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Method and system as well as intermediate product for installing a building room air conditioning system

The present invention first relates to a method for installing a building room air conditioning system.

To do this, it is known in principle from the prior art to arrange retaining cassettes or what is known as a “sail” on a ceiling or wall of a building room. The side of the retaining cassette facing the interior of the room has an appealing appearance here, which conceals or covers the actual heat-exchanging apparatus, such as a fluid-conducting tube system.

It is also already known from the prior art for surface heat exchangers of the retaining-cassette type to be assembled by the manufacturer. In this sense, the manufacturer first provides a retaining cassette, into the inner face of which they insert a tube system, which is typically fastened directly to the inner face (or is fastened indirectly to the inner face by means of a non-woven material). Standard retaining means or in particular (strip-like) “heat-conducting plates” can be used to fasten the tube system.

In this prior-art method, the assembled surface heat exchanger is then delivered as a whole, in the assembled state, to a remote site where the building room is located, in which the surface heat exchanger is to be installed.

This prior-art method has proven to be disadvantageous to the extent that there is still a need to improve the thermal conductivity of the entire heat exchanger, and there is also very high logistical complexity (in particular on the part of the manufacturer).

A prior-art method of this kind is known from EP 0 769 659 A1, for example, according to which a strip-shaped contact element supporting the tube system forms a heat-conducting plate, which is directly adhered in a retaining cassette at

a single site directly by means of adhesive tape.

The problem addressed by the present invention is therefore to provide a method which makes it possible to reduce logistical complexity while improving thermal conductivity.

The present invention first solves this problem by means of the features of claim 1 and therefore in particular by means of the following method steps:

- supplying to a first site, in particular the installation site, a retaining cassette for mounting on a ceiling or wall having an attachment face extending substantially in a plane,
- assembling, at a second, remote site, an intermediate product, comprising precisely one at least 0.3 mm thick metal support plate, to one side of which a tube system is attached for directing a medium from at least one heat-conducting plate, and on the other side of which an adhesive layer and a protective layer covering the adhesive layer are disposed,
- transporting the intermediate product from the second to the first site,
- manually removing, in particular peeling off, the protective layer to expose the adhesive layer,
- manually adhering the intermediate product to the attachment face of the retaining cassette with the aid of the exposed adhesive layer to assemble a surface heat exchanger,
- mounting the assembled surface heat exchanger on the building room ceiling or wall, in particular as part of a plurality of surface heat exchangers disposed in a cascaded arrangement and connected in a conducting arrangement on said building room ceiling or wall.
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In other words, the concept of the invention consists in not fastening the tube system directly to the retaining cassette at a first site, but instead first fastening the tube system to an at least 0.3 mm thick support plate, this support plate comprising a protected adhesive layer on the opposite side.

In a separate working step, this easy-to-handle unit, which can also be referred to as an intermediate product, can then be adhered to the retaining cassette at a separate, remote site.

In this way, optimised thermal conduction is first ensured, since a support plate is arranged between the relatively thin retaining cassette and the tube system, which is capable of transferring the temperature or thermal energy to be transferred to the retaining cassette in an optimised manner (meaning that the air conditioning of the room is also optimised by the assembled surface heat exchanger).

In addition, the logistical complexity is reduced insofar as the manufacturer of the intermediate product only still has to manufacture the intermediate product, and therefore a more easily transportable product is provided which can be transported without a retaining cassette. Since the adhesive layer is protected, the intermediate product, which can be stored and transported in a considerably more compact manner because of the dimensions, can be handled and grasped without there being any undesired adhesion.

The first site may be, for example, the site at which the intermediate product is manufactured, in particular an assembly hall of the intermediate-product manufacturer or the like.

The intermediate product can then be transported to another, second site, which may in particular be the installation site, i.e. the site at which the building room to be air conditioned is located. The term “site” can be understood to mean a locality, for example a town, or a building, or an environment. The retaining cassette may already be located at the installation site. The assembly of the surface heat exchanger and the mounting of the surface heat exchanger can then be carried out directly and immediately at the installation site, for example by a tradesperson working at the installation site or by a specialist company.

Alternatively, the second site, to which the intermediate product is transported, may also not be the installation site. For example, it may instead be the site of the installer's company. This installer can receive the intermediate product, which is connected at its own premises to the retaining cassettes present there or produced there to form complete surface heat exchangers. This installer can then transport these assembled surface heat exchangers to the installation site and the installation can then be carried out there.

