

FILTER PANEL, FILTRATION APPARATUS AND METHOD OF PROVIDING FILTER PANEL

Technical Field

- 5 The present disclosure generally relates to filter panels. In particular, a filter panel comprising a sheet material folded to clamp ends of a filtering element, a filtration apparatus comprising a filter panel, and a method of providing a filter panel, are provided.

Background

- 10 A wide range of filtration apparatuses for filtrating liquid exist, for example to filtrate wastewater. Some filtration apparatuses comprise one or more filtering elements that move during filtration. A filtration apparatus may for example be of the drum filter type where one or more filtering elements are provided at a circumference of a rotating drum. To this end, a plurality of
15 filter panels may be mounted on the drum, where each filter panel carries a filtering element. There are also applications where one or more filter panels are permanently positioned in one place.

- WO 2016207143 A1 discloses a filter panel for a drum filter. The filter panel is manufactured by means of molding and consists of a plastic material. The
20 filter cloth may be glued or welded onto the filter panel.

Summary

- Prior art filter panels are relatively expensive and complicated to manufacture. For example, if a filtering element is secured to the support structure of the filter panel only by gluing, there is a risk of separation
25 between the filtering element and the support structure during filtration. Removal of a filter panel from the filtration apparatus when the filtering element has come loose aggravates replacement of the filter panel. The gluing

further has to be performed accurately in order to avoid separation between the filtering element from the support structure. Such gluing is quite time consuming and prone to errors. Many prior art filter panels are also overengineered, making them unnecessary complicated and expensive. An
5 important criterion in the design of the filter panel is stability and resistance to deformation, so that large-area filtering elements can be used.

One object of the invention is to provide an improved filter panel.

A further object of the invention is to provide an filtration apparatus.

A still further object of the invention is to provide an improved method of
10 providing a filter panel.

These objects are achieved by the filter panel according to appended claim 1, by the filtration apparatus according to appended claim 11, and the method according to appended claim 13.

The invention is based on the realization that by providing a support
15 structure comprising a sheet material that is folded to clamp a filtering element, the filtering element can be reliably secured to the support structure in a less complicated manner.

According to a first aspect, there is provided a filter panel comprising a filtering element including a primary filter end, a secondary filter end and a
20 filtering section between the primary filter end and the secondary filter end; and a support structure including a primary end support section, a secondary end support section, and a central support section between the primary end support section and the secondary end support section supporting the filtering section; wherein each of the primary end support section and the
25 secondary end support section comprises a sheet material folded to clamp the primary filter end and the secondary filter end, respectively.

The filtering element may be fixed to the support structure only by the clamping due to the folding of the sheet material. Thus, no dedicated locking elements may need to be provided to secure the filtering element to the

support structure. The filter panel provides a fast, cost-efficient and less complicated production. The filter panel can also be made of few parts.

The filtering element may be substantially rectangular, or rectangular. In this case, a first short side and a second opposite short end thereof may constitute the primary filter end and the secondary filter end, respectively. Each of the primary and secondary filter ends may have substantially equal, or equal areas. Alternatively, or in addition, the filtering section may be substantially larger than each of the primary and secondary filter ends, such as at least 100 % larger. The filtering element may be provided in a single piece. By clamping the primary and secondary filter ends, the filter panel enables provision of a relatively large filtration area, i.e., in relation to a size of the filter panel.

The primary end support section, the secondary end support section and the central support section may be formed from a single piece of sheet material. A provision of the central support section as a single piece of sheet material facilitates manufacture and recycling of the filter panel.

As one possible alternative, only the primary and secondary end support sections are made of sheet material. In this case, the support structure may for example comprise a plurality of circular rods connected to the primary and secondary end support sections.

The sheet material may be a metal sheet material. The sheet material may for example be made of stainless steel. Alternatively, or in addition, the sheet material may have a thickness of at least 0.1 mm and/or less than 3 mm, such as 0.7 mm.

