

[54] **FILTER ASSEMBLY**

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[52] **U.S. Cl.** **55/381; 55/500; 55/521;**
210/493

[51] **Int. Cl.**..... **B01d 27/06; B01d 29/18**

[58] **Field of Search** 55/378, 498, 361, 365,
55/373, 380, 381, 491, 492, 500, 501, 368,
502, 508, 510, 529, 521, 488, 489, 363, DIG.
5, DIG. 11, DIG. 33; 210/487, 493; 4/142, 149

[56] **References Cited**

UNITED STATES PATENTS

1,109,372	9/1914	Thurman	55/379 X
1,564,178	12/1925	Orem	55/380 X
1,737,313	11/1929	Kamrath	210/493 X
2,355,714	8/1944	Eberman.....	55/521 X
2,545,648	3/1951	Byrne.....	4/149
3,122,397	2/1964	Mintz.....	4/142
3,698,161	10/1972	Brixius et al.	55/521 X

FOREIGN PATENTS OR APPLICATIONS

21,200	9/1912	United Kingdom.....	55/508
1,072,700	3/1954	France	55/500

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Attorney, Agent, or Firm—Brown, Murray, Flick & Peckham

[57] **ABSTRACT**

A conically-shaped cloth bag having a plurality of rings made of flexible plugged tubes sewed into the bag in parallel planes spaced along the bag axis, beginning with the truncated conical apex thereof by amounts corresponding to the height of the desired final filter assembly. A plurality of pairs of cloth support tabs are sewed at opposite ends of a diameter of each sewed ring where each tab has a center line falling in a common plane passing through the bag axis and a reinforcing grommet with an aperture there-through having its center in the common plane. The bag includes a pair of rod-supporting gaskets having holes positioned approximately in said plane with the line passing through the gasket holes being spaced from the largest ring plane by an amount corresponding to the uniform spacing of said ring planes. The filter assembly is constructed by turning the bag inside-out and supporting said rings in a common plane by passing a rod through said grommets to support said sewed rings by means of the supporting tabs attached thereto.

6 Claims, 10 Drawing Figures

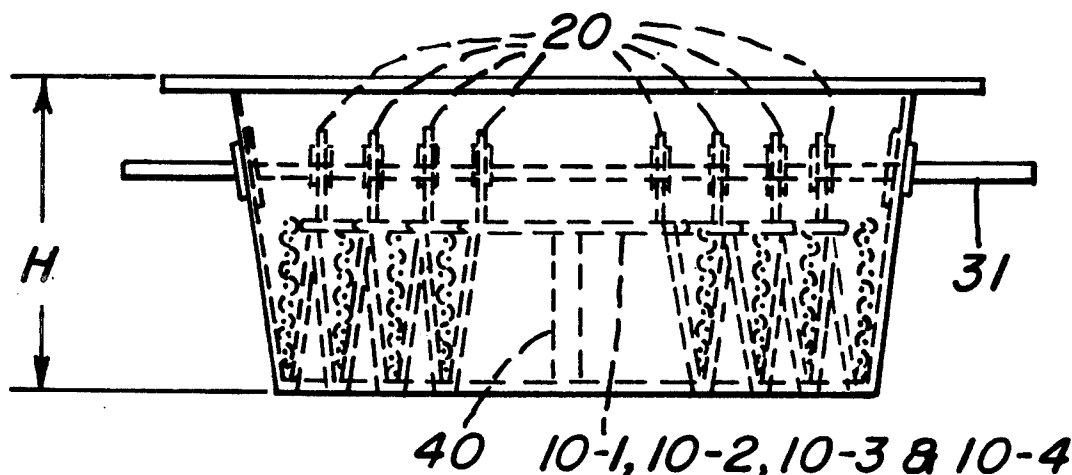


FIG. 1.