It is important that there is spatial separation between the site of the assembly of the intermediate product and the site of the assembly of the surface heat exchanger (by inserting the intermediate product into a retaining cassette).

For this purpose, the first and the second site may for example be at least one kilometre from one another, preferably at least 10 kilometres or more preferably at least 50 kilometres from one another. In this sense, the two sites are several kilometres from one another.

It is necessary for this purpose for the intermediate product to be easy to handle and transportable, and in particular for the adhesive layer provided to be protected.

In order to protect this adhesive layer, a protective layer is provided which is formed as a film or the like, for example. In particular, the adhesive layer may also be an adhesive tape used as standard in industry, which is already provided with a corresponding, peel-off protective film. In this sense, the adhesive layer does not need to be formed continuously. Instead, a plurality of adhesive strips or the like can also be provided.

It is important for the adhesive regions of the adhesive layer to be provided with a peel-off protective layer which can be removed manually.

Therefore, at the second site (in particular at the installation site), said protective layer can be taken off manually, i.e. without tools, in order to assemble the surface heat exchanger. For this purpose, the protective layer may provide special means or may also be designed to be easy to grip and peel off in a conventional manner. The protective layer may for example be a piece of paper or a film or the like which is suitable for protecting the adhesive layer but which can be manually detached therefrom again easily and manually.

By peeling off or removing the protective layer, the adhesive layer is exposed and the remainder of the intermediate product (i.e. the intermediate product without the protective layer) can then be adhered to the retaining cassette. For this purpose, the retaining cassette typically has an attachment face in its interior which is designed to be flat.

Typically, precisely one surface heat exchanger is attached in a retaining cassette in this case. In alternative embodiments, however, it is also possible to insert two or more surface heat exchangers into one retaining cassette, the surface heat exchangers preferably being fluidically connected to one another in this case.

Retaining means for fastening to a wall or ceiling of a building room can be associated with the retaining cassette in a conventional manner. In addition, depending on the customer's requirements and the use, a cassette may also comprise what are known as acoustic perforations. In this sense, the cassette is not designed to be closed, but instead has perforations, which are typically arranged regularly and, in a grid, on the surface thereof, i.e. in particular in the region of the attachment face. In this case, it is useful for the intermediate product to be inserted into the retaining cassette to likewise comprise congruent perforations, in any case in the region of the support plate and optionally in the region of the adhesive layer. In particular, the protective layer does not need to comprise these perforations, since it is removed or taken off before assembly of the surface heat exchanger.

A surface heat exchanger produced in this way is usually installed together with a plurality of identical surface heat exchangers on a ceiling or wall of a building, usually without joints, in order to give a homogeneous appearance. The tube systems of the individual surface heat exchangers can be fluidically connected here, in particular also by openings in the side walls of the retaining cassette or the like.

This plurality of surface heat exchangers can also be referred to as a climate-control ceiling or climate-control wall. It is used for air conditioning the room, i.e. in particular for heating or cooling the room.

If a heating effect is desired, a hot medium, in particular water, is typically directed through the tube system. If cooling is desired, a cold medium, likewise preferably cooled water, is directed therethrough. The tubes in particular consist of copper here, but may also consist of any other suitable metal or another material, such as a suitable plastics material. Typically, the tubes of a single surface heat exchanger have a meandering shape here, i.e. they consist of straight portions and curved portions. Advantageously, the straight portions have a D shape in cross section and the round portions have a circular shape in cross section.

The tube system is typically fastened to the support plate by means of heat-conducting plates, which are either adhered to the support plate or fastened thereto in another, in particular mechanical, manner (e.g. in an interlocking manner). In particular, a plurality of strip-like heat-conducting plates may be provided, which are also in particular associated with the straight tube portions and engage over said tube portions so as to be fastened on either side or at least on one side.

In order to install the surface heat exchanger, as already described, the protective layer can be removed from the intermediate product and said product can then be manually adhered, in particular by applying pressure, to the attachment face of the retaining cassette over its entire surface and fully.

The retaining cassette typically consists of metal or steel and may in particular also be magnetic. It is also referred to as a sail and the heat exchanger using it is also referred to as a heat exchanger of the cassette type. The heat-conducting plate(s) generally consist(s) of materials having good heat-conducting properties, such that a heat-conducting function is in particular provided in order to transfer the temperature of the medium to the support plate. In addition to this heat-conducting function, the heat-conducting plate of course also has the function of fixing the tube system (or a portion of the tube system) and simultaneously pressing on the support plate with constant tension. Therefore, the heat-conducting plate is typically made of spring-hard metal.