Each of the primary end support section and the secondary end support section may comprise a first fold section folded relative to the central support section and a second fold section folded relative to the first fold section. In this case, the first fold section may be positioned between the central support section and the second fold section, e.g., along the support structure. For example, in case the primary end support section, the secondary end support section and the central support section are formed from a single piece of

sheet material, the first fold section may be positioned between the central support section and the second fold section along the sheet material.

- For each of the primary and secondary end support sections, the second fold section may be folded at least 160° and/or less than 200° , such as 180° ,
5 relative to the first fold section. Both the first fold section and the second fold section may be folded at least 70° and/or less than 110° , such as 90° , relative to the central support section.

Each of the primary filter end and the secondary filter end may be clamped between a respective first fold section and second fold section.

- 10 Each of the primary end support section and the secondary end support section may comprise a through hole passing through the first fold section and the second fold section. Thus, when the second fold section is folded relative to the first fold section, the through holes overlap each other for receiving a fastener.
- 15 The primary filter end may comprise a third fold section folded relative to the second fold section. In this case, the second fold section may be positioned between the first fold section and the third fold section, e.g., along the support structure. For each of the primary end support section and the secondary end support section, the third fold section may be folded at least
20 70° and/or less than 110° , such as 90° , relative to the second fold section.

- Each of the primary filter end and the secondary filter end may be clamped between a respective third fold section and the central support section. By folding the support structure twice at each of the primary and secondary end support sections, the filtering element can be clamped twice and the through
25 holes become raised and aligned for mounting.

The support structure may comprise a side fold section of sheet material folded relative to the central support section to clamp the filtering element. The support structure may comprise two such side fold sections on opposite sides of the central support section. Each side fold section may be folded at

least 70° and/or less than 110°, such as 90°, relative to the central support section.

The central support section may be curved. If the central support section is curved after clamping of the primary and secondary filter ends by folding of
5 the sheet material, the filtering element will be stretched by the curving.

The filtering element may consist of wire mesh. Alternatively, or in addition, the filtering element may consist of any filter medium. Alternatively, or in addition, the filtering element may consist of one or more layers.

According to a second aspect, there is provided a filtration apparatus
10 comprising a filter panel according to the first aspect. The filtration apparatus may comprise a drum. In this case, the filtration apparatus may be referred to as a drum filter. The filter panel may be secured to the drum.

The filtration apparatus may comprise a plurality of filter panels. Each filter panel may be of the same size and shape. This facilitates replacement since
15 only one type of filter panel needs to be held in stock. For one circumference of the drum, the filtration apparatus may for example comprise four or five filter panels enclosing the drum. The plurality of filter panels provided at a common circumference may be referred to as a group. The filtration apparatus may comprise one or several such groups, e.g., axially distributed
20 along the drum.

When each of the primary end support section and the secondary end support section of the filter panel comprises a through hole passing through the first fold section and the second fold section, the filter panel may be secured to the drum by a fastener passing through each through hole.

25 According to a third aspect, there is provided a method of providing a filter panel, the method comprising providing a filtering element including a primary filter end, a secondary filter end and a filtering section between the primary filter end and the secondary filter end; providing a support structure including a primary end support section comprising a sheet material, a

secondary end support section comprising a sheet material, and a central support section between the primary end support section and the secondary end support section; positioning the filtering element on the support structure such that the primary filter end is supported by the primary end support section, the secondary filter end is supported by the secondary end support section, and the filtering section is supported by the central support section; and folding the sheet material of the primary end support section and the secondary end support section to clamp the primary filter end and the secondary filter end, respectively.

- 10 The filter panel of the method according to the third aspect may be of any type described in connection with the first aspect, and vice versa.

The support structure may comprise a side fold section of sheet material. In this case, the method may further comprise folding the side fold section relative to the central support section to clamp the filtering element.

- 15 The method may further comprise bending the filtering element and the support structure to curve the central support section. The bending may comprise rolling the filtering element and the support structure, e.g., in a rolling machine.

The bending may be performed after the folding of the sheet material of the primary end support section and the secondary end support section. Since the respective filter ends of the filtering element are clamped by the sheet material by the folding before bending, the subsequent bending provides two functions, namely both curving the support structure to a desired shape and stretching the filtering element.

