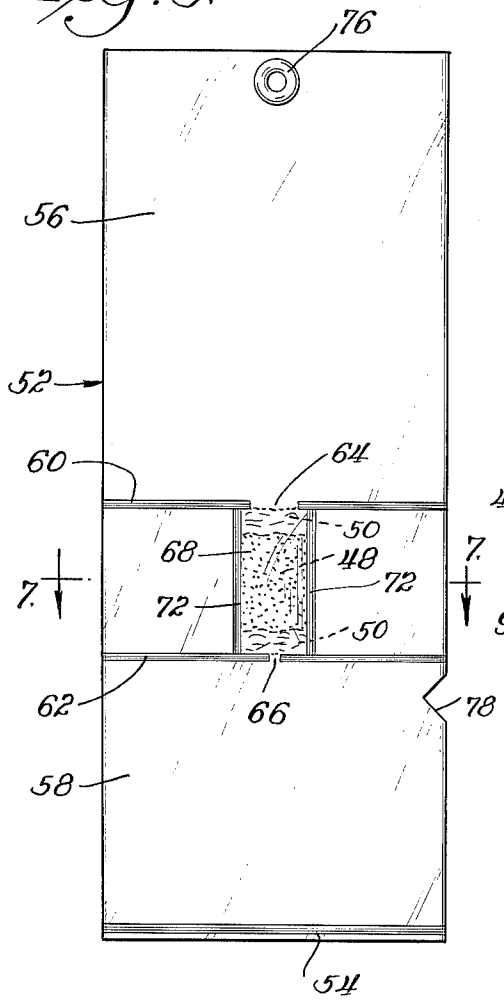


Fig. 8

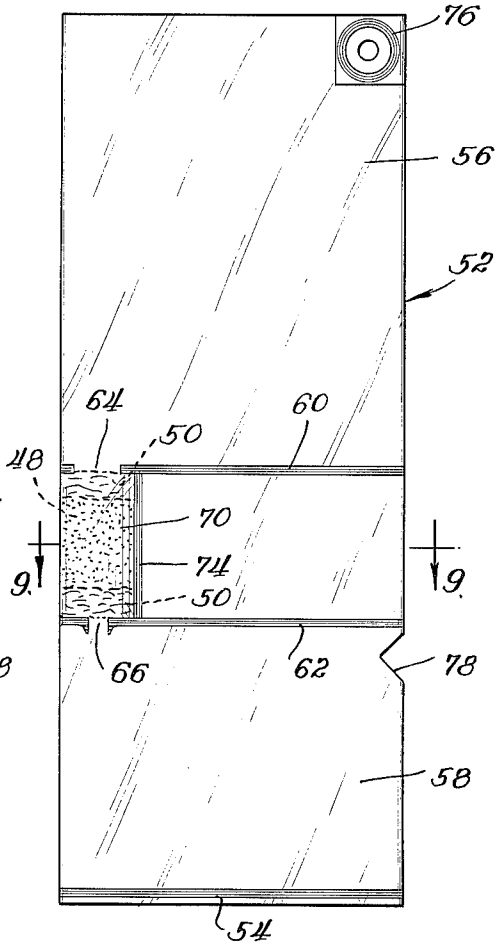


Fig. 7.

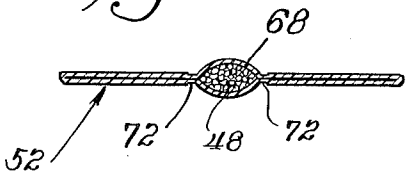
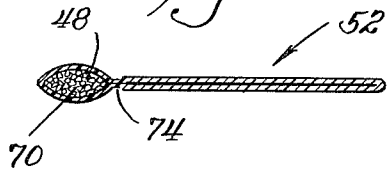


Fig. 9.