Owing to the at least 3 mm thick metal support plate (steel can optionally also be used), the temperature can be transferred in a more optimised manner. Preferably, the metal support plate has a thickness of at least 0.5 mm and more preferably of at least 0.6 mm. Metal sheets that are too thin, as are known for example from the different field of refrigerator technology, cannot be used, since on one hand they bend easily and on the other hand they do not allow for proper heat transfer, and this is, however, particularly important in surface heat exchangers from the field of building air conditioning.

In the surface heat exchanger that is used and assembled in the present case, the support plate, together with the tube system and the heat-conducting plate, is associated with the inner face of the cassette facing away from the room.

With regard to the claimed method according to claim 1, it is noted that the last four method steps listed therein are in particular carried out in the chronological order in which they are mentioned.

According to a particularly advantageous embodiment of the method according to the invention, the support plate consists of aluminium, which allows for particularly good thermal conductivity.

According to another advantageous embodiment of the method according to the invention, the outer protective layer, which covers the adhesive layer, is provided in the form of a film or sheet and can be peeled off manually without tools. The protective layer may thus be a film or may also be a piece of paper or the like which is suitable for being manually peeled off the adhesive layer.

In particular, the protective layer may be part of an adhesive tape or of an adhesive-tape-like layer which can provided together with the adhesive layer. An adhesive tape or adhesive layer having a protective layer on either side may be provided by the manufacturer, for example. When manufacturing the intermediate product, one protective layer can then be peeled off and the adhesive tape or adhesive layer can be adhered, with a protective layer still attached to just one side, to the underside of the support plate by the other side. The remaining protective layer then remains adhered to the adhesive layer until the surface heat exchanger element is assembled in order to protect the adhesive layer.

Advantageously, it is provided that the protective layer comprises a peel-off face or grip face. In the simplest case, this peel-off face may be the rear side of the protective layer, which can be gripped from behind by means of a finger nail, for example. In this sense, the protective layer can be easily peeled off and then gripped from behind at a corner, for example. Advantageously, however, it may also alternatively be provided that the protective layer protrudes slightly beyond the adhesive layer in order to provide the user with a grip face. Alternatively, however, the protective layer may of course also provide a separate tab, in particular in a corner region, which makes it easier to peel off or remove the protective layer.

According to a particularly advantageous embodiment of the invention, after removal of the protective layer, the support plate is black in appearance on its side having the adhesive layer. This provides visual advantages, in particular if the support plate together with the tube system (i.e. the remainder of the

intermediate product once the protective film is peeled off) is intended to be directly adhered to the retaining cassette (i.e. without a black non-woven material therebetween).

This embodiment of the invention is suitable in particular for cases in which the retaining cassette is not closed in the region of its attachment face, but is perforated, and non-woven material is not used, as described. The effect of a black colour may be achieved here by a separate layer underneath a transparent adhesive, for example. Alternatively, however, a black-coloured adhesive or the like can of course also be used.

According to another advantageous embodiment of the invention, the retaining cassette has a width and a length of respectively at least 50 cm. Retaining cassettes having smaller dimensions have proven to be unsuitable for the installation, in particular for visual reasons but also for reasons of ease of installation and stability.

Typical retaining cassettes have a width and a length of approximately 60 cm. Alternative, non-square retaining cassettes oriented in a somewhat elongate manner may have dimensions of 60 x 120 cm, for example.

In order to be inserted into retaining cassettes having these dimensions, the support plates of the intermediate product typically have dimensions having edge lengths of approximately 30 to 120 cm. Typically, the edge length of the corresponding support plate must be at least somewhat smaller than the edge length of the retaining cassette, such that the support plate and therefore the remainder of the intermediate product after peeling off the protective layer can be inserted into the retaining cassette without any problems.

Typical support plates have dimensions of 30 x 30 cm to 50 x 50 cm, for example. For larger sails, however, larger support plates can of course also be provided. Both edge lengths are, however, typically at least 20 cm or 30 cm, but typically

probably do not exceed 250 cm in length/width.

