Device suitable for the treatment of a fluid, as well as a method and machine suitable for the manufacture of such a device.

~~The~~ Embodiments of the invention ~~relates~~ seek to provide a device suitable for processing at least one fluid, which device is provided with at least one elongated foil that is formed in a number of reciprocating foil layers, wherein between two opposite foil layers a spacer is situated which is permeable at least parallel to the foil layers, said foil layers and interposed spacers extending spirally around a central axis, wherein folding lines between two foil layers extend substantially parallel to the central axis.

~~The~~ Embodiments of the invention further ~~relates to~~provide a method and a machine suitable for the manufacture of such a device.

Depending on whether the foil is made of a heat-conducting foil, a membrane foil or a combination thereof, the device is suitable as a heat exchanger, a membrane filter, or a combination thereof. In a combination of, for example, a heat-conducting foil and a membrane foil, a spacer is situated between at least two foil layers of one of these foils.

In such a device, described in WO2010/011138 of the applicant and in the device shown in the figures 8-10, the foil layers and the interposed mesh-like spacer extend spirally from a centerline of a cylindrical container to the exterior of the cylindrical holder. Because of the cylindrical shape, relatively large pressures may be applied. As is clearly visible in the figures 8-10, the device shown in WO2010/011138 comprises a relatively large number of foil layers, which makes the manufacture of such a device relatively complex.

According to a first aspect of the present invention, there is provided a device suitable for processing at least one fluid, which device is provided with at least one elongated foil, made of a heat-conducting foil, a membrane foil or a combination thereof, which foil is formed in a number of reciprocating foil layers, wherein between two opposite foil layers a spacer is situated which is permeable at least parallel to the foil layers, said foil layers and interposed spacers extending spirally around a central axis, wherein a folding line between two foil layers extends parallel to the central axis, wherein the device comprises a number of tubular supports extending parallel to the central axis, wherein each spacer is coupled at least at an end near the central axis with one of said tubular supports where, of the tubular supports near the central axis, first tubular supports are each situated between two foil layers, which foil layers are connected to one another near the central axis at the folding line, which folding line is formed by the first tubular support, whereas second tubular supports are situated between two successive first tubular supports, wherein at least tubular supports near the central axis are alternately connected to a first and second fluid channel, whereby two sets of tubular supports are formed, in which a first set of tubular supports is located in a first space that is separated by the foil layers from a second space, while the spaces are connected to the different fluid channels wherein the tubular supports are provided with at least one aperture facing the spacer configured to function as supply or discharge channel of a fluid to be processed by the device, and wherein the axial ends of the spirally wound foil layers are sealed by means of a seal, wherein the entire axial side can herewith be sealed with the exception of the desired passages in the ends of the tubular supports.

~~The invention aims to provide a device which combines the advantages of the known device and which is relatively simple to manufacture.~~

~~This objective is accomplished with the device according to the invention, in that each spacer is coupled at least at an end near the central axis with a support extending parallel to the central axisaxis where, of the supports near the central axis, first supports are situated between two foil layers, which foil layers are~~

~~connected to one another near the central axis, whereas second supports are situated between two successive first supports.~~

When spirally winding the foil layers around the central axis, the foil layers and the spacers can be firmly held by means of the supports that are coupled with the ends of the spacers near the central axis. The foil layers and the intervening spacers may subsequently be spirally wound around the central axis in a number of turns.

After the manufacturing of the device, a good support of the foil layers is obtained by the supports and the spacer. Moreover, the foil layers are shielded by the supports from possible sharp edges of the spacers.

An embodiment of the device according to the invention is characterized in that each spacer is coupled at both ends with a support.

This means that during the winding of the foil layers and the interposed spacers around the central axis, via the supports a tension force on the foil layers can be applied at the ends averted from the central axis, so that during winding the foil layers remain tightly tautened and do not undesirably curl.

After the manufacture of the device a cylindrical device is obtained, wherein a good support of the foil layers is obtained by the supports, both on the inside and the outside of the cylindrical device.

Another embodiment of the device according to the invention is characterized in that the support is tubular.

