FILTER ELEMENT FIXATION FOR FILTER PRESSES

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IE IT LI LU MC NL PT SE

(30) Priority:
14.09.1993 GB 9319008
17.02.1994 GB 9403066

(43) Date of publication of application:
03.07.1996 Bulletin 1996/27

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Description

[0001] The present invention relates to a filter fabric apparatus for a filter press and has more particular reference to a barrel neck connection or between spaced filter cloths in producing a filter fabric for a filter press.


[0003] It is known to provide on filter presses and some other filter types filter plates having a slurry feed hole in the filtering area. Both sides of such a filter plate are covered with a layer of filter material and each layer is provided with a feed hole. It is necessary to prevent the slurry from escaping between the filter layers and the filter plate in the region of the feed hole.

[0004] In one known arrangement a connecting device consisting essentially of a short cylinder having a flange at one end and threaded at the other is passed through the feed hole of one layer, through the hole in the filter plate and through the hole in the other layer. An annular ring is placed over the projecting cylindrical portion and a nut is screwed onto the threaded portion so pressing the layers of filter material between the flanges and the filter plate to provide a seal. This type of fixing is difficult and time consuming to assemble and often difficult to dismantle when the filter fabric has reached the end of its useful life.

[0005] In another known arrangement the two layers of filter material are interconnected at the feed hole by a cylindrical portion made from the filter cloth material which portion is stitched at one end to one layer and at the other end to the other layer to form a so-called "barrel neck" filter cloth. The stitching operation is particularly time consuming and installing the filter cloth necessitates passing one layer of the cloth through the feed hole in the filter plate. Furthermore if the filter cloth becomes hardened during use it is often impossible to remove the cloth without cutting. Thus removal for washing is prevented and the useful life of the filter cloth becomes shortened. Also if one side of the cloth becomes damaged the complete filter cloth must be disregarded.

[0006] In order to overcome the problem of stitching a known filter cloth (described in GB-A-1459099) of the "barrel neck" type utilises a hollow plastics cylinder which is secured to the two layers of the filter cloth by heat bonding. However, the problems of fitting and removing the cloth still remain.

[0007] In another known arrangement described in DE-A-2110860 a pair of filter cloths which cover the respective sides of a filter plate are each provided with a connecting device which is semi-circular in cross-section and which is made from an elastic deformable material. The device is secured to the filter cloth and when installed in the press the semi-circular portions of each device lay tightly over one another.

[0008] In practice the connections of this type have been found to be difficult to install because the semi-circular section must be deformed substantially. In addition some support is required for the connection to ensure adequate sealing between the two components.

[0009] GB-A-2088231 describes a filter arrangement comprising two filter cloths on opposite sides of a filter press connected by a barrel neck connection. The barrel neck connection comprises two annular members each of which is secured to one of the filter cloths. The ends of the annular members are constructed to connect releasably together with a snap fit. However, such an arrangement is difficult to manufacture in a cost effective manner in that the rings must be made to a close tolerance if they are to fit together correctly. Furthermore if the rings are manufactured to such a close tolerance they are difficult to prise apart and are often damaged in doing so. Hence, they cannot be reused.

[0010] The present invention has been made from a consideration of these problems.

[0011] According to the present invention there is provided a filter fabric apparatus for a filter press, the apparatus comprising first and second filter cloths, each having a feed opening and a feed passage between the feed openings, the apparatus furthermore comprising at least first and second members and optionally a third member, each of the members having apertures, the first member being secured to the first filter cloth and the second member being secured to the second filter cloth, wherein the feed passage is formed by locating the first member over at least one of said second and third members such that the bulk of the first member does not define the surface of the feed passage that defines the passage through which material to be filtered is directed, characterised in that at least two of the members are of differing hardness.

[0012] The filter members of the present invention can be mounted on a filter plate individually and then joined together. Likewise they can be removed individually. This facilitates ease of manufacture and easier dismantling of the pair of filter cloths. Furthermore this arrangement enables the cloths to be replaced individually.