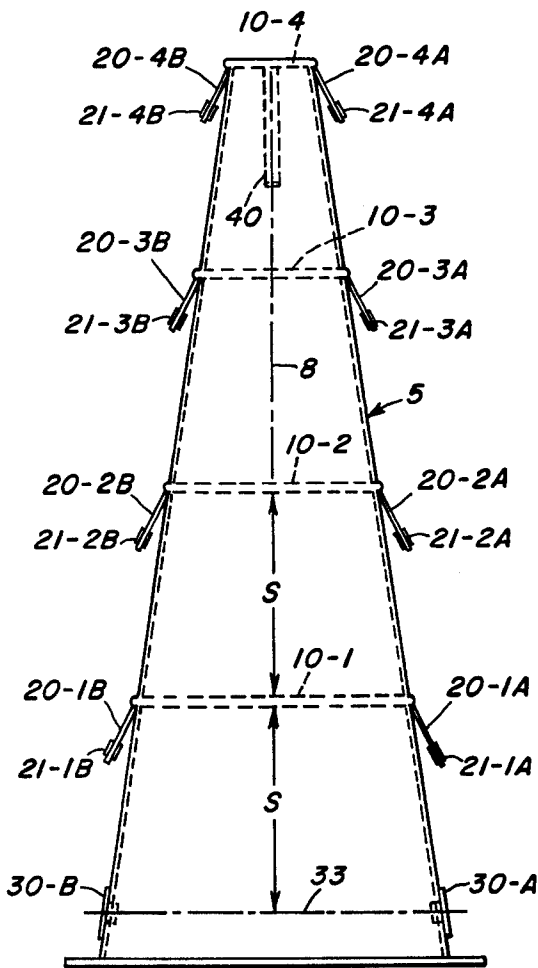


FIG. 2.

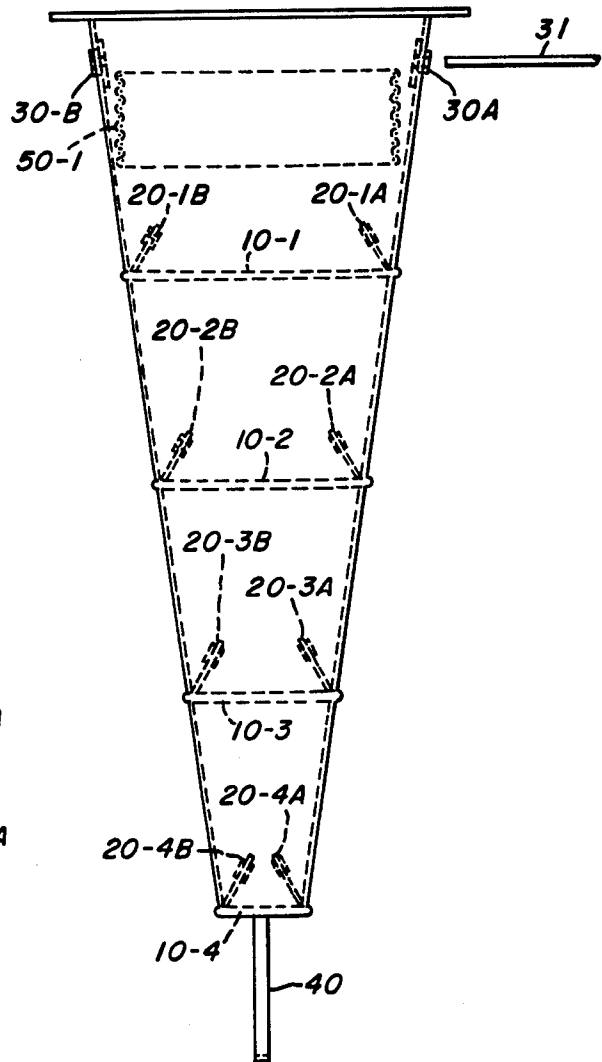


FIG. 3.

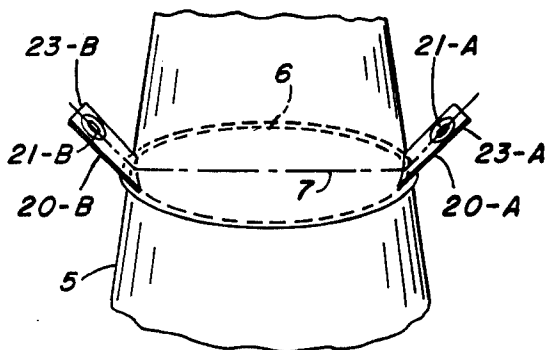


FIG. 4-1.

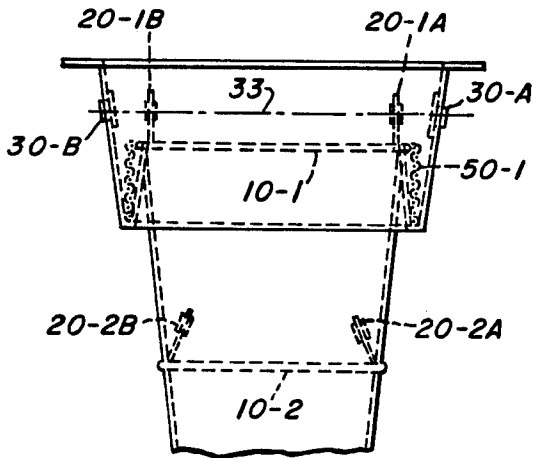


FIG. 4-2.

