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The invention relates to a valve for controlling the inlet and/or outlet of a fluid medium, in particular air, into at least one or from at least one substantially fluid-tight closed first hollow chamber formed between a first foil layer and a second foil layer of a foil cushion of a building envelope element, in which hollow chamber the fluid medium is subjected to pressure, with a valve element which can be attached to the first foil layer and which is designed to be movable relative to an opening provided in the first foil layer, and with a control element which is designed to move the valve element relative to the opening or to hold it in a first position at least partially exposing the opening. Furthermore, the invention relates to a building envelope element with a foil cushion which has a first foil layer and a second foil layer, the first foil layer being provided with an opening, at least one substantially fluid-tight closed first hollow chamber being formed between the first foil layer and the second foil layer, in which a fluid medium, in particular air, is contained, and the fluid medium in the at least one first hollow chamber being subjected to pressure, and with a valve as mentioned above.

Buildings of the aforementioned kind are often used in foil roof systems and foil façade systems. Large commercial buildings such as sports stadiums, event centres or shopping centres are particularly suitable for this application. The advantages associated with foil roof or foil façade systems, such as lightness, light transmission, adaptability of heat transmission and/or colour design, are particularly effective for these large roof and façade surfaces.

The applicant develops, manufactures and distributes building envelope elements of the aforementioned kind. In particular, the foil cushions used for building wrapping elements have one or two fluid-filled chambers, the medium in the chambers being under pressure thus stabilising the foil cushion. For this purpose, the foil layers are welded together along their edges or joined together differently in a fluid-tight manner and form between them at least one hollow chamber which is closed in a substantially fluid-tight manner. Furthermore, previously known foil cushions often have a medium supply device, such as a pipe, a channel or a hose for example, in order to introduce the fluid medium into the hollow chamber or into at least one of the chambers. In order to fill the hollow chamber or at least one of the chambers with the fluid medium or to empty the hollow chamber or at least one of the chambers, the building envelope elements with foil cushions are provided with at least one valve. The valve has a valve seat in which an opening is formed, and a valve element which cooperates with the valve seat and is

designed to close the opening in a closed position and to release the opening in an open position.

5 The pressure in the chambers is of crucial importance for the functionality of the foil cushions, in particular for their stability, insulating effect and resistance. It is particularly important that the pressure within the hollow chamber or at least one of the chambers and/or the pressure ratio between two chambers is within a certain value range. If the pressure within the hollow chamber or at least one of the chambers is too low, the stability and insulating effect of the foil cushion may suffer. If the pressure is too high, there is a risk of damage or even destruction of the foil cushion. Therefore, the regulation of the pressure in the hollow chamber or at least one of the chambers is important both during the initial filling of the foil cushion and also for maintaining or restoring the pressure in the installed state of the building envelope elements.

15 The valve enables the inlet and outlet of a fluid medium into and out of a hollow chamber or into at least one and out of at least one chamber. However, it is a disadvantage that the filling quantity and/or the pressure within the hollow chamber or at least one of the chambers has to be monitored during filling in order to avoid exceeding or falling below the target filling quantity and thus the target pressure within the hollow chamber or at least one of the chambers. This is particularly costly and error-prone in the case of a large number of building envelope elements required for a foil roof or foil façade system, the pressure of which has to be built up for the first time and also regularly or continuously monitored and, if necessary, corrected during installation.

25 DE 10 2004 025 025 308 A1 discloses a system for controlling the supply of compressed air for a building envelope element with a foil cushion, in which a compressed air supply line is connected by branch lines respectively to an upper hollow chamber which is delimited by an upper foil layer and a central foil layer and to a lower hollow chamber which is delimited by the central foil layer and a lower foil layer. In each of these two branch lines there is a valve. Said valves consist of a solenoid valve, which has a valve seat, a coil and a closing unit moveable by means of the coil. The solenoid valves are controlled accordingly by a control room with reference to detected pressure measurements via a signal line leading to the coil. Thus when current flows through the coil a magnetic field is generated which causes the movement of the closing unit either into a closed position or opened position.

In order to improve pressure control, DE 20 2007 015 753 U1, which shows all features in the preamble of claim 1, proposes the valve be equipped with an activating element, referred to there as an activating means, which is designed to release the valve element, referred to there as a shut-off body, from the valve seat and to open the valve if the distance between the film layer on which the valve is arranged and the film layer adjacent to this film layer falls below a limit value, and with a closing means which is designed to press the valve element against the valve seat and thus close the valve if the said distance exceeds a limit value. Accordingly, when the valve is closed, the control element is spaced from the valve element and the valve element is pressed against the valve seat by the closing means. This is because if the pressure formed in the at least one hollow chamber is sufficiently large or exceeds a predetermined target pressure, the distance between the two layers of film becomes so large that the control element no longer acts on the valve element, but the valve element is pressed against the valve seat by the closing force of the closing means, thereby closing the valve. The closing means can, for example, be a correspondingly arranged spring with a certain spring force, which as closing force presses the valve element against the valve seat. If, on the other hand, no or only very little pressure is built up in the cavity, the control element is pressed against the valve element by one of the film layers, whereby the valve element is released from the valve seat against the closing force and the valve opens. As long as the pressure inside the hollow chamber is low and thus the valve is open, fluid can flow through the valve into the cavity from the outside or from a connected fluid container, causing the pressure in the cavity to increase successively. If the increasing pressure in the hollow chamber causes the two layers of film that define the cavity to move further and further apart, the control element attached to one of the two layers of film also moves away from the valve element; this causes the control element to detach from the valve element and then the valve element is pressed against the valve seat again by the closing force generated by the closing means. Thus, by using a mechanical control element, an effective pressure control can be achieved easily. Since the pressure-dependent valve actuation is thus mechanical, a power supply is not required and the pressure control is always available. An externally controlled active regulation of the pressure in the film cushion is not necessary. In addition, this well-known design allows the valve to be actuated very often and repeatedly in order to react correspondingly quickly to changes in pressure.