The tubular supports are hereby applicable as supply- and discharge channels. Moreover, in the tubular support a gripping means can simply be detachably attached for the fabrication of the device.

Another embodiment of the device according to the invention is characterized in that the support is provided with at least one aperture facing the spacer.

In this way, it is possible to use the support not only as gripping means during the manufacturing process, or as a support and shield for the spacer, but also simply as supply- or discharge channel of a fluid to be processed by the device.

Via the aperture the fluid can flow from the space situated between the foil layers to the space bounded by the tubular support, and vice versa.

A further embodiment of the device according to the invention is characterized in that the aperture comprises an elongated slot extending parallel to the central axis, in which the end of the spacer is situated.

In this way a simple coupling of the spacer with the support ~~is~~ may be obtained. The aperture serves hereby for coupling of the spacer but also as passage for fluid.

Yet another embodiment of the device according to the invention is characterized in that the end of the spacer located ~~the~~ in tubular support is provided with a thicker portion that extends over at least part of the end.

Because of the thicker portion it is possible to link the spacer easily with the support, by sliding the thicker portion that is functioning as a tendon into the support, whereby the spacer extends through the slot. Here the thicker portion should be of such dimensions that it is not movable through the slot in radial direction.

A still further embodiment of the device according to the invention is characterized in that the elongated slot extends from a first end of the tubular support to a predetermined distance from the second end of the tubular support.

While fitting the spacer via the first end into the slot, a stop is formed by the second end, which may simply prevents further movement of the tubular support in axial direction.

A still further embodiment of the device according to the invention is characterized in that at least the tubular supports near the central axis are positioned alternately with first and second ends to the axial ends of the spirally wound foil layers and spacers.

As a result, two sets of supports ~~are~~ may be formed as it were, in which a first set of supports is located in a first space that is separated by the foil layers from a second space in which the second set of supports is located. After the winding of the foil layers, the first ends of all the supports can for example be shut and the second ends can be connected to a fluid supply or drain. Here, the first space is accessible

via a first axial side of the cylindrical device, whereas the second space is then accessible via a second side of the cylindrical device that is averted from the first axial side.

A still further embodiment of the device according to the invention is characterized in that at least the tubular supports near the central axis are alternately connected to a first and second fluid channel.

As a result, two sets of supports ~~are~~ may be formed as it were, in which a first set of supports is located in a first space that is separated by the foil layers from a second space, while the spaces are connected to different fluid channels. In a similar manner the tubular supports located at the averted side of the central axis can be connected to a third and fourth fluid channel. Here, the first and third fluid channels are connected to the first space, whereas the second and fourth fluid channels are connected to the second space.

A still further embodiment of the device according to the invention is characterized in that the first fluid channel is positioned at a first axial end of the spirally wound foil layers and spacers, whereas the second fluid channel is positioned at a second axial end of the spirally wound foil layers and spacers, the second end being averted from the first fluid channel.

As a result, the fluid channels ~~are~~ may be simply separated from each other and easily accessible from either side of the cylindrical device. In a similar manner, tubular supports located at a side averted from the central axis can also be alternately connected to two different fluid channels. The fluid channels that are connected to the same space, and located close to the central axis and distant from the central axis respectively, serve as supply-and discharge channels, or vice versa.

A still further embodiment of the device according to the invention is characterized in that the tubular supports, connected to the first respectively second axial end on the first respectively second fluid channel, are sealed at the second respectively first axial end.

Because of the sealed ends, it ~~is~~ may be effectuated in a simple manner that the fluid can only flow from the device at the desired axial side.

An embodiment of the device according to the invention is characterized in that the axial ends of the spirally wound layers of foil are sealed by means of a seal.

The entire axial side can herewith be easily sealed, with the exception of the desired passages in the ends of the supports, for example by means of a resin or a kit.

An embodiment of the device according to the invention is characterized in that a sealing foil portion of the foil is connected to a first foil layer, extending towards and being connected to the last foil layer and extending towards and again being connected to the first foil layer.

As a result, two enclosed spaces ~~are~~ may be formed that are completely separated from each other by the foil parts, which are completely sealed off in the circumferential direction of the cylindrical device by the sealing foil portion.