According to a particularly advantageous embodiment of the invention, after removal of the protective layer, the intermediate product is adhered to the attachment face undeformed. In this sense, after removal of the protective layer, this is in fact, strictly speaking, not the intermediate product, but rather the remainder of the intermediate product. For the sake of comprehension, however, this will just be referred to as an intermediate product in this case. In any case, the remainder of the intermediate product or the support plate is adhered to the attachment face undeformed, such that, for example, the support plate is not bent, angled or the like for this purpose. Owing to the greater material thickness, this is also generally not even possible. Since the support plate together with the adhesive layer extends substantially along a plane, the support plate is also adhered to the planar attachment face substantially along a plane.

Preferably, the remainder of the intermediate product is adhered to the attachment face substantially over its entire surface, with it being possible, for example, to provide that the adhesive layer is attached to the support plate continuously and without gaps.

Alternatively, the adhesive layer may however also comprise perforations or the like, in particular if perforations are likewise provided either in the attachment face of the retaining cassette and/or on the support plate. Within the meaning of the present invention, however, this is still considered to be substantially over the entire surface. This is in particular understood to mean that the adhesion is not just carried out at points.

According to the invention, it may be advantageous for the support plate to only comprise a substantially continuous adhesive layer on one side for this purpose. A continuous adhesive layer is therefore not provided on the other side, associated with the tube system. Although the heat-conducting plates can be fastened to the other side using adhesive, this is generally only in a strip-like

manner and not continuously.

According to the invention, the side of the intermediate product or the remainder of the intermediate product comprising the adhesive layer is preferably adhered plane parallel with the attachment face. In this sense, two faces, which substantially extend along a parallel plane, namely the attachment face and the adhesive layer or the underside of the support plate, are moved towards one another in as parallel a manner as possible such that the two planes come to lie on top of one another. A user can then help the two faces to adhere manually by applying pressure.

Advantageously, both said side of the intermediate product and/or said side of the support plate and the attachment face do not comprise any recesses for this purpose, although minor perforations, in particular grid-shaped acoustic perforations, can be provided. Recesses in the sense that either the attachment face or the support plate comprises regions in the manner of deep-drawn, set-back regions would, however, probably not allow for full adhesion.

According to another advantageous method step, the following may be provided:

- connecting the surface heat exchanger as part of the installation to at least one other surface heat exchanger produced in a substantially identical manner and disposed on the same wall or ceiling.

In this sense, a plurality of surface heat exchangers can be disposed beside one another in a cascaded arrangement to form a climate-control ceiling or climate-control wall, without joints as far as possible. The method thus provides a surface heat exchanger system which is typically fluidically interconnected such that a medium directed to the climate-control ceiling or climate-control wall flows through all the surface heat exchangers in succession.

Especially when there is a plurality of surface heat exchangers, it is advantageous for the assembly site for the intermediate products not to be charged with the

logistics or the transport of the retaining cassettes.

However, the method according to the invention can in principle also be implemented using just one surface heat exchanger.

Furthermore, the problem addressed by the invention is also solved by an intermediate product according to claim 10 and by a building room air conditioning system according to claim 11.

In this regard, it should be noted that all the features and advantages described in connection with method claims 1 to 9 are of course also applicable to claims 10 and 11 and are not explicitly repeated once again at this point in the context of the device claims and system claims merely for the sake of clarity. The same of course also applies vice versa, i.e. with regard to the advantages described for the device claims and system claims in relation to the method claims.

Accordingly, for example, an intermediate product is also intended to be disclosed which comprises a support plate consisting of aluminium and/or having a thickness of at least 0.3 mm, in particular at least 0.4 mm or at least 0.5 mm, and/or, after removal of the protective layer, is black in appearance on at least one side, has dimensions of at least 30 x 30 cm, more advantageously at least 40 x 40 cm, and/or comprises a protective layer provided in the form of a film or sheet for covering the adhesive layer.

Equally, a building room air conditioning system is in particular intended to be disclosed in which the retaining cassette has a width and a length of respectively at least 50 cm, in particular of respectively 60 cm or of approximately 60 cm by approximately 120 cm, and/or in which, after removal of the protective layer, the intermediate product can be adhered to the attachment face undeformed, and/or in which the side of the intermediate product comprising the adhesive layer can be adhered plane parallel with the attachment face, the attachment face and said side of the intermediate product in particular being flat and free of recesses.