EP1406038 A2 describes a relief valve which is suitable for being attached to a flexible foil layer and which opens under overpressure. For this purpose, magnetic elements or strips are used which when exceeding the holding force cause a tab to expose the opening to which the relief valve is attached. The valve of EP1406038 A2 is however
5 not suitable for being controlled by the distance between two foils of a foil cushion in case of a change in pressure.

Even though the valve in the design described above has proven to be effective in practice, there is still a need to further simplify and thus improve the design of the valve.

For the solution of this problem, according to a first aspect of the invention, a
10 valve is proposed for controlling the inlet and/or outlet of a fluid medium, in particular air, into at least one or from at least one substantially fluid-tightly closed first hollow chamber formed between a first foil layer and a second foil layer of a foil cushion of a building envelope element, in which hollow chamber the fluid medium is subjected to a pressure, with a valve element which can be attached to the first foil layer and which is
15 designed to be movable relative to an opening provided in the first foil layer, and with a control element which is designed to move the valve element relative to the opening or to hold it in a first position at least partially exposing the opening, characterised in that the valve element comprises magnetisable material and the control element comprises magnetic material or the valve element comprises magnetic material and the control element comprises magnetisable material or the valve element and the control element
20 each comprise magnetic material and the control element is designed for arrangement on the second foil layer at a distance.

Accordingly, the invention uses magnetism to actuate the valve. According to the invention, this is achieved in that (1.) the valve element comprises magnetisable material and the control element comprises magnetic material, or (2.) the valve element comprises
25 magnetic material and the control element comprises magnetisable material, or (3.) the valve element and the control element both comprise magnetic material. Whereas in the prior art the actuation of the valve takes place by means of the mechanical loading of the valve element with the control element, in that the valve element is released from the valve seat by the control element and thereby releases the opening of the valve, in the
30 invention the influencing of the valve element by the control element takes place in a contactless manner using magnetism. At least one of the valve element and the control element needs to have magnetic material from which (possibly after a single

magnetisation) a magnetic field constantly emanates (permanent magnet); such a material, which is also referred to as magnetically hard, is therefore a material which is inherently magnetic and generates a magnetic field. By contrast, magnetisable material in a field-free environment is non-magnetic; but as soon as it comes into the vicinity of a magnetic material and thus into the vicinity of a magnetic field, it also becomes magnetic, while this magnetisation is immediately lost again at least for the most part when it is removed from the magnetic material and thus from the external magnetic field. Magnetisable material is alternatively referred to as ferromagnetic or soft magnetic material.

Furthermore, the control element is designed for arranging on the second foil layer at a distance. As with pressure fluctuations in the hollow chamber delimited by the two foil layers, the distance between the two foil layers and thus also necessarily the distance between the valve element and the control element changes accordingly, so that when reaching a predefined threshold the valve element enters the area of influence of the control element. Such an arrangement is advantageous, as the distance between the two foil layers is dependent on the pressure in the hollow chamber and varies with changes in pressure which thus has a direct effect on the distance between the control element and the valve element. Thus there is change in the distance between the control element and the valve element directly from the change in pressure, so that the valve element without any delay enters the magnetic area of influence of the control element, in particular when the distance between the valve element the control element reaches a predefined threshold.

Preferred embodiments and developments of the invention are defined in dependent claims 2 to 20.

Thus, the valve element is preferably movable relative to the opening between the first position and a second position, whereby it frees the opening more in the first position than in the second position, and it is expedient that the distance of at least one free end of the valve element from the opening is greater in the first position than in the second position.

The effect of the magnetism and the magnetic force generated therefrom decreases disproportionately with increasing distance and increases disproportionately with decreasing distance and is highest when the magnetic bodies are contacted (distance = 0). This finding is used by a further development of the aforementioned design to define

a predetermined threshold value which the distance between the valve element and the control element must reach in order to allow the force generated by the magnetism to act from the control element on the valve element. This allows a simple and effective design to be achieved. Finally, the solution according to the invention is also more flexible than the known design; as while in the known design the valve element can only be moved by the control element in the opening direction by mechanical intervention, in the solution according to the invention the magnetic and ferromagnetic material can be optionally adapted as required so that either a repelling magnetic force or an attracting magnetic force is generated. This allows the threshold value to be set either as a lower limit value or an upper limit value. Thus, in the invention, the control element can be used not only to open the valve element, but also optionally to close it.