Only if the foil is a membrane foil, contact between the fluids in the different spaces is possible.

An embodiment of the device according to the invention is characterized in that the supports near the central axis are positioned around a central support tube.

The tubular supports lie alternately directly against the support tube or against the support tube with the intervention of the foil layer.

It is also possible that the support tube itself functions as a support for those spacers of which, in the case of individual supports, the supports would have lain directly against the support tube.

An embodiment of the device according to the invention is characterized in that at least near the central axis at least one additional support is situated between a first support and a second support, where, of the supports near the central axis, the first support is situated between two foil layers of a first foil, which foil layers of the first foil are connected to one another near the central axis, whereas the additional support, the two foil layers of a first foil as well as the first support are situated between two foil layers of a second foil, which foil layers of the second foil are connected to one another near the central axis.

The additional support is being used to guide near the central axis, the second foil around both the additional support, two foil layers of a first foil as well as the first support. In this manner an additional space ~~is being~~ may be created between the first and second foil for an additional fluid. If the additional support is tubular and provided with at least one aperture located between the first and second foil, the additional fluid can easily be guided into or out of the additional space through the tubular additional support.

It is possible to provide a number of additional supports between the first and the second support, whereby near the central axis a number of foils and, if desired an number of foil like spacers are wrapped around only the first support or around the first support and one additional support of around the first support and more additional supports. In all these cases near the central axis no foil need to be wrapped around the second support.

~~The invention also aims to provide a method for the simple manufacture a device as described above.~~

~~This objective is accomplished with the method according to the invention in that a number of tubular supports extending parallel to one another are positioned between two rotatable elements on a central axis and are coupled therewith, wherein first ends of the spacers are coupled with the supports and the foil is wound in a reciprocating way alternately in foil layers around the first and second ends of the spacers, wherein the spacers and the foil layers extend substantially parallel to oneanotherwhere, of the supports near the central axis, first supports are situated between two foil layers, which foil layers are connected to one another near the central axis, whereas second supports are situated between two successive first supports, whereupon the elements along with the foil layers and the spacers are rotated around the central axis, wherein the foil layers and the spacers are positioned spirally around the central axis.~~

According to a second aspect of the present invention, there is provided a method suitable for the manufacture of a device according to anyone of the preceding claims, wherein a number of tubular supports extending parallel to one another are positioned between two elements rotatable on a central axis which elements are provided with fastening elements for detachably coupling of tubular supports between the elements, wherein first ends of the spacers are coupled with the tubular supports, and the foil is wound in a reciprocating way alternately in foil layers around the first and second end of the spacers, wherein the spacers and the foil layers extend parallel to one another where, of the tubular supports near the central axis, first tubular supports are situated between two foil layers, which foil layers are connected to one another near the central axis, whereas second tubular supports are situated between two successive first tubular supports, whereupon the elements along with the foil layers and the spacers are rotated around the central axis wherein the axial ends of the spirally wound foil layers are sealed by means of a seal, wherein the entire axial side can herewith be sealed with the exception of the desired passages in the ends of the tubular supports.

With the method according to embodiments of the invention, first a package of foil layers and spacers is formed that is extending substantially parallel to a plane. The package of foil layers and spacers can extend horizontally, in which case it can be

easily carried by a carrier. The length of the carrier may simply be adjusted to the length of the package. However, it is also possible that the package extends vertically, in which case the foil layers and spacers are hanging on the disc-shaped elements, as it were. Here at a first side the supports, coupled with spacers, are coupled with the disc-shaped elements. Subsequently, the disc-shaped elements are rotated and the foil layers and the interposed spacers are wound to the orbit determined by the supports. Depending on the length of the foil layers and the thickness of the foil layers and spacers, a number of spiral windings will be formed. If desired, the disc-shaped elements may then be removed or be part of the final device.

An embodiment of the method according to the invention is characterized in that the axial ends of the spirally wound layers of foil are sealed by means of a seal.

The sealing is preferably done after the winding, because then an axial side can be sealed in one single operation.