Other advantages and embodiments of the invention become apparent from the dependent claims, which are not cited, as well as from the following description of the figures, in which:

Fig. 1 shows, in a series of schematic plan views, the basic components and the production sequence of an intermediate product as claimed according to the present invention, with Fig. 1e then showing the bottom view of the intermediate product,

Fig. 2 is a highly schematic view, roughly along arrow II in Fig. 1, of a section through the intermediate product according to the invention, omitting some tube portions,

Fig. 3 is a view according to Fig. 2 of the intermediate product with the protective layer having been partially peeled off,

Fig. 4 is a view according to Fig. 3 of the intermediate product, or the remainder thereof, with the protective layer having been peeled off and said intermediate product being inserted into a retaining cassette,

Fig. 5 is a view according to Fig. 4 of an assembled surface heat exchanger according to the method according to the invention,

Fig. 6 is a highly schematic lateral sectional view through a building room in which the assembled surface heat exchanger according to Fig. 5 has been mounted centrally, omitting the (remainder of the) intermediate product for the sake of clarity, and

Fig. 7 is a highly schematic plan view of an alternative assembled surface heat exchanger comprising two (remainders of the) intermediate products which have been inserted into a retaining cassette and have already been adhered, and which have an alternative configuration to the intermediate product shown in Fig. 1 comprising protruding tubes.

For the following description of the figures, it should be noted that identical or comparable parts are provided with identical reference signs, sometimes with the addition of lower-case letters or an apostrophe. In the claims, which follow the

description of the figures, the reference signs used in the drawings and the description of the figures are therefore essentially used without apostrophes or lower-case letters for the sake of simplicity, provided that the corresponding objects are comparable.

First, the series of figures in Fig. 1 shows the manufacture of an intermediate product 10 according to the invention by the manufacturer (cf. Fig. 1d and 1e).

According to Fig. 1a, a support plate 11 is first used for the production thereof, for example in the manufacturer's production facilities. The support plate 11 is shown in Fig. 1a by way of its front side 12 and consists substantially of a metal sheet, for example made of aluminium. Here, the support plate 11 has a material thickness of at least 0.3 mm, and in the present embodiment approximately 0.5 mm or 0.6 mm. This material thickness in particular ensures that the support plate 11 can also be described as a metal transfer sheet, since the material thickness provided allows for optimal thermal conduction in the support plate.

According to Fig. 1b, a tube system 13 in the manner of a tube meander is provided on the front side 12 of the support plate 11. Here, the tube system 13 shown in particular comprises four straight tube portions 14a, 14b, 14c, 14d, which typically exhibit a D-shaped cross section. The three substantially curved portions 15a, 15b, 15c arranged therebetween may, however, retain a round cross section, for example. According to Fig. 1d, this tube system 13 is attached to the support plate 11 by means of heat-conducting plates 16a, 16b, 16c, 16d as shown in Fig. 1c. In this case, the heat-conducting plates 16a, 16b, 16c, 16d are in particular strip-shaped and can each engage over a straight tube portion 14a, 14b, 14c, 14d and attach to the support plate 11.

In this sense, in the present embodiment, the curved tube portions 15 are in particular not attached directly to the support plate 11, but instead are only indirectly attached via the straight portions 14 and the heat-conducting plates 16. The heat-conducting plates 16 may for example be adhered to the support plate

11 (in particular on both sides) or may be attached to the support plate in another manner, for example mechanically, as set out in the subsequently published document DE 10 2015 003 280 by the applicant, the disclosure of which is hereby incorporated in full into the content of the present patent application. Therefore, the heat-conducting plates may in particular be metal strips having good heat-conducting properties.

The intermediate product assembled in this way is shown in Fig. 1d in a front view and in Fig. 1e in a rear view.

The rear view according to Fig. 1e shows that the rear side 19 of the intermediate product 10 and therefore also the rear side of the support plate 11 is provided with a protective layer 17, for example a peel-off film or a peel-off piece of paper coated with silicone, or the like. In this case, the protective layer 17 serves to cover and protect an adhesive layer (not shown in Fig. 1) that is arranged on the rear side of the intermediate product 10 and the support plate 11. The intermediate product 10 is intended to be adhered to a retaining cassette using this adhesive layer in the manner described later.

Typically, to ensure that it is easy to remove or peel off, the protective layer 17 comprises a grip face 18, which may for example be provided by a protruding film region or simply a region of the underside of the film (which is associated with the adhesive layer).

The finished intermediate product according to Fig. 1d/e is typically manufactured separately by a surface heat exchanger manufacturer. It is, however, intended to be inserted into a retaining cassette which is not located at the manufacturer's site according to the invention.

In this sense, the intermediate product denoted by reference sign 10 in Fig. 1 constitutes an easy-to-handle, transportable and easy-to-store unit which can be shipped or transported in a logistically simple manner (since shipping without the

particularly heavy retaining cassette is possible, for example).