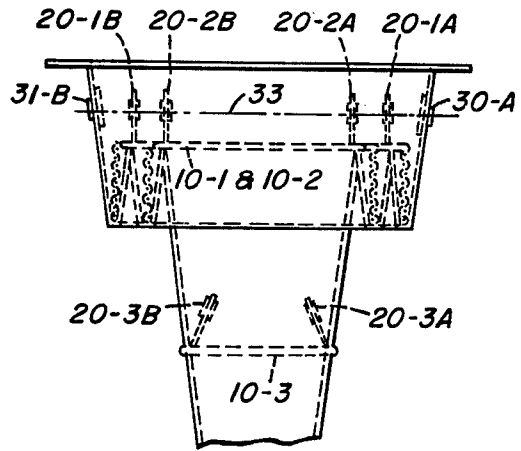


FIG. 4-3.

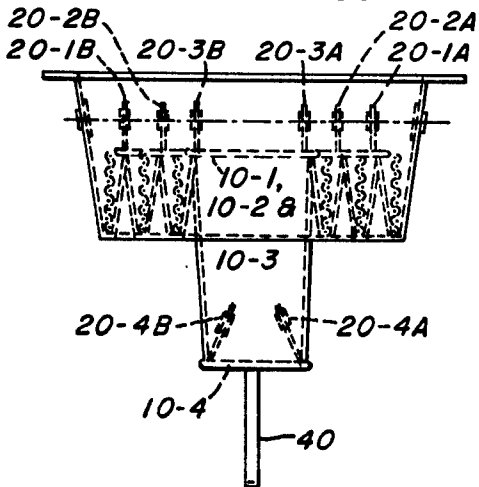


FIG. 4-4.

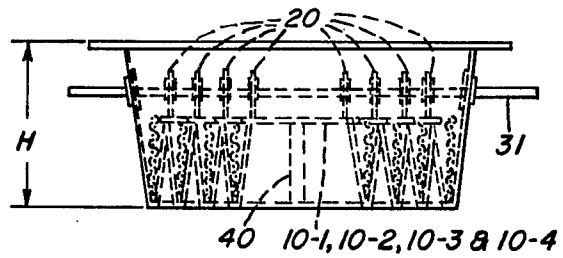


FIG. 5.

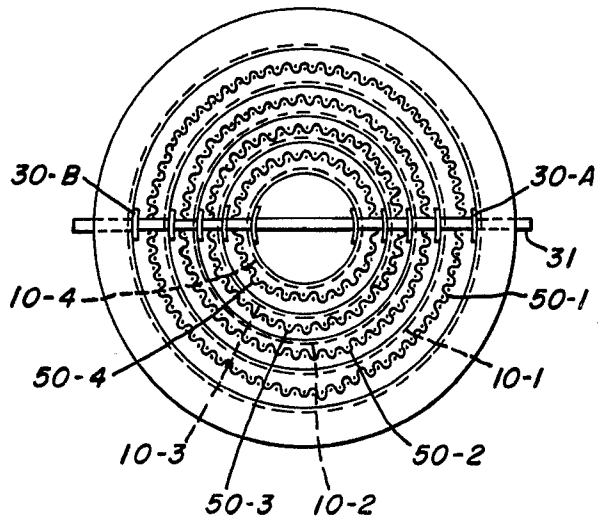


FIG. 6.

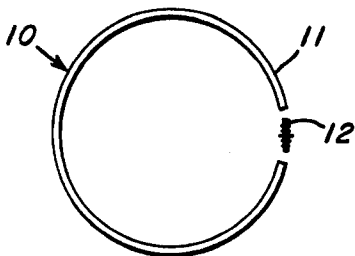
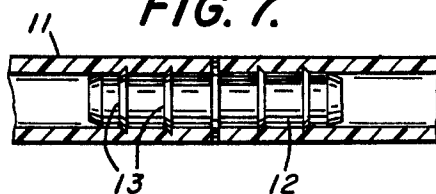


FIG. 7.