Preferably, the valve element can be designed so that it can be moved into its first position in a direction away from the control element and into its second position in a direction towards the control element. In a first development of this design, the magnetic material is designed in such a way that it generates a repelling force by which the valve element is brought into its first position when the distance to the control element falls below the specified threshold value. In an alternative second further development of this design, the magnetic material is designed in such a way that, in contrast to the first development, it does not generate a repelling force but an attraction force by which the valve element is brought into its second position when its distance from the control element falls below the predetermined threshold value.

In an alternative design, the valve element is designed in such a way that, in contrast to the first design, it can be moved into its first position in the direction of the control element and into its second position in a direction away from the control element. In a first development of this second design, the magnetic material is designed in such a way that it generates a repelling force by which the valve element is moved into its second position when its distance from the control element falls below the specified threshold value. In an alternative second embodiment, the valve element is arranged in such a way that, in contrast to the first version, it can be moved into its first position in the direction of the control element and into its second position in a direction away from the control element. In an alternative second development of this design, the magnetic material is designed in such a way that, in contrast to the first further development, it does not generate a repelling force but an attraction force by which the valve element is moved

into its first position when its distance from the control element falls below the specified threshold value.

It is expedient to move the valve element between a maximum open position, in which the opening is essentially completely opened, and a closed position, in which the opening is closed by the valve element. The first position can preferably be located between the closed position and the maximum open position, which can preferably also apply in the same way to the second position. Alternatively, the first position of the valve element can be defined as a maximum open position and the second position of the valve element as a closed position.

The valve element should be movably arranged on the first foil layer. In a further development of this design, it is advantageous to provide the magnetic or ferromagnetic material on the valve element in the area of its free end or adjacent to its free end in order to generate a relatively high pivoting torque for safe movement between the first position and the second position for a given magnetic force. Preferably, the valve element may be designed as a flexible or elastic tab which is to be attached to the foil layer at its one end and is movable at its other end in relation to the valve opening. A constructively particularly simple but effective development consists furthermore in making the valve element from foil material at least in sections.

According to a second aspect of the invention, the above problem is solved by a building envelope element with a foil cushion comprising a first foil layer and a second foil layer, the first foil layer being provided with an opening, at least one substantially fluid-tight closed first hollow chamber being formed between the first foil layer and the second foil layer, in which a fluid medium, in particular air, is contained, and the fluid medium in the at least one first hollow chamber is subjected to a pressure, and with a valve according to a first aspect of the invention, the valve element of which is movable relative to the opening in the first foil layer. While the valve element is formed in the first foil layer defining the hollow chamber, the control element is arranged in the second foil layer defining the hollow chamber. Such an arrangement is advantageous because the distance between the two foil layers depends on the pressure in the hollow chamber and varies with changes in pressure, which accordingly has a direct influence on the distance between the control element and the valve element. Thus a change in the distance between the control element and the valve element is a direct result of the change in pressure, so that the valve element enters the magnetic sphere of influence of the control

element without any delay, so to speak, especially when the distance between the valve element and the control element reaches a predetermined threshold value.

Preferred embodiments of the invention according to the second aspect are defined in the dependent claims 20 to 21.

5 Preferably the arrangement can be such that the control element influences the valve element due to the magnetism in such a way that the valve element releases the opening more strongly as the pressure in the hollow chamber increases, i.e. opens more or further, thus causing an increase in the effective opening cross-section, whereby more fluid medium or air escapes from the hollow chamber. This in turn has the result that the
10 pressure in the hollow chamber decreases, whereby in this case the arrangement is such that when the pressure in the hollow chamber decreases, the control element influences the valve element due to the magnetism in such a way that it causes a reduction of the effective cross-section of the opening and thus closes the opening more strongly, so to speak. This leads to an increase in the pressure in the hollow chamber. In this way, an
15 equilibrium is ultimately created which ensures that the influence of the magnetism on the valve element is about as great so that the valve element is held in a position in which the pressure loss deliberately caused by the opening is approximately equalised by an increase in pressure in the hollow chamber. This condition can be achieved in particular if the hollow chamber is constantly supplied with fluid medium or air.

20 A preferred design of the building envelope element comprises a third foil layer forming the outside of a building envelope, while the second foil layer forms the inside of a building envelope and the first foil layer forms a middle foil layer disposed between the second foil layer and the third foil layer, so that a first chamber is formed between the first foil layer and the second foil layer and a second chamber is formed between the first
25 foil layer and the third foil layer, both the first chamber and the second chamber are closed substantially fluid-tight, both the first chamber and the second chamber contain a fluid medium, in particular air, and the fluid medium in the first chamber is subjected to a first pressure and the fluid medium in the second chamber is subjected to a second pressure. In this design, the at least one valve according to the first aspect of the invention
30 is arranged to control the inlet and outlet of the medium into and out of one of the two chambers. In a development of this design, the valve element of the at least one valve is arranged on the middle first foil layer and thus the valve controls the flow of the medium between the second chamber and the first chamber. In this way, pressure changes

between the two chambers can be controlled or compensated in a clever way without essentially having to supply further fluid medium from the outside. Alternatively, it is also possible to connect one chamber to a source of fluid or compressed air so that this chamber is constantly kept under pressure and supplied with new fluid medium as required, while the other chamber has a vent valve through which excess fluid can escape and excess pressure can thus be released. Thus the equilibrium effect described above can be achieved particularly advantageously with this design.