Typically, the easy-to-handle intermediate product denoted by reference sign 10 in Fig. 1 for assembling a surface heat exchanger is then transported to another/remote site, at which the assembly of the surface heat exchanger takes place (by bringing together the intermediate product and a retaining cassette), as shown in particular in the series of figures 2 to 5.

Here, Fig. 2 is a cross-sectional view through the intermediate product 10 approximately according to the arrows II in Fig. 1 d, but with two straight tube portions being omitted. Therefore, for the sake of clarity, only two of the actual four straight tube portions 14 of the tube system 13 are shown in Fig. 2 by way of example. According to Fig. 2, the tube portions 14 are D-shaped in cross section and are fastened to the front side 12 of the support plate 11 by the heat-conducting plates 16, on either side in the present embodiment.

Fig. 2 also shows that an adhesive layer 20 is arranged on the rear side or underside 19 of the support plate 11, which layer is covered by a protective layer 21, in particular over its entire surface. The protective layer 21 is used in particular to make it easier to handle and transport the intermediate product 10 in the sense that the intermediate product 10 does not adhere to another object during transport due to the adhesive layer 20.

The intermediate product 10 shown in Fig. 2 is then already at a second site, this possibly being the installation site, for example, i.e. the building room in which the surface heat exchanger is intended to be attached, for example. In principle, this may, however, be the installation site only in the sense that the assembly of the surface heat exchanger takes place in a neighbouring room, a neighbouring building or outside the destination building or in a space adjacent to the destination room. Alternatively, the second site may also be (slightly) different from the installation site. For example, the finished intermediate product 10 according to Fig. 2 may first be transported from the locality of the manufacturer

to a locality of an installer which is in the vicinity of the installation site.

In any case, according to Fig. 3, the protective layer 21 or protective film 21 can be easily manually removed or peeled off at a second site, which is advantageously the installation site. In this way, the adhesive layer 20 of the intermediate product 10 is exposed. To do this, a user can grip a grip face 18 of the protective layer 21 from behind with their hand.

After removal of the protective layer 21, a black colour impression can then appear when looking at the underside of the support plate 11. This colour impression can be produced by a black-coloured adhesive layer 20, for example, or in an alternative embodiment (not shown), by a separate coating on the underside of the support plate 11 which would thus be arranged between the support plate 11 and the adhesive layer 20, with a substantially transparent adhesive layer having to be used in this case.

The protective layer 21 is preferably removed according to Fig. 3 immediately before the remainder 22 of the intermediate product is adhered into or onto the retaining cassette 23, as shown in Fig. 4. The remainder 22 of the intermediate product 10, in particular comprising the exposed adhesive layer 20, the support plate 11 and the tube system 13 and the heat-conducting plates 16, can then be brought closer to the inner face 24 of the retaining cassette in an insertion direction E and can be adhered thereto, in particular over its entire surface, by means of the exposed adhesive layer 20. In this case, this adhesion takes place in a substantially plane parallel manner by the plate plane P being brought towards the attachment plane B of the retaining cassette 23 in a plane parallel manner until it adheres to an attachment face 25 of the retaining cassette 23. No tools, aids or the like are generally required for this purpose. A user can do this manually, in particular by exerting pressure on the rear side 24 of the support plate approximately in the insertion direction E after placing the remainder 22 of the intermediate product 10 in into or onto the retaining cassette 23 or the attachment face 25.

The assembled surface heat exchanger is then denoted by reference sign 26 in Fig. 5.

Another embodiment, which provides that the attachment face 25 of the retaining cassette 23 is provided by a preferably black non-woven material that is arranged in the retaining cassette, is not shown in Fig. 4 and 5. This optional non-woven material has acoustic and visual properties, inter alia, and can be inserted into the cassette 23 in advance in a separate method step.

If the surface heat exchanger 26 has been assembled according to Fig. 2 to 5 remotely from the installation site, the surface heat exchanger 26 can then be transported from the second site, for example the site of the local installer, to the installation site, in particular the intended building room. If, however, the surface heat exchanger 26 has been assembled at the installation site, the final installation of the assembled surface heat exchanger 26 can then (according to Fig. 6) be carried out.