- 25 The method may further comprise folding the sheet material of the primary end support section and the secondary end support section again after the bending, e.g., by simultaneously folding the first fold section and the second fold section at least 70° and/or less than 110°, such as 90°, relative to the central support section and optionally relative to the third fold section if the third fold section is provided.

The primary end support section, the secondary end support section and the central support section may be formed from a single piece of sheet material.

The sheet material may be a metal sheet material.

Each of the primary end support section and the secondary end support
5 section may comprise a first fold section folded relative to the central support section and a second fold section folded relative to the first fold section. The first fold section may be positioned between the central support section and the second fold section. Each of the primary filter end and the secondary
10 filter end may be clamped between a respective first fold section and second fold section. Each of the primary end support section and the secondary end support section may comprise a through hole passing through the first fold section and the second fold section. The method may further comprise securing the filter panel to a drum of a filtration apparatus by a fastener passing through each through hole.

15 **Brief Description of the Drawings**

Further details, advantages and aspects of the present disclosure will become apparent from the following description taken in conjunction with the drawings, wherein:

- Fig. 1: schematically represents a perspective view of a filtration
20 apparatus comprising a plurality of filter panels;
Fig. 2: schematically represents a perspective view of one of the filter panels;
Fig. 3: schematically represents a top view of a filtering element;
Fig. 4a: schematically represents a top view of a sheet material for forming
25 the support structure;
Fig. 4b: schematically represents a side view of the sheet material in Fig. 4a;
Fig. 5a: schematically represents a top view of the sheet material and the filtering element thereon;
30 Fig. 5b: schematically represents a side view of the sheet material and the

filtering element in Fig. 5a;

- Fig. 6a: schematically represents a top view of the filter panel when the sheet material has been folded to clamp the filtering element;
- Fig. 6b: schematically represents a side view of the filter panel in Fig. 6a;
- 5 Fig. 7a: schematically represents a top view of the filter panel when a central support section of the support structure has been curved;
- Fig. 7b: schematically represents a side view of the filter panel in Fig. 7a;
- Fig. 8a: schematically represents a top view of the filter panel when the sheet material has been folded again;
- 10 Fig. 8b: schematically represents a side view of the filter panel in Fig. 8a;
- Fig. 9: schematically represents a partial perspective view of the filtration apparatus;
- Fig. 10: schematically represents a partial side view of the filtration apparatus; and
- 15 Fig. 11: is a flowchart outlining general steps of a method.

Detailed Description

In the following, a filter panel, a filtration apparatus comprising a filter panel, and a method of providing a filter panel, will be described. The same or similar reference numerals will be used to denote the same or similar structural features.

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Fig. 1 schematically represents a perspective view of one of many examples of a filtration apparatus 10. The filtration apparatus 10 comprises a plurality of filter panels 12. In this example, all filter panels 12 are of the same size and shape. The filtration apparatus 10 further comprises a drum 14. The filtration apparatus 10 of this example is thus a drum filter. The filter panels 12 are secured to the drum 14.

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The filtration apparatus 10 of this specific and non-limiting example further comprises an inlet 16 supplying liquid 18 to be filtered to the drum 14, a tank 20 below the drum 14 and an outlet 22 downstream of the tank 20. The liquid 18 is here exemplified as wastewater. The liquid 18 is conducted into an

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interior of the drum 14 and leaves the drum 14 by passing through the filter panels 12. During this passing, the liquid 18 is filtered.

The drum 14 rotates during filtration as shown with arrow 24. To this end, the filtration apparatus 10 of this example comprises a motor 26 for driving
5 the rotation of the drum 14, either directly or indirectly via a transmission (not shown). The filter panels 12 that are temporarily positioned in inactive positions (e.g., on a vertically upper part of the drum 14) can be subjected to various treatments, such as removing filter cake collected thereon.