[0013] By locating the first member over another member the feed passage is preferably, at least in part, multi-walled. The apertures through the members are preferably concentrically arranged. The two members may be tubular or may comprise truncated cones. A flange may be provided at one end of each of the tubular members or truncated cones. The angle of taper of such truncated cones would preferably be less than 5° and would preferably be substantially 2°. The engaging surfaces of the two cones may be textured, but smooth high friction surfaces are preferred. A lubricant may be provided between the engaging surfaces of the members. This may comprise a fluid such as an aqueous gel, an aqueous syrup or a water insoluble grease based for example on a petroleum product or silicone.

[0014] In a further embodiment of the invention the...
engaging surfaces of the tubular members may comprise co-operating threads. The term "threads" used herein also incorporates regions defining grooves. The threads may be spiral or may be arranged as a series of threads disposed in a parallel fashion. Preferably the apparatus comprises non-continuous co-operating threads in which selected regions of the surface of the tubular members are thread free. These threads may be annular rather than helical. The threads are not introduced to each other by a screwing action, but are connected by a pushing action and an optional subsequent turning action. That is, the threaded regions can be opposed to each other so as to define barbs in which case the two tubular members can be connected via a straight push-fit, or threads on the male member can be aligned with non-threads on the female, followed by a twist to mesh the threads. If the female member is to be twisted the filter cloth attached to the female member should be furled. In dismantling non-alignment of threads is obligatory.

If non-threaded and threaded regions are provided the threaded regions are preferably equally spaced around the tubular member. The non-threaded regions are similarly spaced and are at least as large as the threaded regions so as to facilitate separation of the two tubular members.

The arrangement described above is relatively easy to manufacture. It is also easy to assemble and disassemble in situ and results in guaranteed alignment on the plate.

The two tubular members may be connected via barbs on one member engageable with stops on another. One of the barbs or stops are ideally located on the outer surface of the innermost member, the said barbs or stops extending outwardly. By using two tubular members of differing hardness the thread of one acts as a set of flexible barbs.

A gasket, preferably of elastomeric material such as rubber, may be provided at the base of one of the tubular members, i.e. the member over which the other member is received. The gasket prevents leakage when the device is in use.

In a further alternative embodiment of the invention a third tubular member is fitted between the first two tubular members so as to act as a connecting piece.

In order that the present invention may be more readily understood specific embodiments thereof will now be described by way of example only with reference to the accompanying drawings in which:-

Fig.1 is a perspective view of one filter fabric apparatus in accordance with the invention;
Fig.2 is a section through the filter apparatus of Fig.1;
Figs. 3 & 4 show a further filter apparatus in accordance with the invention;
Fig.5 shows another filter apparatus in accordance with the invention;
Fig.6 shows a further filter apparatus in accordance with invention;
Fig.7 is a perspective view of two tubular members of a further filter apparatus in accordance with the present invention;
Fig.8 is a side elevation of the members of Fig.7;
Fig.9 shows a cross section through a further filter apparatus in accordance with the invention;
Figs. 10 & 11 show a fixing member being secured to a filter cloth; and
Fig.12 shows filter cloths as shown in part in Figs. 10 and 11 being secured to a connecting tubular member.

Referring to Figs. 1 and 2 a filter fabric apparatus 10 for use in a filter press comprises two truncated cones 11,12 moulded from plastics or from an elastomer. An annular flange 13,14 extends from one end of each cone, a filter cloth 15,16 being secured to each flange 13,14. An aperture is provided through each filter cloth the apertures being in register with the channels defined by the cones. The angle "α" of the truncated cones is very small, for example 2°.