In the following, a preferred embodiment is explained in more detail with reference to the enclosed drawings. In the latter:

Fig. 1 show a building envelope element schematically in cross-section;

Fig. 2 shows a section of the building envelope element of Fig. 1 in a figure with enlarged sections, showing a supply line connected to a medium supply device and a valve in the closed state;

Fig. 3 shows in a figure with enlarged sections, a section of the building envelope element of Fig. 1 with representation of the supply line connected to a medium supply device and the valve in the open state; and

Fig. 4 shows a schematic representation of a preferred design of the valve in plan view (a), in longitudinal section in the closed state (b) and in longitudinal section in the open state (c).

Fig. 1 shows a schematic cross-section of a building envelope element 2, which can form a foil roof or foil façade system with a large number of other building envelope elements. The building envelope element 2 has an upper or outer foil layer 4, a middle foil layer 5 and a lower or inner foil layer 6. The foil layers 4 to 6 are welded together along their edges 8. A first, essentially fluid-tight chamber 10 is formed between the outer foil layer 4 and the middle foil layer 5. A second, also essentially fluid-tight chamber 12 is formed between the middle foil layer 5 and the inner foil layer 6. Furthermore, the building envelope element 2 in the design shown has a supply line 20 which is connected to a medium supply device not shown. Finally, Fig. 1 schematically shows a valve 30.

In the embodiment shown, fluid medium, preferably gas and especially preferably air, is fed through the supply line 20 to the upper first chamber 10, as shown by the arrow 22 in Figures 2 and 3. As Figures 2 and 3 also show, in the embodiment shown a so-called flushing valve 24 is arranged in the lower or inner foil layer 6, through which air flows out of the lower second chamber 12 essentially continuously.

As Figures 2 to 4 also show, the valve 30 has a valve element 32, which is equipped with a magnetic body 33 and in the embodiment shown is arranged on the middle foil layer 5 separating the two chambers 10, 12 from one other. Furthermore, the valve 30 has an opening 34, which can be closed by the valve element 32, and a valve seat 36, which is formed in the middle foil layer 5, contains the opening 34 and is provided for the contact and at the same time sealing support of the valve element 32 in the closed position according to Figure 2.

A preferred embodiment of the valve element 32 is shown as an example in Figure 4. According to this, the valve element 32 is designed as a movable tab, one end 32a of which is attached to the foil layer 5, whereby the attachment can be formed by welding or adhering, for example. The tab-shaped valve element 32 is made of a flexible or elastic material and can preferably be made of the same material as the foil layer 5 and thus comprise a corresponding foil material. Thus the free second end 32b is freely movable in relation to the foil layer 5. In the design example shown, the magnetic body 33 is designed as a disc-shaped plate and is arranged in the area of the free end 32b of the valve element 32 in such a way that, when the valve element 32 is closed, it lies within the opening 34 closed by the valve element 32 according to Figure 4b, as shown in Figure 5b. When the valve is closed, as shown in Figure 4b, the portion of valve element 32 in the region of the free end 32b and adjacent to the free end 32b lies substantially flat in sealing contact with the valve seat 36 surrounding the opening 34. While Figure 4b shows the valve element 32 in its closed position, Figure 4c shows the valve element 32 in a position in which it is lifted from valve seat 36 with the said section and thus at least partially exposes the opening 34.

The valve seat 36 is preferably designed as a circular, flat plastic ring. The flat design of both valve seat 36 and valve element 32 has the advantage that, especially during transport and installation of the foil cushions 2 in the unfilled or only slightly filled state, they take up very little space and offer few possibilities of damage to the foil layers 4 to 6, for example caused by points or sharp edges. Furthermore, the corresponding plastic elements are lightweight and also economical to manufacture.

As Figures 2 and 3 again show, the valve 30 has another element, marked by the reference numeral "38", which is located on the lower or inner foil layer 6. This element is a control element 38, which influences the movement of valve element 32 in the manner described in more detail below. The control element 38 is designed as a plate-

shaped body in the embodiment shown and is arranged on the inside of the lower or inner foil layer 6 facing into the second chamber 12. Similar to the magnetic body 33, the control element 38 also comprises magnetic material, so that a magnetic interaction occurs between the magnetic body 33 on the valve element 32 and the control element 38, whereby a force can be applied to the valve element 32 in a manner described in more detail below.

During operation, air is supplied essentially continually to the upper or first chamber 10 through the supply line 20. As a result, the pressure in the upper first chamber 10 and thus also compared to the pressure in the lower second chamber 12 can increase, which can also lead to a corresponding increase in the pressure difference compared to the lower second chamber 12. Since the valve element 32 is located on the side of the middle foil layer 5 facing the upper first chamber 10, the pressure increase described above can, in extreme cases, lead to the valve element 32 being pressed against the valve seat 36, thereby closing the valve 30 (if it is not already closed).