Fig. 2 schematically represents a perspective view of one of the filter panels
10 12. The filter panel 12 comprises a support structure 28 and a filtering element 30. The filtering element 30 is held by the support structure 28. The support structure 28 comprises a primary end support section 32a, a secondary end support section 32b and a central support section 34 between the primary and secondary end support sections 32a and 32b. As shown, the
15 central support section 34 is curved into an arc-shape conforming to the shape of the targeted drum 14. The central support section 34 supports the filtering element 30. Each of the primary and secondary end support sections 32a and 32b comprises a sheet material folded to clamp the filtering element 30, as described herein. Moreover, each of the primary and secondary end
20 support sections 32a and 32b comprises through holes 36 for securing the filter panel 12 to the drum 14.

Fig. 3 schematically represents a top view of the filtering element 30 according to one example. The filtering element 30 is here exemplified as a flexible filter cloth. The filtering element 30 comprises a primary filter end
25 38a, a secondary filter end 38b and a filtering section 40 between the primary and secondary filter ends 38a and 38b. The filtering element 30 further comprises a primary filter side 42a and a secondary filter side 42b on opposite sides of the filtering section 40.

The filtering element 30 of this example is rectangular. Accordingly, the
30 primary and secondary filter ends 38a and 38b are provided by the respective

short sides of the filtering element 30 and the primary and secondary filter sides 42a and 42b are provided by the respective long sides of the filtering element 30. The filtering element 30 may for example have a length of at least 700 mm and/or less than 1800 mm, such as about 1200 mm, and a
5 width of at least 200 mm and/or less than 600 mm, such as about 400 mm.

The filtering element 30 may comprise a wire cloth, such as a metal wire cloth or alloy wire cloth, having a three-dimensional pore geometry. The wire cloth may comprise warp wires and weft wires crossing each other and interwoven by a weave pattern. The warp wires may be formed in at least two
10 different configurations to define warp wires of first and second types. A length of the first type of warp wires may deviate from a length of the second type of warp wires in relation to a particular length unit. Pores may be formed in interstices between sections of two neighboring warp wires and crossing sections of two neighboring weft wires.

15 All weave types and combinations of materials and wire diameters are possible for the filtering element 30. In special designs, the metal wire cloth contains wires that are not made of metal but other materials.

The filtering element 30 can consist of all filter media. The filter media can be made of any material. The filtering element 30 can be designed as a single
20 layer or multiple layers. The layers can be formed from different filter media or from the same filter media.

Preferably, the filtering element 30 is made of metallic materials so that the element is suitable for recycling.

Fig. 4a schematically represents a top view of a sheet material 44 for forming
25 the support structure 28, and Fig. 4b schematically represents a side view of the sheet material 44 in Fig. 4a. With collective reference to Figs. 4a and 4b, the sheet material 44 has been machined, for example with laser cutting or machining, to provide the illustrated shape.

In Figs. 4a and 4b, the sheet material 44 is in an entirely flat configuration with no folded parts. The sheet material 44 is a single piece of material. The sheet material 44 may for example have a thickness of 0.7 mm. The sheet material 44 may for example be made of metal, such as stainless steel, such
5 stainless steel types 1.4401 or 1.4404 (also known as grades 316 and 316L, respectively).

In this example, each of the primary and secondary end support sections 32a and 32b, comprises a first fold section 46, a second fold section 48 and an optional third fold section 50 in that order respectively away from the central
10 support section 34. In addition, the sheet material 44 provides two side fold sections 52 on opposite sides of the central support section 34.

The central support section 34 comprises a plurality of openings 54, here three openings 54. Longitudinal bars 56 extending between the primary and secondary end support sections 32a and 32b are defined between the
15 openings 54 in the central support section 34.

Fig. 4a shows that one or more through holes 36 (here two) are provided in each of the first fold section 46 and the second fold section 48 of each of the primary and secondary end support sections 32a and 32b.

