

engaging the screen resulting in condensation of melted plastic material into the openings of the screen whereupon the screen attaches to the filter element skeleton.

However, the above method may be carried out only in case of a screen made of heat weldable material which can be plastic welded to the filter element cage/skeleton,  
5 or where the openings of the screen are sufficiently large to facilitate molten plastic flow into the openings, to thereby engage to the skeleton of the filter element.

## SUMMARY OF INVENTION

The disclosed subject matter is concerned with a screen-type filter element and its manufacturing. Whilst the disclosed subject matter is disclosed in connection with  
10 substantially fine mesh screens, it is appreciated that the device and method disclosed for manufacturing same may be facilitated also in connection with less fine mesh screens.

In a first aspect, the present invention provides a screen-type filter element, comprising:  
15 a substantially rigid screen-bearing skeleton; and  
a filter screen assembly including at least one fine mesh screen sheet material layer and at least one coarse mesh screen sheet material layer, the filter screen assembly extending within or over the substantially rigid screen-bearing skeleton and secured thereto by a plurality of enveloping ribs, the plurality of enveloping ribs being applied  
20 over one face of the filter screen assembly to extend through at least the at least one coarse mesh screen sheet material layer and thereby support the filter screen assembly at discrete portions and secure the filter screen assembly to the substantially rigid screen-bearing skeleton.

In a second aspect, the present invention provides a fluid filter unit comprising the  
25 filter element according to claim 1 and a housing configured for accommodating the filter element, and wherein the filter unit is configured with a fluid flow path extending radially through the filter element.

In a third aspect, the present invention provides a method of manufacturing a filter element in accordance with the first aspect, comprising:

- 30 (a) providing a support core member;  
(b) providing a filter screen assembly configured for placing over a support core-member;

(c) providing a filter screen-bearing skeleton configured with support ribs,

(d) wherein the skeleton is molded over the support core member and the filter screen assembly, whereby molten plastic material is allowed to flow through the filter screen assembly towards the core member to thereby secure  
5 the screen filter to the skeleton.

wherein the core member is formed with one or more flow channels formed over its surface such that the molten plastic material flows along the flow channels of the support core member, resulting in generating one or more enveloping ribs.

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By the broad aspect of the present disclosed subject matter there is provided a screen filter element comprising a substantially rigid screen bearing skeleton and at least one fine screen sheet material extending within or over the skeleton and secured thereto by a plurality of enveloping ribs, applied over one face of the filter screen sheet to thereby  
15 support it at discrete portions and secure it to the skeleton.

The enveloping ribs may be part of the skeleton material melted to thereby constitute the enveloping ribs, or the enveloping ribs may be made of material applied over the sheet material and attached to the skeleton material by bonding, adhering, etc.

One or more of the enveloping ribs may be constituted by a series of isolated  
20 connection points either forming part of the molten skeleton material or made of material applied over the sheet material and attached to the skeleton material by bonding, adhering, etc.

According to one example the screen filter element comprising a substantially rigid screen bearing skeleton (cage) made of, or at least partially coated, with heat or  
25 chemically meltable material, and at least a fine mesh screen sheet material secured to the skeleton with one face facing the skeleton, such that portions thereof are enveloped by skeleton material by melting same and allowing it to flow over an opposite face of the screen sheet material.

Any one or more of the following features and designs may be incorporated in  
30 connection with the device and method subject of the present disclosed subject matter:

**Claims:**

1. A screen-type filter element comprising a substantially rigid screen-bearing skeleton and at least one fine mesh screen sheet material layer and at least one coarse  
5 mesh screen material layer extending within or over the skeleton and secured thereto by a plurality of enveloping ribs, the enveloping ribs being applied over one face of the filter screen sheet to thereby support it at discrete portions and secure it to the skeleton.
2. A screen-type filter element, comprising a substantially rigid screen-bearing skeleton made of, or at least partially coated with, heat meltable material, and at least  
10 one fine mesh screen sheet material layer and at least one coarse mesh screen material layer secured to the skeleton with one face facing the skeleton, such that portions thereof are enveloped by skeleton material by melting same and allowing it to flow over an opposite face of the screen sheet material layers.
3. A filter element, according to any one of the proceeding claims, wherein the  
15 enveloping ribs are part of the skeleton material.
4. A filter element, according to claim 3, wherein the enveloping ribs are constituted by melted skeleton, or made of material applied over the sheet material and attached to the skeleton material.
5. A filter element, wherein the enveloping ribs are substantially continuous.
- 20 6. A filter element, wherein the enveloping ribs are substantially segmented.
7. A filter element according to any one of the preceding claims, wherein a filter screen is made of any one of the following materials: plastic, metal, woven or non-woven fabric.
8. A filter element according to any one of the preceding claims, wherein the filter  
25 element is configured in any required shape and size;
9. A filter element according to any one of the preceding claims, wherein the filter element comprises more than one layer of coarse screen sheet material, to thereby support and protect a fine layer of screen material.
10. A filter element according to any one of the preceding claims, wherein the fine  
30 mesh screen layer is positioned at any tier between coarser mesh sheets.
11. A filter element according to any one of the preceding claims, wherein the different layers are made of different material and differ in their porosity.

**12.** A filter element according to any one of the preceding claims, wherein the screen sheet layer is externally or internally articulated to the skeleton.

**13.** A filter element according to any one of the preceding claims, wherein the enveloping rib portions extend at least in an axial direction.

5 **14.** A filter element according to any one of the preceding claims, wherein the enveloping portions extend at warp and weft patterns with intersections.

**15.** A filter element according to any one of the preceding claims, wherein an inside surface of an inner-most screen layer is substantially smooth.

**16.** A filter element according to any one of the preceding claims, wherein at least  
10 one enveloping portion of the filter element is substantially equidistant from the fine screen.

**17.** A filter element according to any one of the preceding claims, wherein the enveloping portions substantially correspond with narrow ribs of the screen-bearing skeleton, whereby the effective filtering screen area is substantially not affected.

15 **18.** A filter element according to any one of the preceding claims, wherein the filter element is formed with two ring edges and whereby the molten material of the skeleton axially extends between the two end rings.

**19.** A filter element according to any one of the preceding claims, wherein axially extending end edges of the sheet material are joined and the join line extends behind an  
20 enveloping axial rib.

**20.** A filter element according to any one of the preceding claims, wherein the end rings of the filter element are designed for coupling in a substantially seal-tight fashion with the filter housing.

**21.** A filter element according to any one of the preceding claims, wherein the end  
25 rings are designed also for axial co-extension with like filter elements.

**22.** Method of manufacturing a filter element in accordance with any one of the proceeding claims, comprising:

- (a) providing a support core member;
- (b) providing a filter screen assembly configured for placing over a support  
30 core-member;
- (c) providing a filter screen-bearing skeleton configured with support ribs,
- (d) wherein the skeleton is molded over the support core member and the filter screen assembly, whereby molten plastic material is allowed to flow through

the filter screen assembly towards the core member to thereby secure the screen filter to the skeleton.

**23.** A method in accordance with Claim 22, wherein the core member is formed with one or more flow channels formed over its surface such that the molten plastic material flows along the flow channels of the support core member, resulting in generating one or more enveloping ribs.

**24.** Method of manufacturing a filter element in accordance with any one of the proceeding claims, comprising:

- (a) providing a mold comprising a support core member and a skeleton mold member provided with channels corresponding to the position of the enveloping ribs;
- (b) providing a filter screen assembly configured for placing over a support core-member;
- (c) placing the filter screen assembly over the support core member;
- (d) placing the skeleton mold member around the filter screen assembly and the core member;
- (e) allowing a molten plastic material to flow through the filter screen assembly towards the core member to thereby secure the screen filter to the skeleton.
- (f) removing the skeleton mold member and the core member of the resulting filter element.