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BAG ASSEMBLAGE

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Fig. 10

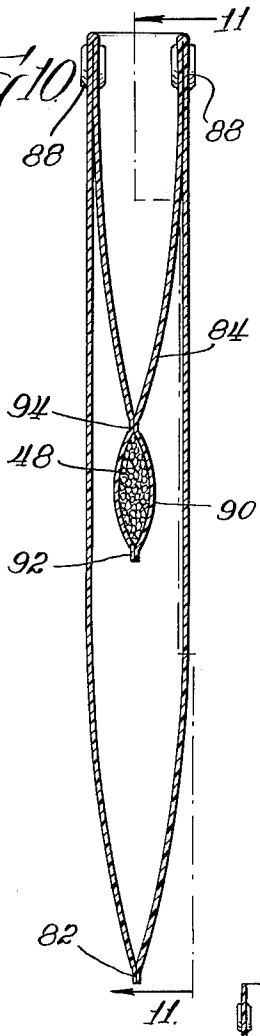


Fig. 11

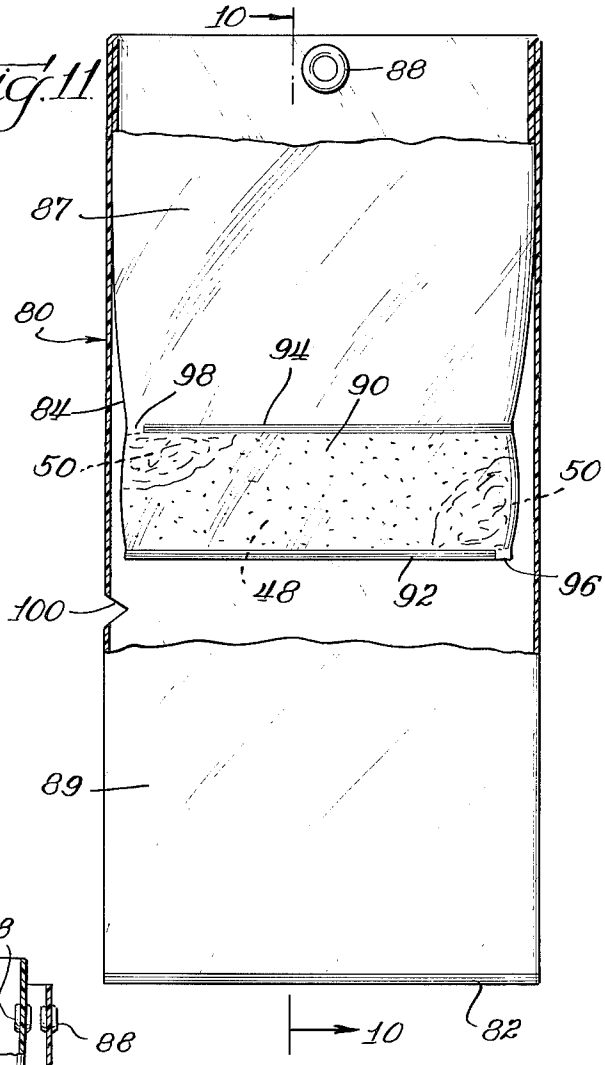
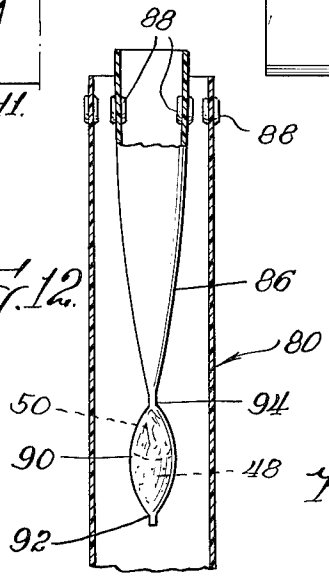