~~The invention also aims to provide a machine by which, in a simple manner, a device as described above can be manufactured.~~

~~This objective is accomplished with the machine according to the invention, in that the machine is provided with at least two elements rotatable about a central axis, which elements are provided with fastening elements for detachably coupling of tubular supportsbetween the elements, which machine is further provided with a substantially horizontally extending carrier and at least one foil roll holder that is movable in and opposite to the direction facing the central axis, relative to the carrier.~~

According to a third aspect of the present invention there is provided a machine suitable for the fabrication of a device according to the first or second aspects, wherein the machine is provided with at least two elements rotatable around a central axis, which elements are provided with fastening elements for detachably coupling of tubular supports extending parallel to the central axis between the at least two elements, which tubular supports are coupled to spacers at least at an end of the spacers near the central axis, which machine is further provided with a horizontally extending carrier and at least one foil roll holder that is movable in and opposite to the direction facing the central axis, relative to the carrier to wound the foil on the at least one foil roll holder in a reciprocating way alternately in foil layers around a first and second end of the spacers, wherein first tubular supports are each situated between two foil layers, which foil layers are connected to one another near the central axis at the folding line, which folding line is formed by the first tubular support, whereas second tubular supports are situated between two successive first tubular supports, and that the elements along with the foil layers and the spacers are rotatable around the central axis, wherein the foil layers and the spacers are positioned spirally around the central axis.

In this manner a foil layer can be positioned step by step, a support with an spacer coupled therewith can be placed on the foil layer and detachably connected to the disc-shaped elements, again a foil layer can be positioned etc., during which the foil roll holder is reciprocating over the spacers, and the disc-shaped elements are rotated each time after the application of a foil layer through an angle which is equal to 360 degrees, divided by the number of supports.

An embodiment of the machine according to the invention is characterized, in that the foil roll holder is moveable between the disc-shaped elements from one side of the central axis to the other side of the central axis and vice versa.

This may allows the foil layer to be easily wrapped around the support and a fold line to be formed. For this purpose, a new support with spacer is connected to disc-shaped elements at the moment that the foil roll holder is positioned at a distance from the already-formed foil layers with interposed spacers, after which the foil roll holder is moved across the spacer to the end averted from the central axis of the spacer.

The invention will be further explained with reference to the accompanying drawings, in which:

Figures 1A - 1E show side views of a machine according to the invention, which is suitable for the manufacture of a device according to the invention, wherein the machine is shown in different processing positions;

Figures 2A and 2B show a top view and side view of a spacer of a device according to the invention;

Figures 3A - 3C, respectively, show a side view, a cross-sectional view and an enlarged cross-sectional view of a support of a device according to the invention;

Figures 4A - 4C, respectively, show a top view, side view and enlarged view of a spacer shown in Figures 2A and 2B, which is coupled with the supports illustrated in Figures 3A - 3C;

Figures 5A1 and 5A2 - 5H1 show side views and rear views illustrating a part the machine shown in the Figures 1A - 1E, and of the device according to the invention, at various steps during the execution of the method according to the invention;

Figure 6 shows schematically an enlarged side view of a part of the machine shown in the Figures 1A - 1E and of the devices according to the invention, at one step during the execution of the method according to the invention;

Figure 7 schematically shows the course of the foil and the position of the spacers in a device according to the invention;

