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[54] FILTER LEAF
9 Claims, 4 Drawing Figs.

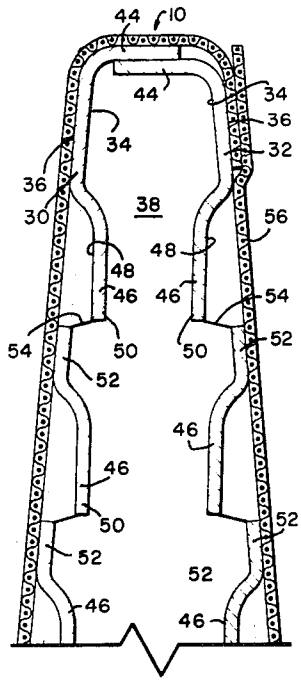
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[56] References Cited
UNITED STATES PATENTS

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ABSTRACT: A filter segment for a disc filter, having louvered openings providing slotlike drainage passages through its sidewalls and a drainage duct between such sidewalls communicating with the drainage passages to receive filtrate therefrom.



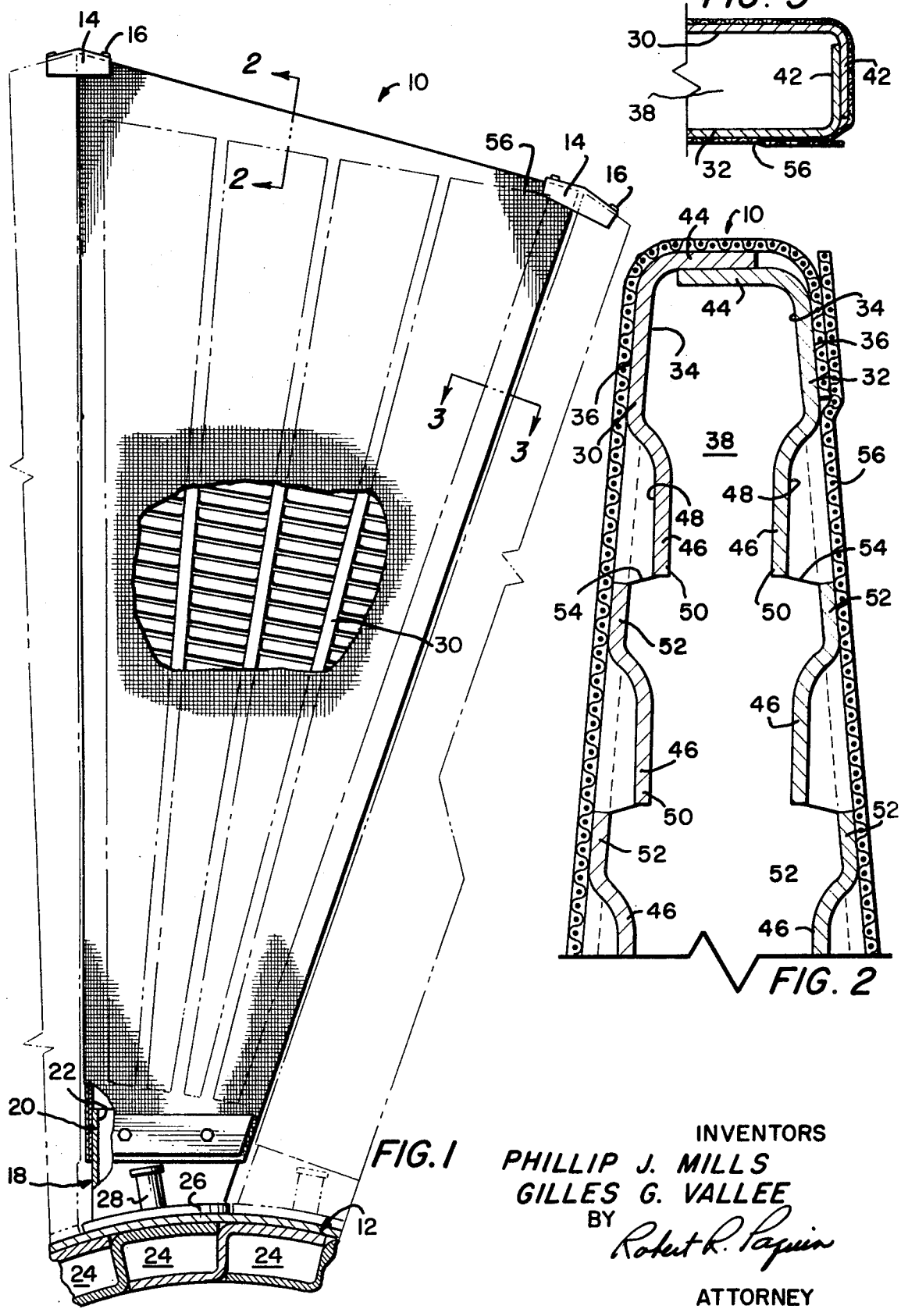


FIG. 1

FIG. 3

FIG. 2

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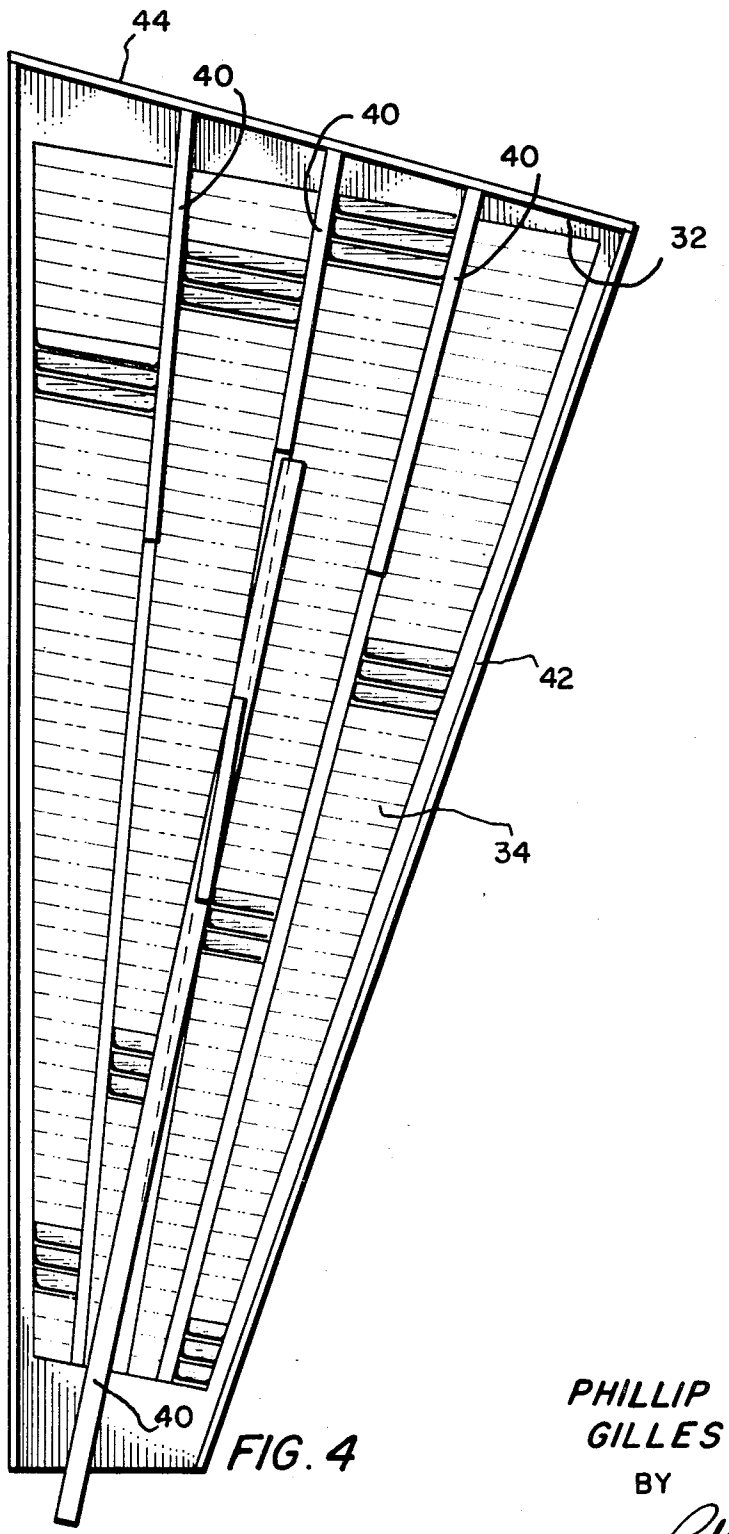