Fig. 12



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BAG ASSEMBLAGE

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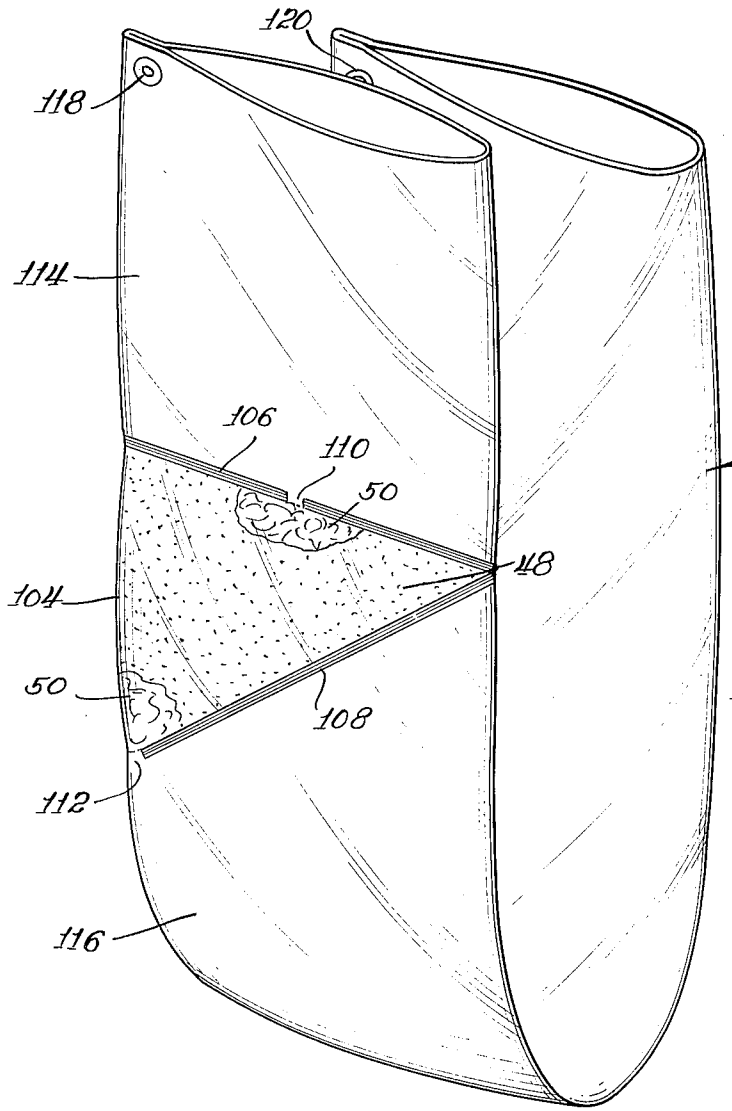