In order to fit the filter apparatus 10 to a filter plate of a filter press the female truncated cone 12 is passed through the bore through the filter plate until the filter cloth 16 is located adjacent the filter plate. The male truncated cone 11 is then inserted from the opposite side of the filter plate into the female cone 12. The fit of the truncated cones is so precise that no fluid can escape between the touching surfaces when the filter plate is operating. It may be desirable when fitting the cones together to lubricate the engaging surfaces thereof.

Figs. 3 and 4 show the assembly of a further embodiment of the invention 20. Here the first and second members have co-operating screw threads 21,22 on their engaging surfaces in order that the members may be brought into threaded engagement. Here the female member is inserted into the bore through the filter plate prior to the male member being brought into threaded engagement with it. This arrangement offers enhanced stability and strength.
the materials are of different hardness the thread 51 of threads 53 are provided on the two members 51,52. As materials of differing hardness. Co-operating screw which the first and second members 51,52 are made of [0032]

toration.

aligned with the non-grooved portions of the other. It is lar members is effected by first twisting the members [0031]

provided around the inside of the second tube. Once again shown) is removed. Further annular grooves 47 are pro-
dvided around the outside thereof. A quarter of the grooves are removed so as to provide a blank portion 46. Similarly the opposing quarter of the grooves (not shown) is removed. Further annular grooves 47 are pro-
vided around the inside of the second tube. Once again opposing quarters 48 of the groove 47 are removed.

A rubber gasket 49 is provided on the flange 43 extending from the first tube 41. [0030] In order to fit the filter apparatus to a filter plate [0029] The first tube 41 has annular grooves 45 provided around the outside thereof. A quarter of the grooves are removed so as to provide a blank portion 46. Similarly the opposing quarter of the grooves (not shown) is removed. Further annular grooves 47 are pro-
vided around the inside of the second tube. Once again opposing quarters 48 of the groove 47 are removed.

The filter apparatus comprises a tube (12) optionally having a flange [0028] Referring to Figs. 7 and 8 a filter fabric apparatus 40 for use in a filter press comprises two tubes 41,42 moulded from plastics or an elastomer. Suitable materials include polypropylene, polyester and polyamide. An annular flange 43.44 extends from one end of each tube, a filter cloth (not shown) being secured to each flange. An aperture is provided through each filter cloth, the apertures being in register with the channels defined by the tubes.

The edges of the connecting piece may be tapered so as to facilitate easy fitting thereof. Co-oper-
ating projections and grooves may be provided on the first and second members and the third member, for example as shown in Fig.6. Here annular projections 34 extend from the first and second members and engage with annular grooves 35 provided on the third member 33. Grooves may additionally or alternatively be pro-
vided on the first and second members for engagement with projections provided on the third member. The third member is preferably at least as rigid, if not more so, than the first and second members.

1. A filter fabric apparatus for a filter press furthermore comprising, the apparatus first and second filter cloths (15, 16), each having a feed opening and a feed passage between the feed openings, the apparatus furthermore comprising first and second members (11, 12) and a third member (33), each of the members having apertures, the first member being secured to the first filter cloth and the second member being secured to the second filter cloth, wherein the feed passage is formed by locating the first and second members about said third member such that the bulk of the first and second members do not define the surface of the feed passage that defines the passage through which material to be filtered can be directed.

2. A filter apparatus according to claim 1 characterised in that said third member (33) defines said feed passages, and is received snugly within said first and second members (31, 32), which are of equal diameter.

3. A filter fabric apparatus according to claim 2 characterised in that grooves (35) are provided in either the first and second members (31, 32) or the third member (33) and cooperate with annular projections (34) on the other of the third member (33) or first and second members (31, 32).

4. A filter fabric apparatus as claimed in claim 1, characterised in that the feed passage is defined at least in part by plurality of walls.

5. A filter fabric apparatus for a filter press as claimed in claim 1 or 2, characterised in that the first member comprises a tube (12) optionally having a flange
6. A filter fabric apparatus as claimed in any preceding claim, characterised in that the second member comprises a tube (11) optionally having a flange (13) provided at one end thereof.