FIG. 4

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FILTER LEAF

BACKGROUND OF THE INVENTION

The present invention relates to filtering apparatus and more particularly to disc filters of the type employed for filtering a slurry such as, for example, pulp stock for the manufacture of paper.

Conventionally, the filter segments which form the filter discs of a filter of this type frequently are provided with drainage openings or passages extending through the thickness of the segment sidewalls into communication with drainage duct means between the sidewalls. The total flow area of these drainage passages is a determinant of the percentage of liquid or filtrate removed from the stock during the filtering process; and such total flow area should be normally as great as possible to permit maximum draining of liquid from the stock.

In conventional filter segments such passages generally have been in the form of either relatively small cross section openings which communicate with shallow elongated grooves in the outer face of their respective sidewall or elongated openings which are constructed through the sidewalls in a manner whereby their provision inherently substantially reduces the strength of the sidewalls. The formation of the passages in the configuration of such conventional small cross section openings is believed to inherently undesirably limit the attainable total flow area of the passages. The provision of the passages in the configuration of such conventional elongated openings is, of course, subject to the deficiency that, as they inherently substantially reduce the sidewall strength, their total flow area must be maintained at a relatively low level wherein the ratio of such area to the provided sidewall area is sufficiently low as to not unduly weaken the sidewalls. Hence, it is believed that the construction of the passages in the form of these conventional elongated openings also undesirably limits the attainable total flow area of the passages.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a new and improved filter segment which is particularly constructed and arranged such that the drainage passages are formed of maximum total flow area with only a minimal reduction in the strength of the segment.

Another object of the invention is to provide a new and improved filter segment of the type set forth which is particularly constructed and arranged whereby filtrate flowing through the drainage passages is directed towards the base of the segment.

These objects are attained by the provision of a filter segment which, generally considered, may comprise a pair of sidewalls oppositely disposed in spaced relationship to include remote side faces and adjacent side faces having drainage duct means therebetween, such sidewalls each including a plurality of louvered openings providing drainage passages through their thickness in communication with the drainage duct means for draining filtrate thereto.

BRIEF DESCRIPTION OF THE DRAWINGS

Referring to the drawings:

FIG. 1 is an elevational side view of a filter segment constructed in accordance with one embodiment of the invention, shown with a portion of the screen wire broken away;

FIG. 2 is an enlarged fragmentary sectional view taken on line 2—2 of FIG. 1, looking in the direction of the arrows;

FIG. 3 is an enlarged fragmentary sectional view taken on line 3—3 of FIG. 1 looking in the direction of the arrows; and

FIG. 4 is a fragmentary elevational view illustrating the inner or adjacent side face of one of the sidewalls of the filter segment in conjunction with the reinforcing ribs there adjacent.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring more particularly to the drawings wherein similar reference characters designate corresponding parts throughout the several views, FIG. 1 illustrates a filter segment or leaf designated generally as **10** which is mounted on the usual rotatable hub **12** in juxtaposed relationship with other filter segments adjacent ones of which are indicated fragmentarily in broken lines. The segment **10**, as illustrated, is connected at its outer periphery to such adjacent segments by clips **14** which internally receive the segments and are affixed thereto by threaded fasteners **16**; and it will be understood that adjacent segments throughout the filter disc including the segment **10** will be normally connected in this or another suitable manner.