EPO - DG 2
28. 02. 2014
51

Claims

1. Device (7) suitable for processing at least one fluid, which device (7) is provided with at least one elongated foil (304, 305), made of a heat-conducting foil, a membrane foil or a combination thereof, which foil (304) is formed in a number of reciprocating foil layers (29), wherein between two opposite foil layers (29) a spacer (17, 217, 305, 307) is situated which is permeable at least parallel to the foil layers (29), said foil layers (29) and interposed spacers (17, 217, 305, 307) extending spirally around a central axis (8), wherein a folding line between two foil layers (29) extends substantially parallel to the central axis (8), characterized in that the device comprises a number of tubular supports (6, S6-S8) extending parallel to the central axis (8), wherein each spacer (17, 217, 305, 307) is coupled at least at an end near the central axis (8) with one of said tubular supports (6, S1-S8) where, of the tubular supports (6, S1-S8) near the central axis (8), first tubular supports (6, S1-S8) are each situated between two foil layers (29), which foil layers (29) are connected to one another near the central axis (8) at the folding line, which folding line is formed by the tubular support (6, S1-S8), whereas second tubular supports (6, S1-S8) are situated between two successive first tubular supports (6, S1-S8), wherein at least tubular supports (6, S1-S8) near the central axis (8) are alternately connected to a first and second fluid channel, whereby two sets of supports are formed, in which a first set of supports (6, S1-S8) is located in a first space (30, 309, 310, 311) that is separated by the foil layers (29) from a second space (31, 309, 310, 311), while the spaces (30, 31. 309, 310, 311) are connected to the different fluid channels.

2. Device (7) according to claim 1, characterized in that each spacer (17, 217, 305, 307) is coupled at both ends with a tubular support (6, S1-S8).

3. Device (7) according to claim 2, characterized in that the tubular support (6, S1-S8) is provided with at least one aperture facing a holder (11, 12).

4. Device (7) according to claim 2 or 3, characterized in that the aperture comprises an elongated slot (24, 120) extending parallel to the central axis (8), in which the end of the spacer is situated.

5. Device (7) according to anyone of the preceding, characterized in that the end of the spacer located in the tubular support (6, S1-S8) is provided with a thicker portion (21) that extends over at least a part of the end.

6. Device (7) according to claim 4 or 5, characterized in that the elongated slot (24, 120) extends from a first end (25) of the tubular support (6, S1-S8) to a predetermined distance from the second end (26) of the tubular support (6, S1-S8).

7. Device (7) according to claim 6, characterized in that at least the tubular supports (6, S1-S8) near the central axis (8) are positioned alternately with first and second ends (25, 26) to the axial ends of the spirally wound foil layers (29) and spacers (17, 217, 305, 307).

8. Device (7) according to any one of the preceding claims, characterized in that the tubular supports (16, S1, S8) located at an averted side of the central axis (8) are connected to a third and fourth fluid channel.

9. Device (7) according to claim 8, characterized in that the first fluid channel is positioned at a first axial end of the spirally wound foil layers (29) and spacers (17, 217, 305, 307), whereas the second fluid channel is positioned at a second axial end of the spirally wound foil layers (29) and spacers (17, 217, 305, 307), the second end (26) being averted from a first fluid channel.

10. Device (7) according to claim 9, characterized in that tubular supports, connected at the first, respectively second axial end with the first respectively second fluid channel, are sealed at the second respectively first axial end.

11. Device (7) according to anyone of the preceding claims, characterized in that the axial ends of the spirally wound foil layers (29) are sealed by means of a seal.

12. Device (7) according to anyone of the preceding claims, characterized in that a sealing foil portion of the foil is connected to a first foil layer, extending towards and being connected to the last foil layer and extending towards and again being connected to the first foil layer.

13. Device (7) according to anyone of the preceding claims, characterized in that the tubular supports (6, S1-S8) near the central axis (8) are positioned around a central support tube (28).

14. Device (7) according to any anyone of the preceding claims, characterized in that at least near the central axis (8) at least one additional tubular support (S1-S8) is situated between a first tubular support (6, S1-S8) and a second tubular support (6, S1-S8), where, of the tubular supports (6, S1-S8) near the central axis (8), the first tubular support (6, S1-S8) is situated between two foil layers (29) of a first foil, which foil layers (29) of the first foil are connected to one another near the central axis (8), whereas the additional tubular support (S1-S8), the two foil layers (29) of a first foil as well as the first tubular support (6, S1-S8) are situated between two foil layers of a second foil, which foil layers of the second foil are connected to one another near the central axis (8).

15. Device (7) according to claim 14, characterized in that the additional tubular support (6, S1-S8) is provided with at least one aperture (302) located between the first and second foil.