Furthermore, the increase in the pressure difference in favour of the upper first chamber 10 can be further increased by the fact that the lower second chamber 12 loses air via the flushing valve 24. Due to the pressure and volume changes in the chambers 10, 12, the position of the middle foil 5 can change accordingly with the valve 30. This is because the increase in the pressure difference in favour of the upper first chamber 10 causes the middle foil layer 5 to be subjected to ever greater pressure in the direction of the lower second chamber 12 and the inner foil layer 6, as indicated by the arrows 28 in Figure 2. This in turn causes the middle foil layer 5 to be pressed towards the lower or inner foil layer 6, which may reduce the distance between the middle foil layer 5 and the inner foil layer 6. This allows the valve element 32 with its magnetic body 33 to approach the control element 38. In the embodiment described, the magnetic body 33 on the valve element 32 and the magnetic material of the control element 38 are designed in such a way that when they approach one other, an opposing magnetic force is created; thus the magnetic plate 33 and the control element 38 are arranged for repulsion. If, as the central foil layer 5 approaches the inner foil layer 6, the repelling force between the control element 38 and the magnetic body 33 at valve element 32, which increases as a result, exceeds the pressure force acting on the central foil layer 5, the valve 30 can now open further or, in extreme cases, valve element 32 can be released from its closed position as shown in Fig. 2. This is because, due to the repelling magnetic effect of the control

element 38 on the magnetic body 33, which then becomes stronger, the valve element 32 is acted upon away from the valve seat 36 into the upper first chamber 10 and can thus release the opening 34 in the valve seat 36 or at least open it more strongly, which can lead to an increase in the effective cross-section of the opening 34. In Figures 3 and 4c the valve element 32 is shown in such a position.

Opening or further opening of the valve 30, allowing air or more air to flow from the upper first chamber 10 to the lower second chamber 12, as indicated by the arrows 40 in Figure 3, causes the pressure in the upper first chamber 10 to decrease and the pressure in the lower second chamber 12 to increase, causing the pressure difference to decrease in favour of the upper first chamber 10. At the same time, the volume of air in the lower second chamber 12 can increase, allowing the middle foil 5 with the valve 30 to slowly move away from the inner or lower foil layer 6, as indicated by the arrows 42 in Figure 3. As a result, the magnetic body 33 of the open valve element 32 can also move away from the control element 38. The repulsion force between the control element 38 and the magnetic body 33 at the open valve element 32 thus decreases again. If the magnetic repelling force then falls below the pressure acting on the valve element 32 in the upper first chamber 10, the force ratios are reversed. This is because the pressure acting on the valve element 32 in the upper first chamber 10 ensures that the valve element 32 is again forced in the direction of the middle foil layer 5 and is thus moved from its first position shown in Fig. 3, which in an extreme case forms its open position, towards a second position, which in the situation shown in Fig. 2 is its closed position.

In the operation described above, the said first position of valve element 32 does not necessarily constitute its fully open position and the said second position of valve element 32 does not necessarily constitute the closed position shown in Fig. 2, but the first and second positions can also be located between the fully open position and the closed position, so that the movement of the valve element 32 between the first position and the second position can take place in an area which is shorter than the distance between the full open position and the closed position shown in Fig. 2.

The arrangement is expediently such that the control element 38 influences the valve element 32 due to the magnetism in such a way that the valve element 32 releases the opening 34 more strongly with increasing pressure in the upper first chamber 10, i.e. opens further and thus causes an increase in the effective opening cross-section of the opening 34, whereby more air escapes from the upper first chamber 10 into the lower

second chamber 12. This in turn has the consequence that the pressure in the upper first chamber 10 decreases, the arrangement being such that, when the pressure in the upper first chamber 10 decreases, the control element 38 influences the valve element 32 due to the magnetism in such a way that it causes a reduction in the effective opening cross-section of the opening 34 and thus closes the opening 34 more strongly, so to speak. This leads to an increase in the pressure in the upper first chamber 10. In this way an equilibrium is ultimately created in which the movement of the free end 32b of the valve element 32 between the aforementioned first and second positions becomes shorter and shorter and thus the distance between the first and second positions decreases until the valve element 32 with its free end 32b remains in a substantially fixed position in which the first and second positions substantially coincide and the opening 34 is partially released or opened by the valve element 32. In this state of equilibrium, the influence of the magnetism on the valve element 32 sufficiently great that it is held in the aforementioned position partially opening the opening 34, in which the pressure loss deliberately caused by the opening 34 is approximately compensated for by a pressure increase in the first upper chamber 10. The latter can be achieved in the embodiment shown by essentially constantly supplying air to the upper first chamber 10 through the supply line 20, as shown by the arrow 22 in Figures 2 and 3. In this way, the upper first chamber 10 is constantly kept under pressure and supplied with new air as required. Since however, the lower second chamber 12 is provided with the flushing valve 24, excess air can escape from the lower second chamber 12 and excess pressure can thus be released. Using the supply line 20 and the flushing valve 24 is a particularly advantageous way of achieving the previously described state of equilibrium. After all, the state of equilibrium is a state in which the valve element 32 moves, as it were, of its own accord into the aforementioned position partially releasing the opening 34.

The magnetic body 33 on the valve element 32 and the control element 38 can preferably each comprise magnetic material from which a magnetic field emanates constantly in the manner of a permanent magnet. Alternatively, however, it is also possible to provide either the magnetic body 33 or the control element 38 with magnetisable material, which is characterised by the fact that it only becomes magnetic when it comes into the area of influence of a magnetic field (this is also called a ferromagnetic property).