The segment **10** comprises a base designated generally as **18** which includes a central boxlike section having walls **20** enclosing a downwardly tapering passage means or duct **42** in communication with one of the flow channels **24** in the hub **12** for draining filtrate from the segment **10**. The base **18** also includes a pair of mounting flanges **26** which project from opposing ones of the walls **20**, such mounting flanges **26** each being provided with a sleeve **28** containing one of the mounting bolts which detachably connect the segment **10** to the hub **12**. The segment **10** also comprises a pair of sidewalls **30, 32** each connected at one end to the base **18** and extending longitudinally from the base **18** in opposed spaced relationship such that the sidewalls **30, 32** include inner or adjacent side faces **34** and outer or remote side faces **36**. The space **38** between the adjacent side faces **34** throughout the lengths and breadths of the sidewalls **30, 32** serves as a drainage duct or drainage duct means and communicates with the passage means **22** in the base **18** for draining filtrate thereto. The space **38** contains a plurality of suitably arranged reinforcing or stiffening ribs **40** which provide internal reinforcement for the segment **10**; and such space **38** is closed along its longitudinal edges and its outer peripheral edge by flow barriers **42, 44**, respectively, which in the illustrated embodiment of the invention are formed integrally with the sidewalls **30, 32**. The flow barriers **42, 44**, as illustrated, are connected in overlapping relationship such as by welding.

In accordance with the present invention louvered openings are formed in each of the sidewalls **30, 32** to provide drainage passages through the thicknesses of the sidewalls **30, 32** in communication with the space or drainage duct means **38**. More particularly, the sidewalls **30, 32** each include a plurality of elongated offset or recessed portions **46** which are press formed inwardly into the drainage duct means or space **38** whereby the recessed portions **46** each bound an elongated recess **48** in the remote face **36** of their respective sidewall **30** or **32**. The recessed portions **46** are each formed to longitudinally extend laterally or transversely to the longitudinal axis of their respective sidewall **30** or **32**; and, as illustrated, each of the sidewalls **30, 32** is provided with four columns of recessed portions **46**, which columns each extend from adjacent the base **18** and include recessed portions **46** progressively increasing in length as the columns extend from such base **18**. The recessed portions **46** each are formed with their side **50** (i.e., their side most adjacent to the base **18**) spaced inwardly in the space **38** from the there adjacent nonrecessed portion **52** of their sidewall **30** or **32**; and the elongated or slotlike spaces **54** between the outer faces of such ends **50** and the inner faces of such adjacent nonrecessed portions **52** serve as the drainage passages through the sidewalls **30, 32**. The recessed portions **46** are, hence, in effect louvers and are particularly constructed to each slope or slant downwardly towards their respective slotlike space **54** for facilitating filtrate flow therethrough to the drainage duct means or space **38**. This construction, as will be seen, forms the drainage passages through the sidewalls **30, 32** in a manner whereby filtrate flow therethrough is primarily in a direction longitudinally of the segment **10** and towards the base **18**, rather than in a direction essentially crosswise of the segment **10** as would

be the case in the event that the drainage passages were in the conventional manner merely openings punched or molded transversely through the sidewalls **30, 32**.

The usual or conventional filter screen **56** is wrapped around the sidewalls **30, 32** and supported by the nonrecessed portions **52** and overlapping flow barriers **42, 44** thereof, whereby the screen **56** overlies the drainage passages and permits only filtrate to flow thereto.

From the preceding description it will be seen that filtrate flowing through the screen **56** passes into the recesses **48** from whence it is directed by the recessed portions **46** to the drainage passages or spaces **54** and into the drainage duct means or space **38**. The filtrate, thus supplied to the drainage duct means **38**, flows into the passage means or duct **22** in the base **18** from whence it is discharged from the segment **10** to one of the flow channels **24** in the hub **12**.

The preferred method for making the filter segment **10** will now be described. In the practice of this method, there are first provided a pair of flat or sheet, stainless steel plate elements which each correspond in dimensions and shape to the overall dimensions and shape of one of the sidewalls **30, 32** and its integral flow barriers **42, 44**. These plate elements are individually die formed in a press whereby the aforedescribed louvered openings are formed in their portions which will form the sidewalls **30, 32** and the peripheral edges of the plate elements are bent to form the flow barriers **42, 44**. The louvered openings and bent edges may be formed in a single pressing operation or alternatively may be formed in two or more separate operations.