Fig. 13

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Fig. 14

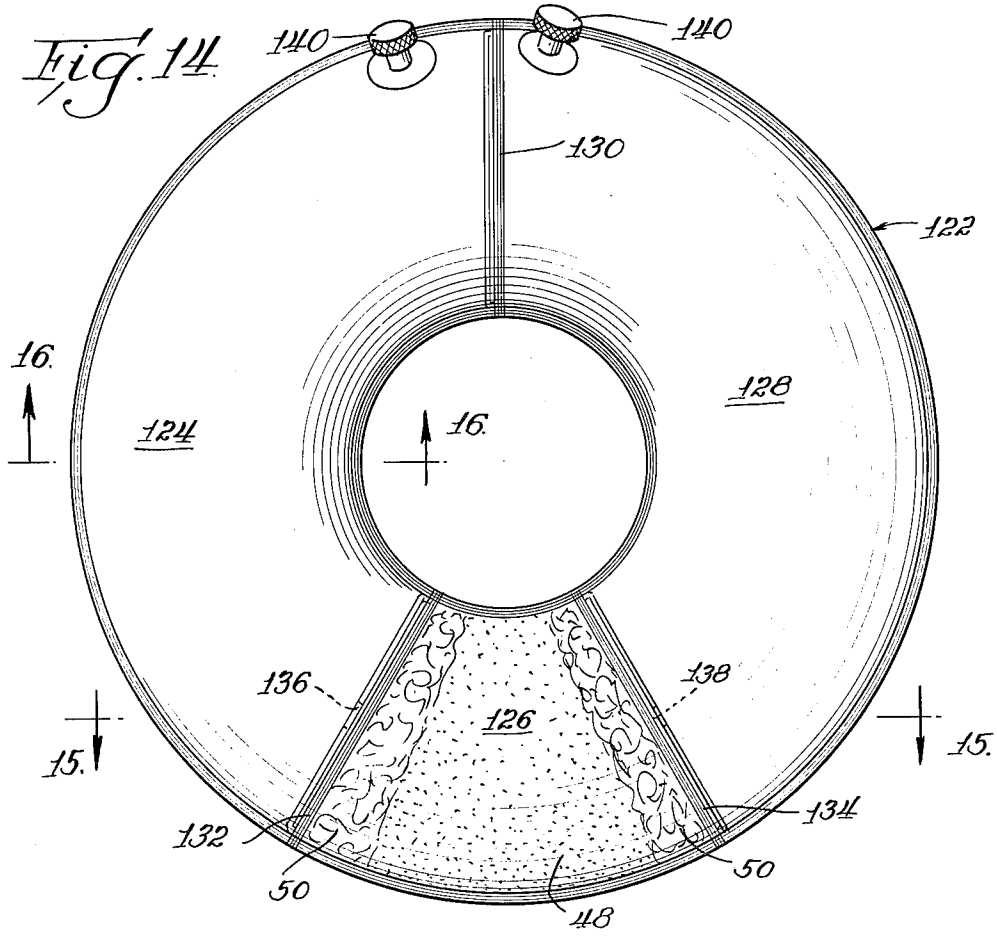


Fig. 15

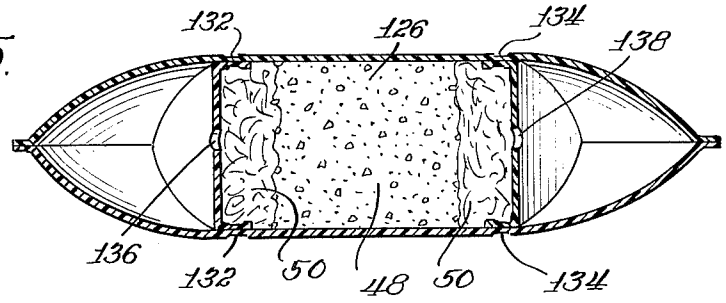
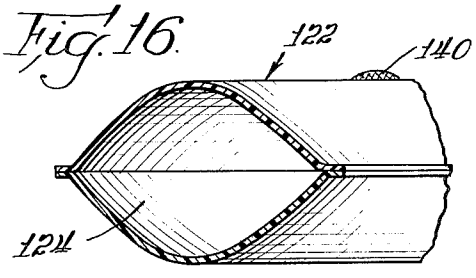


Fig. 16



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United States Patent Office 3,224,586 Patented Dec. 21, 1965

3,224,586

BAG ASSEMBLAGE

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Filed Nov. 14, 1961, Ser. No. 152,287
5 Claims. (Cl. 210—282)

This invention relates to a bag assemblage useable for removing impurities from a given quantity of liquid.

While the principles of the invention may be readily applied for removing almost any type of impurity from a given liquid, the inventive concept is especially directed to the problem of removing radioactive isotopes from water. Such type of water contamination may occur due to fallout resulting from a thermonuclear exposition(s). A bag assemblage made in accordance with the principles of the invention, may be easily stored, or carried about, for an indefinite period, and may be used as a ready and convenient means for treating radioactive contaminated water to make it potable. In addition to effectiveness for intended purpose, a bag assemblage made in accordance with the principles of the invention, is extremely simple in structure, and of low cost, thus making it available to the populace at large.

The main object of the invention is to provide a bag assemblage useable for removing impurities from a given quantity of liquid.