FILTER ASSEMBLY

BACKGROUND OF THE INVENTION

Truncated conical cloth bags having the general configuration of that used according to the present invention have been used in the prior art. These bags have been furnished along with an assembly kit comprising a plurality of metal rings, metal clamps, and a supporting rod. A filter assembly is then constructed by placing the metal rings outside the bag in spacing planes corresponding to the desired final assembly height and attaching metal clamps through the inside of the bag around the rings so as to hold the rings in the proper place and further to provide ring support. The clamps must be positioned properly so that the center line of the clamps, through which there is a supporting hole, are aligned to correspond to a final support line along which the metal rod is passed. The prior art assembly employs supporting gaskets similar to those used according to the present invention and a similar type of metal supporting rod. It has been found, however, that the various metal parts make the assembly more expensive than it should be and the procedure for constructing the final assembly is too complicated and, therefore, requires excessive labor. Various kinds of prior art filter assemblies using metal clamps and supporting elements of the various types may be found in the following U.S. Pat. Nos. 2,640,560; 3,249,228; 3,273,321; 3,368,331; and 3,394,534.

SUMMARY OF THE INVENTION

The present invention considerably simplifies the construction of the filter assembly and eliminates the expensive metal parts required in the prior art practice by sewing flexible tube rings into the cloth bag in the desired support planes and, at the same time, supporting cloth tabs are sewn to opposite ends of a diameter of each ring such that all diameters fall in the same plane and the center line of all supporting tabs also fall in this common plane which passes through the axis of the conically-shaped bag.

By sewing inexpensive flexible tube rings at the desired support plane levels, the desired support is provided, thus reducing the cost of parts and, at the same time, the assembly procedure is then considerably simplified because these planes of support are definitely established and the supporting tabs replace the cumbersome and difficult to handle metal clamps. Thus, the approach of the invention reduces the expense of the filter assembly as well as the cost of labor in completing the final assembly.

As the result of the reduced expense of the filter assembly of the invention, it becomes economically feasible to market these assemblies as disposable items. Thus, in contrast to the prior art practice where the expensive metal parts must be re-used as part of the assembly kit, the present invention makes it possible to minimize the assembly labor and then to dispose of the filter bag after it has served its purpose.

The above and other objects and features of the invention will become apparent from the following description taken in connection with the accompanying drawings which form a part of this specification, and in which:

FIG. 1 shows a truncated conically-shaped bag with rings and supporting tabs sewed thereto;

FIG. 2 shows the bag turned inside-out as the first step in beginning the filter assembly;

FIG. 3 shows the manner in which the rings are sewed into the bag along with associated supporting tabs;

FIGS. 4-1 through 4-4 show various steps in the final assembly procedure according to the invention;

FIG. 5 shows a top view of the final assembly;

FIG. 6 shows a suitable ring and plug arrangement which may be used according to the present invention; and

FIG. 7 shows the manner in which the plug connects the ends of the flexible tube used in the ring of the invention.

Reference is now made to FIG. 1 where it will be noted a cloth bag 5 has a plurality of rings 10 sewed into various parallel planes along axis 8 of the bag. At the ends of a diameter of each sewed ring supporting tabs 20 are sewed, each supporting tab having an associated grommet 21 establishing an aperture there-through. The center lines and grommet holes of the supporting tabs are set by the proper sewing of the tabs to lie in a common plane. After bag 5 is turned inside-out, the supporting tabs 20 may be drawn through the then inside of the bag to the top as is more clearly set forth in FIG. 2. Then the grommets of the supporting tabs may be aligned along a common line 33 for support. This will be discussed in further detail with reference to FIGS. 4-1 through 4-4.

After the rings are sewed into place, parallel planes are established with a spacing S corresponding to the height H of the final assembly shown in FIG. 4-4. It will be understood that the figures herein presented do not represent the actual shape of the total assembly. It may be desired in actual practice, for example, to make spacing S many times larger than it is shown with respect to the diameter of the largest ring 10-1.

Supporting gaskets 30 are sewed at opposite ends of a line 33 which is parallel to the ring support planes and lies in the same plane as the center lines of tabs 20. These center lines are not visible in FIG. 1 but are represented in FIG. 3 as lines 23-A and 23-B for the right and left-hand tabs, respectively. It will be understood that, in the notation herein employed, various reference numerals are generic to a group of elements. For example, reference 23-A represents all of those center lines of tabs on the right side. That is, the center line for tab 21-1A is represented as 23-1A and the center line for tab 21-3A is represented as center line 23-3A. In a similar manner, all of the tabs on the left side in FIG. 1 may be represented as tabs 20-B with a specific example being tab 20-2B providing the left-hand support tab for ring 10-2.