16. Method suitable for the manufacture of a device (7) according to anyone of the preceding claims, characterized in that a number of tubular supports (6, S1-S8) extending parallel to one another are positioned between two elements (3) rotatable on a central axis (8) and are coupled therewith, wherein first ends (25) of the spacers (17, 217, 305, 307) are coupled with the tubular supports (6, S1-S8), and the foil is wound in a reciprocating way alternately in foil layers (29) around the first and second end of the spacers (17, 217, 305, 307), wherein the spacers (17, 217, 305, 307) and the foil layers (29) extend substantially parallel to one another where, of the tubular supports (6, S1-S8) near the central axis (8), first tubular supports (6, S1-S8) are situated between two foil layers (29), which foil layers (29) are connected to one another near the central axis (8), whereas second tubular supports (6, S1-S8) are situated between two successive first tubular supports (6, S1-S8), whereupon the elements (3) along with the foil layers (29) and the spacers (17, 217, 305, 307) are rotated around the central axis (8), wherein the foil layers (29) and the spacers (17, 217, 305, 307) are positioned spirally around the central axis (8).

17. Method according to claim 16, characterized in that second ends (26) of the spacers (17, 217, 305, 307) are coupled with tubular supports (6, S1-S8).

18. Method according to claim 16 or 17, characterized in that the axial ends of the spirally wound foil layers (29) are sealed by means of a seal.

19. Method according to anyone of the preceding claims 16, 17 of 18, characterized in that a sealing foil portion is connected to a first foil layer, extending towards and being connected to the last foil layer and extending towards and again being connected to the first foil layer.

20. Machine (1) suitable for the fabrication of a device (7) according to any anyone of the preceding claims 1 - 15, characterized in that the machine (1) is

provided with at least two disc-shaped elements (3) rotatable around a central axis, which elements (3) are provided with fastening elements for detachably coupling of tubular supports (6, S1-S8) between the elements (3), which tubular supports (6, S1-S8) are coupled to spacers (17, 217, 305, 307) which machine is further provided with a substantially horizontally extending carrier (9) and at least one foil roll holder (11, 12) that is movable in and opposite to the direction facing the central axis (8), relative to the carrier (9) to wound the foil on the at least one foil roll holder (11, 12) in a reciprocating way alternately in foil layers (29) around a first and second end of the spacers (17, 217, 305, 307).

21. Machine (1) according to claim 20, characterized in that the foil roll holder (11, 12) is movable between the disc-shaped elements (3), from one side of the central axis (8) to the other side of the central axis (8), and vice versa.

Claims

1. Device suitable for processing at least one fluid, which device is provided with at least one elongated foil, made of a heat-conducting foil, a membrane foil or a combination thereof, which foil is formed in a number of reciprocating foil layers, wherein between two opposite foil layers a spacer is situated which is permeable at least parallel to the foil layers, said foil layers and interposed spacers extending spirally around a central axis, wherein a folding line between two foil layers extends parallel to the central axis, wherein the device comprises a number of tubular supports extending parallel to the central axis, wherein each spacer is coupled at least at an end near the central axis with one of said tubular supports where, of the tubular supports near the central axis, first tubular supports are each situated between two foil layers, which foil layers are connected to one another near the central axis at the folding line, which folding line is formed by the first tubular support, whereas second tubular supports are situated between two successive first tubular supports, wherein at least tubular supports near the central axis are alternately connected to a first and second fluid channel, whereby two sets of tubular supports are formed, in which a first set of tubular supports is located in a first space that is separated by the foil layers from a second space, while the spaces are connected to the different fluid channels wherein the tubular supports are provided with at least one aperture facing the spacer configured to function as supply or discharge channel of a fluid to be processed by the device, and wherein the axial ends of the spirally wound foil layers are sealed by means of a seal, wherein the entire axial side can herewith be sealed with the exception of the desired passages in the ends of the tubular supports.

2. Device according to claim 1, wherein each spacer is coupled at both ends with a tubular support.

3. Device according to claim 1, wherein the aperture comprises an elongated slot extending parallel to the central axis, in which the end of the spacer is situated.

4. Device according to anyone of the preceding claims, wherein the end of the spacer located in the tubular support is provided with a thicker portion that extends over at least a part of the end.