As an alternative to the embodiment described above in Figures 2 and 3, however, it is also conceivable to design and arrange the magnetic body 33 and the control element 38 in such a way that they are magnetically attracted. For this purpose, the valve element 32 would have to be arranged on the side of the middle foil layer 5 facing the lower second chamber 12 and the control element 38 on the upper or outer foil layer 4. In such a case, the magnetic attraction will force the valve element towards its closed position. If the pressure in the upper first chamber 10 increases due to the supply of air, the distance between the control element and the magnetic plate on the valve element can increase and thus the magnetic attraction may decrease until the shut-off element is urged towards its open position by the increasing pressure in the upper first chamber 10. The resulting reduction of the pressure in the upper first chamber 10 and the relative increase of pressure in the lower second chamber 12 has the consequence that the distance between the upper or outer foil layer 4 and the middle foil layer 5 decreases, the magnetic plate of the valve element can again come into the sphere of influence of the control element on the upper or outer foil layer 4 and thus the magnetic attraction force can become effective again, whereby the valve element is again urged in the direction of its closed position. In a similar way as described above, an equilibrium can be established in which the valve element 32 is held in a position which partially releases the opening 34.

P A T E N T K R A V

1. Ventil til regulering af indløbet og/eller udløbet af et fluidt medium, især luft, ind i mindst ét eller ud af mindst ét første hulrum (12), som er dannet mellem et første folielag (5) og et andet folielag (6) af en foliepude af et bygningsbeklædningsselement og som er i
5 det væsentlige fluidtæt lukket, i hvilket hulrum (12) det fluide medium påvirkes med et tryk, med et ventilelement (32) som kan anbringes på det første folielag (5), hvilket ventilelement (32) er udformet til at være bevægelig i forhold til en åbning (34) tilvejebragt i det første folielag (5), og med et styringselement (38) som er udformet til at bevæge ventilelementet (32) i forhold til åbningen (34) eller til at holde det i en første position som i
10 det mindste delvist frigiver åbningen (34), hvor styringselement (34) er udformet til anbringelse på det andet folielag (6) i en afstand fra ventilelementet (32), **kendetegnet ved, at** ventilelementet (32) omfatter magnetiserbart materiale og styringselementet (38) omfatter magnetisk materiale eller ventilelementet (32) omfatter magnetisk materiale og styringselementet (38) omfatter magnetiserbart materiale eller både ventilelementet (32)
15 og styringselementet (38) omfatter magnetisk materiale.

2. Ventil ifølge krav 1, **kendetegnet ved, at** ventilelementet (32) kan bevæges i forhold til åbningen (34) mellem den første position og den anden position, hvor den frigiver åbningen (34) kraftigere i den første position end i den anden position.

3. Ventil ifølge krav 2, **kendetegnet ved, at** afstanden af mindst én fri ende (32b) af ventilelementet (32) fra åbningen (34) er større i den første position end i den anden position.
20

4. Ventil ifølge krav 3, **kendetegnet ved, at** styringselementet (38) er udformet til at bevirke en bevægelse af ventilelementet (32), når afstanden mellem ventilelementet (32) og styringselementet (38) når en foruddefineret tærskelværdi.
25

5. Ventil ifølge mindst ét af kravene 2 til 4, **kendetegnet ved, at** ventilelementet (32) kan bevæges til sin første position i en retning væk fra styringselementet (38) og til sin anden position i retning mod styringselementet (38).

6. Ventil ifølge krav 4 og 5, **kendetegnet ved, at** det magnetiske materiale danner en frastødningskraft ved hvilken ventilelementet (32) bevæges til sin første position, når
30 afstanden til styringselementet (38) er under den foruddefinerede tærskelværdi.

7. Ventil ifølge krav 4 og 5, **kendetegnet ved, at** det magnetiske materiale danner en tiltrækningskraft ved hvilken ventilelementet bevæges til sin anden position, når dens afstand til styringselementet er under den foruddefinerede tærskelværdi.

8. Ventil ifølge mindst ét af kravene 2 til 4, **kendetegnet ved, at** ventilelementet
35 kan bevæges til sin første position i retning af styringselementet og til sin anden position i en retning væk fra styringselementet.

9. Ventil ifølge krav 4 og 8, **kendetegnet ved, at** det magnetiske materiale danner en frastødningskraft ved hvilken ventilelementet bevæges til sin anden position, når dens afstand til styringselementet er under den foruddefinerede tærskelværdi.

40 10. Ventil ifølge krav 4 og 8, **kendetegnet ved, at** det magnetiske materiale danner

en tiltrækningskraft ved hvilken ventilelementet bevæges til sin første position, når dens afstand til styringselementet er under den foruddefinerede tærskelværdi.

11. Ventil ifølge mindst ét af de foregående krav, **kendetegnet ved, at** ventilelementet (32) kan bevæges mellem en maksimal åbningsposition, i hvilken åbningen (34) er i det væsentlige fuldstændigt frigivet, og en lukkeposition, i hvilken åbningen (34) af ventilelementet (32) lukkes.

12. Ventil ifølge krav 11, **kendetegnet ved, at** den første position befinder sig mellem lukkepositionen og den maksimale åbningsposition.

13. Ventil ifølge kravene 2 og 12, **kendetegnet ved, at** den anden position af ventilelementet (32) befinder sig mellem lukkepositionen og den maksimale åbningsposition.