In FIG. 2, bag 5 with sewed rings, tabs and gaskets is shown turned inside-out, having been put in this position by pulling strap 40 which is sewed into the inside as shown in FIG. 1 to pull the smallest ring 10-4 through the inside of the bag to the position shown in FIG. 2. This is the step which is performed just prior to the final assembly steps shown in FIG. 4 and reference will be made again to FIG. 2 after the procedure for sewing in FIG. 3 has been discussed.

Referring now to FIG. 3, it will be noted that bag 5 is wrapped around ring 10 and tabs 20 are sewed at opposite ends of a diameter 7 so as to establish a ring support plane and tab supporting members for the plane at the same time. The sewing line is shown as 6 in FIG. 3. The tab center lines 23 lie in the same plane with diam-

eter 7 and all diameters 7 of all rings and all tab center lines lie in a common plane passing through axis 8 of the bag. Axis 8 is shown FIG. 1.

In FIG. 4-1, the first step of the assembly is shown. A wire-mesh separator 50-1 is first inserted and then 5
sewed ring 10-1 is pulled out for support by its associated tabs 20-1A and 20-1B in order to align grommets 21-1A and 21-1B with the line of support established by the position of gaskets 30-A and 30-B. The next step shown in FIG. 4-2 is performed by bringing up ring 10
10-2 and aligning associated support tabs 20-2A and 20-2B with the gasket support line 33. Steps 3 and 4 are similar with step 3 bringing up ring 10-3 and corresponding support tabs for alignment and step 4 bringing up ring 10-4 with its support tabs properly aligned. The 15
final step is to pass a supporting rod 31 through gaskets 30 and the aligned grommet centers. It may be noted that, at the beginning of each step, a wire-mesh separator such as 50-1 is inserted into place so that in the top view of the final assembly as shown in FIG. 5, a plurality of concentric cylinders appear with wire-mesh separator 50-1 surrounding ring 10-1, separator 50-2 surrounding ring 10-2 and so forth. 20

In FIG. 6, a ring 10 is shown which comprises a flexible tube 11 which may be made of nylon and a plug 12 25
which may comprise part of a screw as shown in FIG. 7 with appropriate threads thereon to establish suitable friction at the inner surface of the tube in order to maintain the junction as shown in FIG. 7.

From the foregoing description, it should now be apparent that the present invention provides a significant 30
improvement over the prior art filter assemblies by eliminating expensive metal parts and by considerably simplifying the assembly procedure.

I claim as my invention:

1. A filter assembly comprising the combination of:
a conically-shaped filter bag;
a plurality of rings having successively increasing diameters sewed into said filter bag for defining 40
planes of support for said filter bag, the smallest diameter ring being sewed at the truncated conical apex of the filter bag and successively larger diameter rings being sewed into said filter bag at spaced parallel planes along the conical axis of the filter bag, the centers of said plurality of rings lying ap- 45

proximately along said conical axis;
a support tab sewed onto said filter bag at the diametrically-opposed sides of each ring of said plurality of rings, the tabs lying in a plane passing through said conical axis;
a pair of rod-supporting gaskets attached to said filter bag at opposite sides thereof and lying in said plane containing the support tabs and passing through the conical axis of the filter bag; and
rod means engaging each support tab and passing through said rod-supporting gaskets for supporting said filter bag.

2. A filter assembly according to claim 1 further comprising a reinforcing grommet carried by each said support tab for receiving said rod means, said reinforcing grommet defining a hole therethrough extending within said plane passing through said conical axis.

3. The filter assembly defined in claim 2 further comprising: wire-mesh separators having successively increasing diameters; the largest diameter of said wire-mesh separators having a diameter slightly larger than the largest sewed rings in said filter bag for pulling up the largest sewed ring inside the largest wire-mesh separator until the tab holes associated with said largest ring are approximately aligned with said rod-supporting gasket holes, the filter assembly being further characterized by inserting successively smaller diameters of said wire-mesh separators into said filter bag and pulling up an associated sewed ring and aligning the tabs of each ring with said gasket holes until all mesh separators and rings have been aligned and the grommet centers of all of said tabs lie along a common line.

4. The filter assembly defined in claim 3 wherein said 35
rod means engaging the pairs of support tabs is further defined as a supporting rod passing through all of said tab holes and said gaskets to support said plurality of rings.

5. The filter assembly defined in claim 1 wherein said rings are constructed of flexible tubes held in the form of said ring by plugs.

6. The filter assembly defined in claim 1 wherein said support tabs are made of cloth with an aperture therethrough established by mounting a grommet therein.

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