Then, the reinforcing ribs **40** are affixed to one of the louvered plate elements such as by welding; and the elements are connected into a unitary structure or assembly wherein their louvered portions form the spaced sidewalls **30, 32** by welding or otherwise affixing their complementary bent edges in overlapping relationship. The resultant unitary structure is connected at one end to the base **18** by welding or other suitable means whereby the base **18** is rigidly affixed to the structure; and the screen **56** is in a conventional manner wrapped around the structure in overlying relationship to the outer faces **36** of the sidewalls **30, 32** and the bent edges or flow barriers **42, 44**.

From the preceding description it will be seen that we have provided a new and improved means for accomplishing all of the objects and advantages of our invention. It will be understood, however, that, although we have illustrated and hereinbefore specifically described only one form of a filter segment embodying the invention, this embodiment has been given by way of illustration only.

Having thus described our invention, we claim:

1. A filter segment for a disc filter, comprising a pair of sidewalls oppositely disposed in spaced relationship to include adjacent side faces and remote side faces, said adjacent side faces having drainage duct means therebetween, said sidewalls each including a plurality of elongated portions offset from adjacent portions thereof, said elongated offset portions each bounding an elongated recess in one of the side faces of their sidewall, said elongated offset portions being along their lengths spaced from there adjacent portions of their sidewalls to provide elongated drainage passages through the thicknesses of such sidewalls between said elongated offset portions and said there adjacent portions, and said elongated drainage passages communicating with said drainage duct means for draining filtrate thereto.

2. A filter segment according to claim **1**, wherein said offset portions each slope downwardly towards their respective drainage passage for facilitating filtrate flow therethrough.

3. A filter segment according to claim **1**, wherein said elongated offset portions and said elongated drainage passages longitudinally extend transversely of said sidewalls, said drainage passages are along the sides of said offset portions most adjacent to a single end of the filter segment, and said offset portions slope downwardly towards their respective drainage passages.

4. A filter segment for a disc filter including a hub, comprising a base adapted for connection to the hub and including passage means for discharging filtrate from the filter segment, a pair of sidewalls connected to said base and extending longitudinally from said base in opposed spaced relationship such that said sidewalls include adjacent side faces and remote side faces, said adjacent side faces having therebetween drainage duct means and said drainage duct means communicating with said passage means for draining filtrate thereto, said sidewalls each including a plurality of elongated portions recessed from adjacent portions thereof, said elongated recessed portions extending inwardly in the space between said sidewalls and each providing an elongated recess in the remote side face of their sidewall, said elongated recessed portions being along their lengths spaced from there adjacent portions of their sidewalls to provide elongated drainage passages through the thicknesses of said sidewalls between each said elongated recessed portion and said there adjacent portion and said elongated drainage passages communicating with said drainage duct means for draining filtrate thereto.

5. A filter segment according to claim **4**, wherein said recessed portions each longitudinally extend laterally to the longitudinal axis of their sidewall, and said recessed portions each slope downwardly towards their drainage passage for facilitating filtrate flow therethrough.

6. A filter segment according to claim **5**, wherein said drainage passages are at the sides of said recessed portions most adjacent to said base.

7. A filter segment according to claim **6**, wherein said sidewalls each have integral flow barriers which extend along the peripheral edges of the space between said sidewalls, adjacent flow barriers of said sidewalls being connected in overlapping relation for closing such peripheral edges.

8. A filter segment for a disc filter including a hub, comprising a base adapted for connection to the hub and containing passage means for discharging filtrate from the filter segment, a pair of sidewalls unitary with said base and extending longitudinally from said base in opposed spaced relationship such that said sidewalls include adjacent side faces and remote side faces, said adjacent side faces having drainage duct means therebetween and said drainage duct means communicating with said passage means for draining filtrate thereto, said sidewalls each including a plurality of louvered openings providing drainage passages through their thicknesses in communication with said drainage duct means for draining filtrate thereto, the louvers for said openings extending transversely of said sidewalls and projecting from the latter inwardly in the therebetween space towards said base to locate said drainage passages at the sides of said louvers most adjacent to said base, and said louvers sloping downwardly towards their respective drainage passages and towards said base to facilitate filtrate flow through said drainage passages in a direction towards said base.

9. A filter segment according to claim **8**, wherein said sidewalls each have integral flow barriers which extend along the peripheral edges of the therebetween space, adjacent flow barriers of said sidewalls being connected for closing such peripheral edges.