Fig. 5a schematically represents a top view of the sheet material 44 and the
20 filtering element 30 thereon, and Fig. 5b schematically represents a side view of the sheet material 44 and the filtering element 30 in Fig. 5a. With collective reference to Figs. 5a and 5b, the filtering element 30 has been laid on the sheet material 44. The filtering section 40 is supported by the central support section 34, the first filter end 38a is supported by the first fold
25 section 46 of the primary end support section 32a, and the second filter end 38b is supported by the first fold section 46 of the secondary end support section 32b.

In a lateral direction (vertical direction in Fig. 5a) of the sheet material 44, a width of the filtering element 30 substantially corresponds (e.g., within 10 %)

to a width of the central support section 34. Each side fold section 52 protrudes laterally outside the filtering element 30.

In a longitudinal direction (horizontal direction in Fig. 5a) of the sheet material 44, a length of the filtering element 30 is larger (e.g., at least 3 %
5 larger) than a length of the central support section 34. Thus, the filtering element 30 protrudes longitudinally outside the central support section 34 and is supported by the primary and secondary end support sections 32a and 32b, here by the respective first fold sections 46. As shown in Fig. 5a, the length of the filtering element 30 is not long enough to obstruct the through
10 holes 36 in the first fold sections 46.

Optionally, a protective layer (not shown) may be provided on the sheet material 44, such as on the central support section 34 including the longitudinal bars 56 and on a portion of the primary and secondary end support sections 32a and 32b, to protect the filtering element 30 from
15 directly contacting sheet material 44. Such protective layer may in addition have adhesive properties.

Fig. 6a schematically represents a top view of the filter panel 12 when the sheet material 44 has been folded to clamp the filtering element 30, and Fig. 6b schematically represents a side view of the filter panel 12 in Fig. 6a. With
20 collective reference to Figs. 6a and 6b, each second fold section 48 is folded 180° inwards relative to the adjacent first fold section 46. The sheet material 44 is thereby folded around the filtering element 30. During this folding of each second fold section 48, each third fold section 50 is not folded relative to the adjacent second fold section 48.

25 Due to the folding, the filtering element 30 becomes squeezed. That is, the primary filter end 38a is clamped between the first and second fold sections 46 and 48 of the primary end support section 32a and the secondary filter end 38b is clamped between the first and second fold sections 46 and 48 of the secondary end support section 32b. In addition, for each of the primary

and secondary end support sections 32a and 32b, the filtering element 30 is clamped between the third fold section 50 and the central support section 34.

Before, after or simultaneously with the folding of the primary and secondary end support sections 32a and 32b, the two side fold sections 52 are folded
5 180° inwards relative to the central support section 34 to also clamp the primary and secondary filter sides 42a and 42b of the filtering element 30.

Fig. 7a schematically represents a top view of the filter panel 12 when the central support section 34 has been curved, and Fig. 7b schematically represents a side view of the filter panel 12 in Fig. 7a. From the state in Figs.
10 6a and 6b, the entire filter panel 12 is bent to form the desired curvature. To this end, the entire filter panel 12 may for example be passed through a rolling machine.

Since the filtering element 30 is clamped, the filtering element 30 is prevented from slipping out from the primary and secondary end support
15 sections 32a and 32b during the bending. Moreover, since the central support section 34 becomes positioned radially inward of the filtering element 30 with respect to the target curvature, and since the filtering element 30 is clamped, the filtering element 30 is tensioned in the longitudinal direction of the filter panel 12 during the bending.

20 Fig. 8a schematically represents a top view of the filter panel 12 when the sheet material 44 has been folded further, and Fig. 8b schematically represents a side view of the filter panel 12 in Fig. 8a. With collective reference to Figs. 8a and 8b, for each of the primary and secondary end support sections 32a and 32b, the first and second fold sections 46 and 48,
25 with the filtering element 30 held therebetween, are collectively folded 90° inwards relative to the central support section 34 and the third fold section 50. This further tightens the squeeze between the third fold section 50 and the filtering element 30. At the same time, the through holes 36 are raised and hence ready for mounting the filter panel 12. As can be gathered from
30 Fig. 8b, the folding between the second fold section 48 and the third fold

section 50 is more gentle on the filtering element 30 than if the sheet material 44 would end with a sharp edge at the second fold section 48.