A more specific object is to provide a bag assemblage which may be used for treating radioactive contaminated water to make it potable.

Another object is to provide a bag assemblage for the stated purpose which may be easily stored, or carried about, for an indefinite period.

Still another object of the invention is to provide a bag assemblage for the stated purpose, which is simple in structure, and of low cost, thus making it easy to use, and available to the populace at large.

These and further objects and features of the invention will become more apparent from the following description and accompanying drawings wherein:

FIG. 1 is an exterior view of a bag assemblage illustrative of an embodiment of the invention;

FIGS. 2, 3, 4 and 5 are cross-section views as taken through the bag of FIG. 1 during various steps in the process of fabrication;

FIG. 6 is an exterior view of a bag assemblage illustrative of another embodiment of the invention;

FIG. 7 is a section view as generally seen along line 7—7 in FIG. 6;

FIG. 8 is an exterior view of a bag assemblage illustrative of another embodiment of the invention;

FIG. 9 is a section view as generally seen along line 9—9 in FIG. 8;

FIG. 10 is a section view, of a bag assemblage illustrative of another embodiment of the invention;

FIG. 11 is a section view as generally seen along line 11—11 in FIG. 10;

FIG. 12 is a fragmentary section view of a modification of the bag of FIG. 10;

FIG. 13 is a perspective-like view of a bag assemblage illustrative of another embodiment of the invention;

FIG. 14 is a plan view of a bag assemblage illustrative of still another embodiment of the invention;

FIG. 15 is a section view generally as seen along line 15—15 in FIG. 14; and

FIG. 16 is a section view generally as seen along line 16—16 in FIG. 14.

The bag assemblages with which the invention is concerned, may be made of any flexible, liquid impervious material, transparent or otherwise. However, the bag assemblages are preferably made of polyethylene, of the clear type, which is readily heat sealable to form liquid tight seams. In the alternative a liquid sealant, or glue, may be employed to form the seams. The bag assemblages may also be made in various colors, if desired, to convey certain information, such as, type of filter material, or to make the bag assemblage more noticeable so that it is easily spotted when desired, etc.

Referring now to FIGS. 1 to 5 inclusive, a bag assemblage 20 is shown, which is basically a tubular element, the lower end being closed by a liquid tight seam 22, while the upper end is left unsealed, or open. A gusset 24 is arranged to extend vertically along one edge of the bag, said gusset being formed by inwardly folding an edge of the tubular element. A liquid tight seam 26 is provided in the vertical direction for a major portion of the gusset, while a short liquid tight seam 28, extending the width of the gusset, is provided at a point somewhat below the midregion of the bag assemblage. A longitudinal cavity 29 is thus formed by the gusset. Prior to forming the gusset, a plurality of holes 30 and 32 are made in the tubular element, which holes are in vertical spaced relation. The section views, FIGS. 2 to 5, show these holes in vertical superimposed relation.

A filter compartment 34 is provided in the gusset, which compartment is defined by the lower seam 28, and a horizontal light tight seam 36, which traverses the width of the assemblage 20. An opening, or unsealed portion 38 is provided in the seam 36, which opening 38 is in the gusset 24. It will be seen that the holes 30 are located just above the seam 36, while the holes 32 are located just above the seam 28. The seam 36 separates the bag assemblage into an upper liquid receiving compartment, or container 40 and a lower liquid collecting compartment, or container 42.

Water placed in the upper container 40 will flow through the holes 30, and the opening 38, through the filter compartment 34 and out of the holes 32 into the lower compartment 42. A hole, or opening 44 formed in the upper end of the lower compartment, allows removal of filtered liquid from the lower compartment 42. A strap, or hanger means 46 is secured to the upper end of the bag assemblage 20 whereby the device may be hung in a vertical position during a filtering operation. Attention is directed to the fact, that while in the usual situation, the liquid will pass through the filter compartment 24 under the influence of gravity, if it is desired to accelerate the filtering operation, manual pressure may be applied to the liquid in the upper compartment 40. In such case, the top end of the upper compartment must be folded over to enclose the compartment. Such an operation, i.e., filtering with manual pressure, is easily realized due to the flexible nature of the bag material. It will be seen that accelerated filtering by application of manual pressure, which forces the water from one compartment to another, may be applied to the other bag assemblies described hereinafter.