**25.** A fluid filter unit comprising a filter element in accordance with any one of the proceeding claims, a housing configured for accommodating the filter element, and wherein the filter unit is configured with a fluid flow path extending radially through the filter element.

**26.** A fluid filter unit in accordance with any one of the previous claims, wherein the filter element comprises a filter screen assembly integrated thereto, composed of at least three screen sheet layers such that at least one intermediate screen layer is a fine mesh screen, whilst the outermost screen and the innermost screen are coarse mesh screens.

**Claims:**

1. A screen-type filter element, comprising:  
a substantially rigid screen-bearing skeleton; and  
a filter screen assembly including at least one fine mesh screen sheet material layer and at least one coarse mesh screen sheet material layer, the filter screen assembly extending within or over the substantially rigid screen-bearing skeleton and secured thereto by a plurality of enveloping ribs, the plurality of enveloping ribs being applied over one face of the filter screen assembly to extend through at least the at least one coarse mesh screen sheet material layer and thereby support the filter screen assembly at discrete portions and secure the filter screen assembly to the substantially rigid screen-bearing skeleton.
2. The filter element, according to claim 1, wherein the plurality of enveloping ribs are part of the substantially rigid screen-bearing skeleton.
3. The filter element, according to claim 1, wherein the plurality of enveloping ribs are constituted by melted skeleton, or made of material applied over the filter screen assembly and attached to the skeleton material.
4. The filter element according to claim 1, wherein the plurality of enveloping ribs are either substantially continuous or substantially segmented.
5. The filter element according to claim 1, wherein at least one the at least one fine mesh screen sheet material layer or the at least one coarse mesh screen sheet material layer is made of at least one of plastic, metal, woven fabric, or non-woven fabric.
6. The filter element according to claim 1, further comprising more than one layer of the coarse mesh screen sheet material layer to thereby support and protect the at least one fine mesh screen sheet material layer.

7. The filter element according to claim 1, wherein the at least one fine mesh screen sheet material layer and at least one coarse mesh screen sheet material layer are made of different materials and differ in porosity.
8. The filter element according to claim 1, wherein the at least one fine mesh screen sheet material layer or the at least one coarse mesh screen sheet material layer is externally or internally articulated to the substantially rigid screen-bearing skeleton.
9. The filter element according to claim 1, wherein the enveloping rib portions extend at least in an axial direction.
10. The filter element according to claim 1, wherein the enveloping rib portions extend at warp and weft patterns with intersections.
11. The filter element according to claim 1, wherein at least one of the enveloping portions is substantially equidistant from the at least one fine mesh screen sheet material layer.
12. The filter element according to claim 1, wherein the enveloping portions substantially correspond with narrow ribs of the substantially rigid screen-bearing skeleton such that an effective filtering screen area is substantially not affected.
13. The filter element according to claim 1, wherein axially extending end edges of the at least one fine mesh and at least one coarse mesh screen sheet material layers are joined and a join line extends behind an enveloping axial rib.

14. A fluid filter unit comprising the filter element according to claim 1 and a housing configured for accommodating the filter element, and wherein the filter unit is configured with a fluid flow path extending radially through the filter element.

15. The fluid filter unit in accordance with claim 14, wherein the filter element comprises a filter screen assembly integrated thereto, composed of at least three screen sheet layers such that at least one intermediate screen layer is a fine mesh screen, whilst the outermost screen and the innermost screen are coarse mesh screens.

16. Method of manufacturing a filter element in accordance with any one of the proceeding claims, comprising:

(a) providing a support core member;

(b) providing a filter screen assembly configured for placing over a support core-member;

(c) providing a filter screen-bearing skeleton configured with support ribs,

(d) wherein the skeleton is molded over the support core member and the filter screen assembly, whereby molten plastic material is allowed to flow through the filter screen assembly towards the core member to thereby secure the screen filter to the skeleton.

wherein the core member is formed with one or more flow channels formed over its surface such that the molten plastic material flows along the flow channels of the support core member, resulting in generating one or more enveloping ribs.