7. A filter fabric apparatus as claimed in claim 1 or claim 4 characterised in that the first and second members comprise truncated cones (11, 12) optionally having a flange (13, 14) provided at one end of each of the first and second members.

8. A filter apparatus as claimed in claim 7, characterised in that the truncated cones have an angle of taper of less than 5°.

9. A filter apparatus as claimed in claim 7 or claim 8, characterised in that the truncated cones have an angle of taper of substantially 2°.

10. A filter fabric apparatus as claimed in any preceding claim, characterised in that a lubricant is provided between engaging surfaces of the members.

11. A filter fabric apparatus as claimed in any preceding claim, characterised in that the members are secured together by co-operating threads (21, 22).

12. A filter fabric apparatus as claimed in claim 11 characterised in that the threads are provided in a spiral manner.

13. A filter fabric apparatus as claimed in claim 11, characterised in that a series of threads are provided on each member, the threads being arranged in a parallel fashion.

14. A filter fabric apparatus as claimed in any of claims 11 to 13, characterised in that the threads of the members can be disconnected by relative rotation of the members such that the threads of the respective members are non-aligned so that the members can be separated.

15. A filter fabric apparatus as claimed in any of claims 11 to 14, characterised in that the threads are non-continuous, selected regions of the surfaces of the members being thread free.

16. A filter fabric apparatus as claimed in claim 13, characterised in that the non-threaded regions on one of said members cover at least as large a proportion of the member surface as the threaded regions theretebetween.

17. A filter apparatus as claimed in any preceding claim, characterised in that the members are connected by a barb and stop arrangement.

18. A filter fabric apparatus as claimed in any preceding claim, characterised in that the apparatus further comprises a gasket (47).

19. A filter apparatus as claimed in any preceding claim, characterised in that the third member is provided in the apparatus, the third member comprising a tube (33).

20. A filter fabric apparatus as claimed in claim 18, characterised in that the bulk of the first and second members is located over the third member.

21. A filter fabric apparatus as claimed in claim 19 or claim 20, characterised in that the first and second members are secured to the third member.

22. A filter fabric apparatus as claimed in any of claims 19 to 21, characterised in that the ends of the third member are tapered.

Patentansprüche

1. Filtergewebevorrichtung für eine Filterpresse, wobei die Vorrichtung ein erstes und ein zweites Filtertuch (15, 16) aufweist, von denen jedes eine Zuführöffnung und einen zwischen den Zuführöffnungen liegenden Zuführdurchgang aufweist, wobei die Vorrichtung ferner mindestens erste und zweite Elemente (11, 12) und wahlweise ein drittes Element (33) aufweist, wobei jedes Element mit Öffnungen versehen ist, wobei das erste Element an dem ersten Filtertuch und das zweite Element an dem zweiten Filtertuch angebracht ist, wobei der Zuführdurchgang dadurch gebildet ist, daß das erste Element über mindestens einem der zweiten und dritten Elemente angeordnet wird, derart, daß der Hauptteil des ersten Elementes nicht die Oberfläche des Zuführdurchganges bildet, welcher den Durchgang bildet, durch den das zu filternde Gut geleitet werden kann, dadurch gekennzeichnet, daß mindestens zwei der Elemente eine unterschiedliche Härte aufweisen.

2. Filtergewebevorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß der Zuführdurchgang zumindest teilweise durch mehrere Wände gebildet ist.

3. Filtergewebevorrichtung für eine Filterpresse nach Anspruch 1 oder Anspruch 2, dadurch gekennzeichnet, daß das erste Element ein Rohr (12) aufweist, an dessen einem Ende wahlweise ein Flansch (14) ausgebildet ist.

4. Filtergewebevorrichtung nach einem vorhergehen-
den Anspruch, dadurch gekennzeichnet, daß das zweite Element ein Rohr (11) aufweist, an dessen einem Ende wahlweise ein Flansch (13) ausgebildet ist.