The filter compartment 34 is adapted to receive, prior to seam forming operation, a filter material 48, which can be of many different types, depending upon the type and completeness of the required filtering requirements. For example, when preparing the bag assemblage 20 for use in filtering liquids, i.e., water which have been contaminated with radioactive fallout, filter material, such as an ion exchange resin may be utilized. Examples of such materials, are "Amberlite Monobed," a trademark of material produced by Rohm & Haas, or "Dowex" an anion and cation exchange resin produced by the Dow Chemical Company.

The "Amberlite Monobed" material includes a color agent for indication of degree of exhaustion of the material, which may be desirable under certain conditions of use. Toward each end of the filter material in the compartment 34, a wad, or quantity of strainer material 50,

may be advantageously disposed. Such material may be, for example, cotton, steel wool, a plastic porous plug, such as one made of polyurethane, or any other type of non-toxic fibrous or strainer type material. In such manner, water or other liquid entering the filter chamber **34** will be strained to remove certain impurities, while the water leaving said chamber will not carry along any of the filtering material.

A modified embodiment of the invention is illustrated in FIGS. 6 to 9, which embodiment functions in substantially the same manner as the embodiment above described. A bag assemblage **52**, formed of a tubular element is provided with a horizontal liquid tight seam **54**, which traverses the width of the element, the opposite, or upper end of the tubular element being unsealed, or open. The tubular element **52** is divided into an upper liquid receiving compartment, or container **56**, and a lower liquid collecting compartment, or container **58**, by means of two horizontal liquid tight seams **60** and **62**, which traverse the width of the tubular element. The upper seam **60**, is provided with an opening, or unsealed portion **64**, while the lower seam is provided with an opening, or unsealed portion **66**, each opening being formed in the end portion of a filter compartment **68** (FIG. 6) or **70** (FIG. 8).

Vertically extending liquid tight seams **72** define the side walls of compartment **68**, while a vertically extending liquid tight seam **74** defines one side wall of the compartment **70**, the other side wall of said compartment being formed by the folded edge of the tubular element. It will be seen that the only difference between the bag assemblage of FIG. 6 and FIG. 8, is the lateral positioning of the respective filtering compartments, that of FIG. 6 being centrally located, while that of the FIG. 8 illustration being along one edge of the bag assemblage. Each filter compartment has filtering material **48** and strainer material **50**, as in the case of bag assemblage **20**. It will be noted that in each of the bag assemblies of FIG. 6 and FIG. 8, liquid flow from compartment **56** to compartment **58**, will be in a vertically downward direction, when the bag is positioned as illustrated during a filtering operation.

A reinforced hole, or grommet **76** is positioned centrally at the upper end of the bag assemblage of FIG. 6, while a similar grommet **76** is positioned at the upper right corner extremity in the FIG. 8 assemblage. The holes **76** allow suspension of the bag assembly during a filtering operation. A hole, or opening **78** is formed in the upper right hand corner of the lower compartment **58** of the bag assemblies of FIG. 6 and FIG. 8, which allows pouroff of the filtered water therein when desired.

The embodiment of the invention illustrated in FIGS. 10 to 12 inclusive, differs primarily from those above described in that the filter compartment is horizontally disposed. While the horizontal arrangement of the filtering compartment may not be as efficient i.e., effective as one that is vertically disposed, certain advantages, such as, ease of construction, or fabrication, may be associated with the embodiment shown in FIGS. 10 to 12.