5. Device according to claim 3 or 4, wherein the elongated slot extends from a first end of the tubular support to a predetermined distance from the second end of the tubular support.

6. Device according to claim 5, wherein at least the tubular supports near the central axis are positioned alternately with first and second ends to the axial ends of the spirally wound foil layers and spacers.

7. Device according to anyone of the preceding claims, wherein the tubular supports located at an averted side of the central axis are connected to a third and fourth fluid channel wherein the first and third fluid channels are connected to the first space, whereas the second and fourth fluid channels are connected to the second space.

8. Device according to claim 7, wherein the first fluid channel is positioned at a first axial end of the spirally wound foil layers and spacers, whereas the second fluid channel is positioned at a second axial end of the spirally wound foil layers and spacers, the second end being averted from a first fluid channel.

9. Device according to claim 8, wherein tubular supports, connected at the first, respectively second axial end with the first respectively second fluid channel, are sealed at the second respectively first axial end.

10. Device according to anyone of the preceding claims, wherein a sealing foil portion of the foil is connected to a first foil layer, extending towards and being connected to the last foil layer and extending towards and again being connected to the first foil layer.

11. Device according to anyone of the preceding claims, wherein the tubular supports near the central axis are positioned around a central support tube.

12. Device according to anyone of the preceding claims, wherein at least near the central axis at least one additional tubular support is situated between a first tubular support and a second tubular support, where, of the tubular supports near the central axis, the first tubular support is situated between two foil layers of a first foil, which foil layers of the first foil are connected to one another near the central axis, whereas the additional tubular support, the two foil layers of a first foil as well as the first tubular support are situated between two foil layers of a second foil, which foil layers of the second foil are connected to one another near the central axis.

13. Device according to claim 12, wherein the additional tubular support is provided with at least one aperture located between the first and second foil.

14. Method suitable for the manufacture of a device according to anyone of the preceding claims, wherein a number of tubular supports extending parallel to one another are positioned between two elements rotatable on a central axis which elements are provided with fastening elements for detachably coupling of tubular supports between the elements, wherein first ends of the spacers are coupled with the tubular supports, and the foil is wound in a reciprocating way alternately in foil layers around the first and second end of the spacers, wherein the spacers and the foil layers extend parallel to one another where, of the tubular supports near the central axis, first tubular supports are situated between two foil layers, which foil layers are connected to one another near the central axis, whereas second tubular supports are situated between two successive first tubular supports, whereupon the elements along with the foil layers and the spacers are rotated around the central axis wherein the axial ends of the spirally wound foil layers are sealed by means of a seal, wherein the entire axial side can herewith be sealed with the exception of the desired passages in the ends of the tubular supports.

15. Method according to claim 14, wherein second ends of the spacers are coupled with tubular supports.

16. Method according to claim 14 or 15, wherein a sealing foil portion is connected to a first foil layer, extending towards and being connected to the last foil layer and extending towards and again being connected to the first foil layer.

17. Machine suitable for the fabrication of a device according to anyone of the preceding claims 1 - 15, wherein the machine is provided with at least two elements rotatable around a central axis, which elements are provided with fastening elements for detachably coupling of tubular supports extending parallel to the central axis between the at least two elements, which tubular supports are coupled to spacers at least at an end of the spacers near the central axis, which machine is further provided with a horizontally extending carrier and at least one foil roll holder that is movable in and opposite to the direction facing the central axis, relative to the carrier to wound the foil on the at least one foil roll holder in a reciprocating way alternately in foil layers around a first and second end of the spacers, wherein first tubular supports are each situated between two foil layers, which foil layers are connected to one another near the central axis at the folding line, which folding line is formed by the first tubular support, whereas second tubular supports are situated between two successive first tubular supports, and that the elements along with the foil layers and the spacers are rotatable around the central axis, wherein the foil layers and the spacers are positioned spirally around the central axis.

18. Machine according to claim 17, wherein the elements are disc-shaped, wherein the foil roll holder is movable between the disc-shaped elements, from one side of the central axis to the other side of the central axis, and vice versa.