Fig. 6 shows the surface heat exchanger 26 in a completely installed state, in which the surface heat exchanger 26 has been attached or fastened to a ceiling 27 of a building room 28. For the sake of clarity, however, Fig. 6 only shows the retaining cassette of the surface heat exchanger 26, without the remainder 22 of the intermediate product 10. However, the fully installed surface heat exchanger 26 of course contains all the components shown in Fig. 5.

To install the surface heat exchanger 26, the retaining cassette 23 may for example comprise installation faces, which are indicated in Fig. 6 and are omitted from Fig. 5 for the sake of clarity, and can in particular be attached to the side edges 29 of the retaining cassette 23 (cf. Fig. 5).

In Fig. 6, the surface heat exchanger 26 is installed on the ceiling 27 in a cascaded arrangement together with other surface heat exchangers 26’ and 26’’.

The complete installation also includes, inter alia, the surface heat exchanger 26 being connected to the other surface heat exchangers 26' and/or 26'' with regard to its tube system, such that continuous conduction of a fluid flowing through the tube system 13 on the ceiling 27 is ensured.

With regard to Fig. 6, it is noted that many more or less than three of the surface heat exchangers shown can of course be used on the ceiling. In particular, the surface heat exchangers may not only be arranged beside one another, as shown in the sectional view according to Fig. 6, but may also be arranged in succession in relation to the other spatial direction.

It is common to all the forms of arrangement that the surface heat exchangers 26 form what is known as a climate-control ceiling, which provides air conditioning of the room 28. If a coolant, for example cooled or cold water, flows through the tube systems or tube system, the climate-control ceiling can have a cooling effect. If, however, the room 28 is intended to be heated, a heated medium, for example hot water, can flow through the tube systems 13 of the surface heat exchangers 26.

Merely for the sake of clarity, it is noted with regard to Fig. 6 that the surface heat exchangers 26 could of course also be arranged on the walls 29, depending on the application.

In this case, a typical surface heat exchanger 26 has a width of approximately 60 cm, in particular of between 50 and 70 cm. The surface heat exchanger 26 may have identical dimensions in the other spatial direction or, alternatively, may also have dimensions that are approximately twice as long, i.e. a length l of approximately 120 cm or in particular between 100 cm and 140 cm. Typically, in this case, precisely one (remainder of the) intermediate product 22 is arranged within a retaining cassette or an intermediate product is installed within said retaining cassette.

Fig. 7 shows another embodiment of an installed surface heat exchanger in which the length of the retaining cassette 23' is approximately twice as long as the width, i.e. approximately with a length l of 1.20 m and a width b of approximately 60 cm. In this embodiment, two substantially identical remainders 22' of intermediate products 10' are then fastened beside one another. The two units 22' are, however, actually interconnected with regard to their tube systems 13' (not shown in Fig. 7).

Fig. 7 also shows an alternative configuration such that the units or remainders 22 each have a different design of the support plate 11' compared with the support plate 11 according to Fig. 1d: thus, specifically, in particular the curved regions 15' of the tube system 13' protrude laterally beyond the actual support plate 11'. This configuration may vary depending on the customer's requests.

In addition, another alternative is provided according to which the support plates 11' in Fig. 7 have acoustic perforations 30. These acoustic perforations can provide improved acoustics and can in particular be accompanied by the corresponding acoustic perforations (not shown in Fig. 7) in the attachment face 25 of the retaining cassette 23'. The acoustic perforations in the retaining cassette 23' and in the support plates 11' may thus be placed over one another substantially congruently during the installation. Care should be taken here to ensure that the adhesive layer (not shown in Fig. 7) on the support plate 11' for installation on the attachment face of the retaining cassette 23' leaves the acoustic perforations open where applicable. In this sense, the adhesive layer may also have congruent perforations or congruent openings or cut-outs.

Within the meaning of the present patent application, in this case the adhesive layer thus still has to be considered to be a substantially continuous adhesive layer, which is adhered to substantially the entirety of the inner face of the retaining cassette 23'.

Acoustic perforations may of course also be provided in variants in which only a

remainder of an intermediate product or an intermediate product is used to produce a surface heat exchanger.