14. Ventil ifølge kravene 2 og 11, **kendetegnet ved, at** den første position af ventilelementet (32) danner den maksimale åbningsposition og den anden position af ventilelementet (32) danner lukkepositionen.

15. Ventil ifølge mindst ét af de foregående krav, **kendetegnet ved, at** ventilelementet (32) er udformet til bevægelig anbringelse på det første folielag (5).

16. Ventil ifølge krav 15, **kendetegnet ved, at** det magnetiske eller magnetiserbare materiale er tilvejebragt på ventilelementet (32) i området af dets frie ende (32b) eller nærliggende til dets frie ende (32b).

17. Ventil ifølge krav 15 eller 16, **kendetegnet ved, at** ventilelementet (32) er udformet som fleksible eller elastiske lasker, som kan fastgøres med deres ene ende (32a) på folielaget (5) og kan bevæges med deres anden ende (32b) i forhold til åbningen (34).

18. Ventil ifølge mindst ét af kravene 15 til 17, **kendetegnet ved, at** ventilelementet (32) mindst afsnitsvis er fremstillet af foliemateriale.

19. Bygningsbeklædningselement med en foliepude, som omfatter et første folielag (5) og et andet folielag (6), hvor det første folielag (5) er tilvejebragt med en åbning (34), hvor der mellem det første folielag (5) og det andet folielag (6) er dannet et mindst i det væsentlige fluidtæt lukket første hulrum (12), i hvilket er indeholdt et fluidt medium, især luft, og det fluide medium påvirkes med et tryk i det mindst ene første hulrum (12), og med en ventil (30) ifølge mindst ét af de foregående krav, hvis ventilelement (32) kan bevæges i forhold til åbningen (34) i det første folielag (5) og hvis styringselement (38) er arrangeret på det andet folielag (6).

20. Bygningsbeklædningselement ifølge krav 19, med et tredje folielag (4), som danner ydersiden af en bygningsbeklædning, mens det andet folielag (6) danner indersiden af en bygningsbeklædning og det første folielag (5) danner et midterste folielag, som er arrangeret mellem det andet folielag (6) og det tredje folielag (4), således at et første kammer (12) er dannet mellem det første folielag (5) og det andet folielag (6) og et andet kammer (10) er dannet mellem det første folielag (5) og det tredje folielag (4), hvor både det første kammer (12) og det andet kammer (10) er i det væsentlige fluidtæt lukket, hvor både i det første kammer (12) og i det andet kammer (10) er indeholdt et fluidt medium, især luft, og det fluide medium påvirkes med et første tryk i det første kammer (12) og

med et andet tryk i det andet kammer (10), **kendetegnet ved, at** den mindst ene ventil (30) er arrangeret således at den regulerer ind- og udløbet af mediet ind i eller ud af én af de to kamre.

5 **21.** Bygningsbeklædningsselement ifølge krav 20, **kendetegnet ved, at** ventilelementet (32) af den mindst ene ventil (30) er arrangeret på det midterste første folielag (5) og hermed regulerer ventilen (30) strømmen af mediet mellem det andet kammer (10) og det første kammer (12).