5. Filtergewebevorrichtung nach Anspruch 1 oder Anspruch 2, dadurch gekennzeichnet, daß das erste und das zweite Element Kegelstümpfe (11, 12) umfassen, die wahlweise jeweils einen Flansch (13, 14) an einem Ende des ersten und des zweiten Elementes aufweisen.

6. Filtergewebevorrichtung nach Anspruch 5, dadurch gekennzeichnet, daß die Kegelstümpfe einen Kegelwinkel von weniger als 5° aufweisen.

7. Filtergewebevorrichtung nach Anspruch 5 oder Anspruch 6, dadurch gekennzeichnet, daß die Kegelstümpfe einen Kegelwinkel von im wesentlichen 2° aufweisen.

8. Filtergewebevorrichtung nach einem vorhergehenden Anspruch, dadurch gekennzeichnet, daß zwischen ineinandergreifende Flächen der Elemente ein Schmiermittel eingebracht ist.

9. Filtergewebevorrichtung nach einem vorhergehenden Anspruch, dadurch gekennzeichnet, daß die Elemente durch zusammenwirkende Gewinde (21, 22) miteinander verbunden sind.

10. Filtergewebevorrichtung nach Anspruch 9, dadurch gekennzeichnet, daß die Gewinde spiral-förmig angeordnet sind.

11. Filtergewebevorrichtung nach Anspruch 9, dadurch gekennzeichnet, daß auf jedem Element eine Reihe von Gewinden vorgesehen sind, wobei die Gewinde parallel zueinander angeordnet sind.

12. Filtergewebevorrichtung nach einem der Ansprüche 9 bis 11, dadurch gekennzeichnet, daß die Gewinde der Elemente durch relative Drehung der Elemente voneinander gelöst werden können, derart, daß die Gewinde der jeweiligen Elemente nicht zueinander ausgerichtet sind, so daß die Elemente getrennt werden können.

13. Filtergewebevorrichtung nach einem der Ansprüche 9 bis 12, dadurch gekennzeichnet, daß die Gewinde nicht durchgehende, ausgewählte Bereiche der gewindefreien Oberflächen der Elemente sind.


15. Filtergewebevorrichtung nach einem vorhergehenden Anspruch, dadurch gekennzeichnet, daß die Elemente durch eine Anordnung aus Rastvorsprüngen und Anschlägen verbunden sind.

16. Filtergewebevorrichtung nach einem vorhergehenden Anspruch, dadurch gekennzeichnet, daß die Vorrichtung ferner eine Dichtung (47) aufweist.

17. Filtergewebevorrichtung nach einem vorhergehenden Anspruch, dadurch gekennzeichnet, daß das dritte Element in der Vorrichtung angeordnet ist, wobei das dritte Element ein Rohr (33) umfaßt.


19. Filtergewebevorrichtung nach Anspruch 17 oder Anspruch 18, dadurch gekennzeichnet, daß das erste und das zweite Element an dem dritten Element angebracht sind.

20. Filtergewebevorrichtung nach einem der Ansprüche 17 bis 19, dadurch gekennzeichnet, daß die Enden des dritten Elementes abgeschärzt sind.

Revendications

1. Dispositif de filtration en tissu destiné à un filtre-presse, le dispositif comportant un premier et un second tissu de filtration (15, 16), ayant chacun une ouverture d'alimentation et un passage d'alimentation situé entre les ouvertures d'alimentation, le dispositif comportant de plus au moins un premier et un second élément (11, 12) et de manière facultative un troisième élément (33), chacun des éléments ayant des ouvertures, le premier élément étant fixé sur le premier tissu de filtration et le second élément étant fixé sur le second tissu de filtration, le passage d'alimentation étant formé en positionnant le premier élément sur au moins un parmi lesdits deuxième et troisième éléments de sorte que l'encombrement du premier élément ne définisse pas la surface du passage d'alimentation.
qui définit le passage à travers lequel un matériau à filtrer peut être dirigé, caractérisé en ce qu'au moins deux des éléments ont une robustesse différente.