Referring now to the drawings, a bag assemblage **80**, is shown which is in the form of a tubular element having a liquid tight seam **82** formed along a bottom edge. An interior bag means **84** is arranged within the tubular element to provide an upper compartment. The interior bag means **84** can be an integral part of the tubular element, formed by turning the tubular element inside-out, as best seen in FIG. 10; or it may be a separate bag **86**, see FIG. 12, which can be heat sealed along the top edge to the tubular element after it is positioned, therein. In either case, an upper liquid receiving container, or compartment **87** is provided by the bag means **84**, or **86**, while a lower liquid collecting container, or compartment **89** is provided by the tubular element **80**.

A reinforced hole means **88** is arranged in the upper portion of the bag assemblage **80**, so that it may be vertically suspended during a filtering operation.

A horizontally disposed filter compartment **90** is arranged in the lower region of the interior bag means **84**, or **86**, which compartment is formed by a liquid tight seal **92** at the bottom edge of the bag means, and a liquid tight seal **94** in spaced parallel relation to the seal **92**. The seals **92**, and **94** do not entirely traverse the bag width, seal **92** being short of the right side bag edge to form an opening **96**, while seal **94** is short of the left side bag edge to form an opening **98**. The filter compartment **90** is filled with filter material **48**, while a strainer material **50** is arranged at both ends of the compartment, for purpose as hereinbefore described. A hole, or opening **100** is formed in the edge of the tubular element in an upper portion of the compartment **89**, which hole allows filtered liquid to be drawn out of said compartment.

Operation of the bag assemblage illustrated in FIGS. 10 to 12, should be obvious. A liquid which is to be treated, or filtered, is placed in the interior bag means **84** or **86**, and is allowed to flow by gravity through the filtering compartment **90**, and into the lower compartment **89**. It will be noted that the arrangement of the filter compartment holes **98** and **96**, provide maximum distance for flow of liquid through the compartment, which results in a thorough filtering operation.

The above described embodiments incorporated either of two types of filter compartment arrangement, namely, vertically disposed (FIGS. 1 to 9 incl.) and horizontally disposed (FIGS. 10 to 12 incl.).

A third type of bag assemblage, which may be considered a combination of filter compartment arrangements as hereinbefore described, is shown in FIG. 13. As seen therein, a bag assemblage **102**, which basically is a tubular element, has a triangularly shaped filter compartment **104**, formed by a horizontally disposed liquid tight seam **106**, and an angularly disposed liquid tight seam **108**. Each seam is discontinuous i.e., seam **106** having an opening **110** at about mid-point, while seam **108** has an opening **112** at the lower extremity. In such manner, liquid will be allowed to flow from an upper liquid receiving compartment **114**, through the filter compartment **104**, and into a lower liquid collecting compartment **116**. Filter material **48**, and strainer material **50**, are arranged within the filter compartment **104**.

Unlike the embodiments hereinbefore described, the bag assemblage **102** may be left open at both ends as illustrated. In use, the bag assemblage **102** is suspended vertically using reinforced holes **118** and **120** formed at both ends of the tubular element. It will be noted that the volume of the lower compartment **116** may be easily varied by suspending the bag assemblage so that the holes **118** and **120** are at different elevations.

The bag assemblage **102** represents perhaps the simplest form of the inventive concept. It will, of course, be apparent that all of the embodiments disclosed herein operate in substantially the same manner, whereby an effective filter action is produced.

The embodiment illustrated in FIGS. 14 to 16, inclusive, affords special features which make it especially suited for certain conditions of use. Referring to FIG. 14, a bag assemblance **122** is shown, which is of toroidal shape, and may be formed by heat sealing the edges, in the manner illustrated. The bag assemblage **122** is divided into three compartments **124**, **126**, and **128**, by liquid tight seams **130**, **132**, and **134**. Seam **132** is provided with an opening **136**, while seam **134** is provided with an opening **138**.

Compartment **126**, which serves as a filter chamber, has a quantity of filter material **48**, as well as strainer material **50**, as hereinbefore described. Removable plug means **140** are arranged to close the compartments **124** and **128** in liquid tight manner.