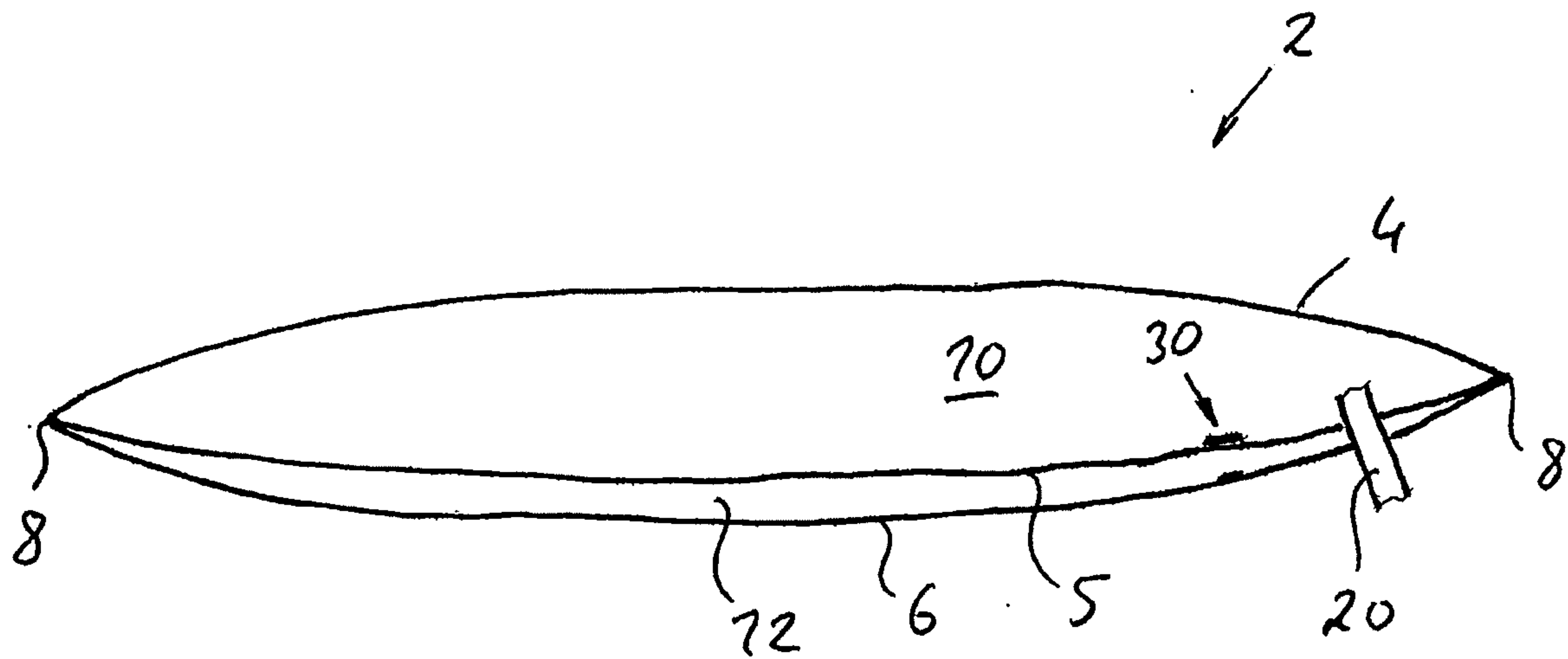


Fig. 1

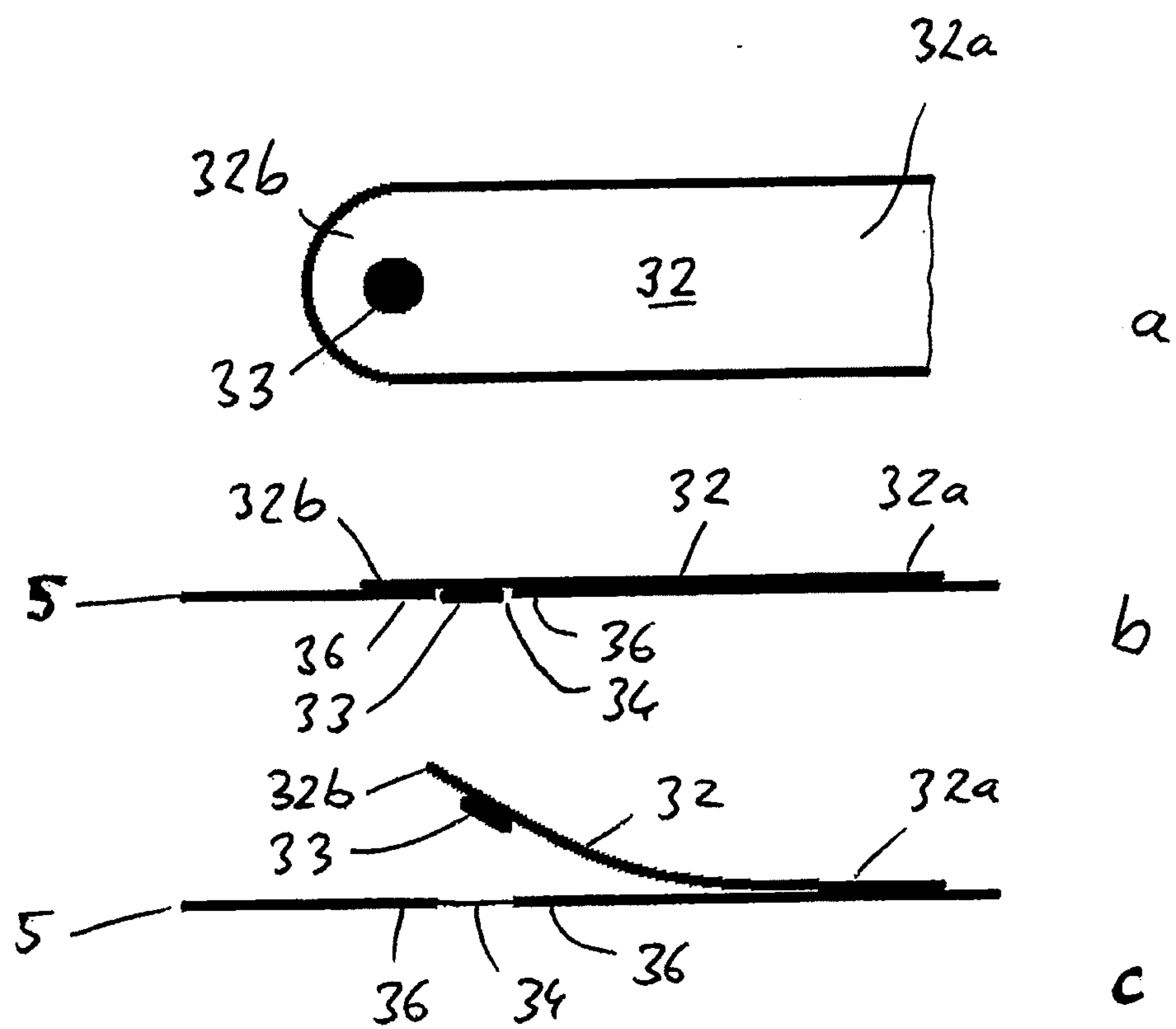


Fig. 4