2. Dispositif de filtration en tissu selon la revendication 1, caractérisé en ce que le passage d'alimentation est défini au moins en partie par une pluralité de parois.

3. Dispositif de filtration en tissu pour filtre-presse selon la revendication 1 ou 2, caractérisé en ce que le premier élément est constitué d'un tube (14), ayant facultativement une bride (12) agencée à une de ses extrémités.

4. Dispositif de filtration en tissu selon l'une quelconque des revendications précédentes, caractérisé en ce que le deuxième élément est constitué d'un tube (11) ayant facultativement une bride (13) agencée à une de ses extrémités.

5. Dispositif de filtration en tissu selon la revendication 1 ou 2, caractérisé en ce que le premier et le deuxième élément sont constitués de cônes tronqués (11, 12), ayant facultativement une collerette (13, 14) agencée au niveau d'une première extrémité de chacun des premier et deuxième éléments.

6. Dispositif de filtration en tissu selon la revendication 5, caractérisé en ce que les cônes tronqués ont un angle de cône plus petit que 5°.

7. Dispositif de filtration en tissu selon la revendication 5 ou 6, caractérisé en ce que les cônes tronqués ont un angle de cône de sensiblement 2°.

8. Dispositif de filtration en tissu selon l'une quelconque des revendications précédentes, caractérisé en ce qu'un lubrifiant est agencé entre les surfaces de contact des éléments.

9. Dispositif de filtration en tissu selon l'une quelconque des revendications précédentes, caractérisé en ce que les éléments sont fixés ensemble par des filets (21, 22) complémentaires.

10. Dispositif de filtration en tissu selon la revendication 9, caractérisé en ce que les filets sont agencés en spirale.

11. Dispositif de filtration en tissu selon la revendication 9, caractérisé en ce qu'une série de filets est agencée sur chaque élément, les filets étant agencés de manière parallèle.

12. Dispositif de filtration en tissu selon l'une quelconque des revendications 9 à 11, caractérisé en ce que les filets des éléments peuvent être déconnectés par mise en rotation relative des éléments de telle sorte que les filets des éléments respectifs ne sont pas alignés, de sorte que les éléments peuvent être séparés.

13. Dispositif de filtration en tissu selon l'une quelconque des revendications 9 à 12, caractérisé en ce que les zones sans filet d'un premier desdits éléments recouvrent au moins une proportion de la surface d'éléments aussi grande que les zones filetées situées entre celles-ci.

14. Dispositif de filtration en tissu selon la revendication 13, caractérisé en ce que les zones sans filet d'un premier desdits éléments recouvrent au moins une proportion de la surface d'éléments aussi grande que les zones filetées situées entre celles-ci.

15. Dispositif de filtration en tissu selon l'une quelconque des revendications précédentes, caractérisé en ce que les éléments sont reliés par un agencement à barbe et butée.

16. Dispositif de filtration en tissu selon l'une quelconque des revendications précédentes, caractérisé en ce que le dispositif comporte de plus un parier (47).

17. Dispositif de filtration en tissu selon l'une quelconque des revendications précédentes, caractérisé en ce que le troisième élément est agencé dans le dispositif, le troisième élément étant constitué d'un tube (33).

18. Dispositif de filtration en tissu selon la revendication 16, caractérisé en ce que l'encombrement des premier et deuxième éléments est situé sur le troisième élément.

19. Dispositif de filtration en tissu selon la revendication 17 ou 18, caractérisé en ce que le premier et le second élément sont fixés sur le troisième élément.

20. Dispositif de filtration en tissu selon l'une quelconque des revendications 17 à 19, caractérisé en ce que les extrémités du troisième élément sont biseautées.