In use, liquid to be treated is placed in either compartment **124**, or **128**, and is allowed to flow, by gravity, or manual manipulation, through the filter chamber **126**, into the compartment **128**, or **124**, as the case may be.

It will be obvious that the bag assemblage 122 affords use under conditions which would be inconvenient in the case of the other disclosed embodiments. For example, in case of an emergency situation, one could utilize the bag asemblage 122 while in a prone position, by manual manipulation, i.e., applying pressure to the liquid in compartment 124, and forcing it through the filter chamber 126 and into the compartment 128. The bag assemblage 122, may also be used by one partially submerged in water or adrift thereon, say a shipwreck survivor, to filter seawater, if need be, for life sustaining purposes. Other applications, or use situations, may be cited, wherein the bag asemblage 122 will be found to be especially well suited for use under the circumstances.

It will now be apparent that a bag assemblage made in accordance with the principles of the invention will satisfy all of the objectives set forth hereinbefore.

The foregoing description has been given in detail without thought of limitation since the inventive principles involved are capable of assuming other forms without departing from the spirit of the invention or the scope of the following claims.

I claim:

1. A bag assemblage formed of a flexible liquid impervious tubular element, a gusset formed along a longitudinal edge of said tubular element, which gusset has a liquid tight seam arranged to provide a longitudinal cavity, a liquid tight horizontally disposed seam in said tubular member arranged to form an upper liquid receiving compartment, and a lower liquid collecting compartment, said liquid collecting compartment being provided with a liquid tight seam closing the lower end thereof and being further formed to provide an opening in the upper region thereof for removal of liquid therefrom, a filter compartment arranged in said gusset, said gusset being formed with openings establishing fluid communication between said compartments to thus allow flow of liquid from the liquid receiving compartment, through the filter compartment, and into the liquid collecting compartment, and a filter material in the filter compartment.

2. A bag assemblage according to claim 1, wherein the material of the tubular element is a heat sealable thermoplastic.

3. A bag assemblage formed of a flexible liquid impervious tubular element, a liquid tight seam closing the lower end of the tubular element, a plurality of liquid tight seams in said tubular element arranged toward the mid-region of the tubular element forming an upper liquid receiving compartment and a lower liquid collecting compartment, said liquid collecting compartment having an opening in the upper end to permit release of liquid therefrom, said plurality of liquid tight seams being further arranged to form a longitudinally extending filter

compartment intermediate the liquid receiving compartment and liquid collecting compartment, said filter compartment being provided with openings establishing fluid communication between said compartments to thus allow flow of liquid from the liquid receiving compartment, through the filter compartment, and into the liquid collecting compartment, and a filter material in the filter compartment.

4. A bag assemblage formed of a flexible liquid imperivous tubular element, a plurality of liquid tight seams in said element arranged to form a liquid receiving compartment, a liquid collecting compartment, and a filter compartment interposed between said liquid receiving and liquid collecting compartments, one of said seams being horizontally disposed while another of said seams is at an angle to said horizontally disposed seam and forming therewith said filter compartment, said filter compartment being provided with openings in said seams establishing fluid communication between said compartments to thus allow flow of liquid from the liquid receiving compartment, through the filter compartment, and into the liquid collecting compartment, and a filter material in the filter compartment.

5. A bag assemblage of generally toroidal shape and formed of a flexible liquid impervious material, a plurality of liquid tight seams in said bag arranged to form in said bag a liquid receiving compartment, a liquid collecting compartment, a filter compartment disposed between the liquid receiving compartment and the liquid collecting compartment, said filter compartment being provided with openings establishing fluid communication between said compartments to thus allow flow of liquid from the liquid receiving compartment, through the filter compartment, and into the liquid collecting compartment, said liquid receiving compartment containing an inlet opening, said liquid collecting compartment containing a discharge opening, plug means removably affixed to said openings in said liquid receiving and liquid collecting compartments, and a filter material in the filter compartment.

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