Fig. 9 schematically represents a partial perspective view of the filtration apparatus 10 with the filter panel 12 mounted thereon, and Fig. 10
5 schematically represents a partial side view of the filtration apparatus 10. In Fig. 10, it can be seen that the filter panel 12 is secured to the drum 14 by a fastener 58 passing through each through hole 36. In this example, the fastener 58 comprises a bolt 60 and a nut 62. The bolt 60 is fixed with respect to the drum 14. Tightening of the nut 62 provides two functions in
10 combination, namely to secure the filter panel 12 to the drum 14 and to force the first and second fold sections 46 and 48 together to increase the clamping of the filtering element 30 held therebetween.

Fig. 11 is a flowchart outlining general steps of a method. The method comprises providing S10 the filtering element 30 including the primary filter end 38a, the secondary filter end 38b and the filtering section 40 between the
15 primary filter end 38a and the secondary filter end 38b. The method further comprises providing S12 the support structure 28 including the primary end support section 32a comprising a sheet material 44, the secondary end support section 32b comprising a sheet material 44, and the central support
20 section 34 between the primary end support section 32a and the secondary end support section 32b. The method further comprises positioning S14 the filtering element 30 on the support structure 28 such that the primary filter end 38a is supported by the primary end support section 32a, the secondary filter end 38b is supported by the secondary end support section 32b, and the
25 filtering section 40 is supported by the central support section 34; and folding S16 the sheet material 44 of the primary end support section 32a and the secondary end support section 32b to clamp the primary filter end 38a and the secondary filter end 38b, respectively.

The method of this example further comprises folding S18 the side fold
30 section 52 relative to the central support section 34 to clamp the filtering element 30.

The method of this example further comprises bending S20 the filtering element 30 and the support structure 28 to curve the central support section 34. The bending S20 may be performed after the folding S16 of the sheet material 44 of the primary end support section 32a and the secondary end support section 32b.

The method of this example further comprises folding S22 the sheet material 44 of the primary end support section 32a and the secondary end support section 32b again after the bending S20.

The method of this example further comprises securing S24 the filter panel 12 to the drum 14 of the filtration apparatus 10 by a fastener 58 passing through each through hole 36.

While the present disclosure has been described with reference to exemplary embodiments, it will be appreciated that the present invention is not limited to what has been described above. For example, it will be appreciated that the dimensions of the parts may be varied as needed. Accordingly, it is intended that the present invention may be limited only by the scope of the claims appended hereto.

CLAIMS

1. A filter panel (12) comprising:
 - a filtering element (30) including a primary filter end (38a), a secondary filter end (38b) and a filtering section (40) between the primary filter end (38a) and the secondary filter end (38b); and
 - a support structure (28) including a primary end support section (32a), a secondary end support section (32b), and a central support section (34) between the primary end support section (32a) and the secondary end support section (32b) supporting the filtering section (40);wherein each of the primary end support section (32a) and the secondary end support section (32b) comprises a sheet material (44) folded to clamp the primary filter end (38a) and the secondary filter end (38b), respectively.
2. The filter panel (12) according to claim 1, wherein the primary end support section (32a), the secondary end support section (32b) and the central support section (34) are formed from a single piece of sheet material (44).
3. The filter panel (12) according to claim 2, wherein the sheet material (44) is a metal sheet material.
4. The filter panel (12) according to any of the preceding claims, wherein each of the primary end support section (32a) and the secondary end support section (32b) comprises a first fold section (46) folded relative to the central support section (34) and a second fold section (48) folded relative to the first fold section (46), and wherein the first fold section (46) is positioned between the central support section (34) and the second fold section (48).
5. The filter panel (12) according to claim 4, wherein each of the primary filter end (38a) and the secondary filter end (38b) is clamped between a respective first fold section (46) and second fold section (48).

6. The filter panel (12) according to claim 4 or 5, wherein each of the primary end support section (32a) and the secondary end support section (32b) comprises a through hole (36) passing through the first fold section (46) and the second fold section (48).
- 5 7. The filter panel (12) according to any of claims 4 to 6, wherein the primary filter end (38a) comprises a third fold section (50) folded relative to the second fold section (48), and wherein the second fold section (48) is positioned between the first fold section (46) and the third fold section (50).
- 10 8. The filter panel (12) according to claim 7, wherein each of the primary filter end (38a) and the secondary filter end (38b) is clamped between a respective third fold section (50) and the central support section (34).
9. The filter panel (12) according to any of the preceding claims, wherein the support structure (28) comprises a side fold section (52) of a sheet
15 material (44) folded relative to the central support section (34) to clamp the filtering element (30).
10. The filter panel (12) according to any of the preceding claims, wherein the central support section (34) is curved.
11. The filter panel (12) according to any of the preceding claims, wherein
20 the filtering element (30) consists of wire mesh.
12. The filter panel (12) according to any of the preceding claims, wherein the filtering element (30) consists of any filter medium.
13. The filter panel (12) according to any of the preceding claims, wherein the filtering element (30) consists of one or more layers.
- 25 14. A filtration apparatus (10) comprising a filter panel (12) according to any of the preceding claims.

15. The filtration apparatus (10) according to claim 14, when comprising a filter panel (12) according to claim 6, wherein the filtration apparatus (10) comprises a drum (14), and wherein the filter panel (12) is secured to the drum (14) by a fastener (58) passing through each through hole (36).
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16. A method of providing a filter panel (12), the method comprising:
- providing (S10) a filtering element (30) including a primary filter end (38a), a secondary filter end (38b) and a filtering section (40) between the primary filter end (38a) and the secondary filter end (38b);
10 - providing (S12) a support structure (28) including a primary end support section (32a) comprising a sheet material (44), a secondary end support section (32b) comprising a sheet material (44), and a central support section (34) between the primary end support section (32a) and the secondary end support section (32b);
15 - positioning (S14) the filtering element (30) on the support structure (28) such that the primary filter end (38a) is supported by the primary end support section (32a), the secondary filter end (38b) is supported by the secondary end support section (32b), and the filtering section (40) is supported by the central support section (34); and
20 - folding (S16) the sheet material (44) of the primary end support section (32a) and the secondary end support section (32b) to clamp the primary filter end (38a) and the secondary filter end (38b), respectively.
17. The method according to claim 16, wherein the support structure (28) comprises a side fold section (52) of a sheet material (44), and wherein the method further comprises folding (S18) the side fold section (52) relative to the central support section (34) to clamp the filtering element (30).
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18. The method according to claim 16 or 17, further comprising bending (S20) the filtering element (30) and the support structure (28) to curve the central support section (34).
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19. The method according to claim 18, wherein the bending (S20) is performed after the folding (S16) of the sheet material (44) of the primary end support section (32a) and the secondary end support section (32b).
- 5 20. The method according to claim 19, further comprising folding (S22) the sheet material (44) of the primary end support section (32a) and the secondary end support section (32b) again after the bending (S20).
21. The method according to any of claims 16 to 20, wherein the primary end support section (32a), the secondary end support section (32b) and
10 the central support section (34) are formed from a single piece of sheet material (44).
22. The method according to claim 21, wherein the sheet material (44) is a metal sheet material.
23. The method according to any of claims 16 to 22, wherein each of the
15 primary end support section (32a) and the secondary end support section (32b) comprises a first fold section (46) folded relative to the central support section (34) and a second fold section (48) folded relative to the first fold section (46), wherein the first fold section (46) is positioned between the central support section (34) and the second fold
20 section (48), wherein each of the primary filter end (38a) and the secondary filter end (38b) is clamped between a respective first fold section (46) and second fold section (48), wherein each of the primary end support section (32a) and the secondary end support section (32b) comprises a through hole (36) passing through the first fold section (46)
25 and the second fold section (48), and wherein the method further comprises securing (S24) the filter panel (12) to a drum (14) of a filtration apparatus (10) by a fastener (58) passing through each through hole (36).