P A T E N T K R A V

1. Fremgangsmåde til indretning af en bygningsrumklimatisering, hvilken fremgangsmåde omfatter følgende trin:

- at tilvejebringe en holdekassette (23) til lofts- eller vægmontage med en befæstelsesflade (25), der i det væsentlige strækker sig i et plan (B), på et første sted, navnlig montagestedet,

- at samle et mellemprodukt (10) på et andet, andetsteds beliggende sted, hvilket mellemprodukt omfatter netop en mindst 0,3 mm tyk metalbæreplade (11), til hvis ene side (12) er fastgjort et rørsystem (13) til ledning af et medium fra mindst en varmeledningsplade (16), og på hvis anden side (19) er anbragt et klæbelag (20) samt et beskyttelseslag (21), der dækker klæbelaget (20),

- at bringe mellemproduktet (10) fra det andet til det første sted,

- manuelt at fjerne, fortrinsvis aftrække, beskyttelseslaget (21) til fritlæggelse af klæbelaget (20),

- manuelt at klæbe mellemproduktet på holdekassettens (23) befæstelsesflade ved hjælp af det fritlagte klæbelag (20) til samling af en fladevarmeveksler (26),

at montere den samlede fladevarmeveksler (26) på bygningsrumloftet eller -væggen (27, 29), fortrinsvis som del af flere kaskadeagtigt anbragte og ledningsteknisk forbundne fladevarmevekslere (26, 26', 26'') på nævnte bygningsrumloft eller -væg (27, 29).

2. Fremgangsmåde ifølge krav 1, k e n d e t e g n e t ved, at bærepladen (11) består af aluminium og/eller har en tykkelse på mindst 0,3 mm, fortrinsvis mindst 0,4 mm eller mindst 0,5 mm.

3. Fremgangsmåde ifølge krav 1 eller 2, k e n d e t e g n e t ved, at det ydre beskyttelseslag (21) er udformet folie- eller bladagtigt og kan trækkes af manuelt uden værktøj og navnlig frembyder en trækflade (18), der kan gribes (bagfra) med en finger(negl).

4. Fremgangsmåde ifølge et af de foregående krav, k e n d e t e g n e t ved, at bærepladen (11) ser sort ud på den side (19), der frembyder klæbelaget (20), efter fjernelse af beskyttelseslaget (21), fortrinsvis på grund af en belægning anbragt mellem bæreplade (11) og klæbelag (20).

5. Fremgangsmåde ifølge et af de foregående krav, k e n d e t e g n e t ved, at holdekassetten (23) frembyder en bredde og en længde på hver især mindst 50 cm, fortrinsvis på hver især cirka 60 cm eller på cirka 60 cm gange cirka 120 cm.

6. Fremgangsmåde ifølge et af de foregående krav, kendetegnet ved, at mellemproduktet (10) efter fjernelse af beskyttelseslaget (21) klæbes ikke-deformeret på befæstelsesfladen (25).

7. Fremgangsmåde ifølge et af de foregående krav, kendetegnet ved, at mellemproduktet (10) i det væsentlige med sin fulde flade klæbes til befæstelsesfladen (25), hvor bærepladen (11) fortrinsvis kun ensidigt frembyder et i det væsentlige gennemgående klæbelag (20).

8. Fremgangsmåde ifølge et af de foregående krav, kendetegnet ved, at den side af mellemproduktet (10), som udviser klæbelaget (20), opklæbes planparallelt med befæstelsesfladen (25), og/eller at såvel den nævnte side af mellemproduktet (10) som befæstelsesfladen (25) hver især er udformet jævne eller uden tilbagespring.

9. Fremgangsmåde ifølge et af de foregående krav, k e n d e t e g n e t ved følgende fremgangsmådetrin:

- at forbinde fladevarmeveksleren (26) som del af montagen med mindst en yderligere, i det væsentlige identisk fremstillet og på samme væg eller loft anbragt, fladevarmeveksler (26', 26'').

10. Mellemprodukt (10) til fremstilling af en fladevarmeveksler (26) til bygningsrumklimatisering, hvor mellemproduktet (10) omfatter netop en mindst 0,3 mm tyk metalbæreplade (11), på hvis ene side (12) er fastgjort et rørsystem (13), til ledning af et medium, fra mindst en varmeledningsplade (16), og på hvis anden side (19) er anbragt et klæbelag (20) såvel som et ydre, manuelt aftageligt beskyttelseslag (21), som dækker klæbelaget (20).

11. Bygningsrumklimatiseringssystem omfattende et mellemprodukt (10) ifølge krav 10 samt en holdekassette (23) til loft- eller vægmontage med en befæstelsesflade (25), der i det væsentlige strækker sig i et plan (B), til manuel fastgørelse af mellemproduktet (10,22) ved fjernet beskyttelseslag (21), hvor befæstelsesfladen (25) fortrinsvis frembyder mindst bærepladens (11) fladestørrelse.

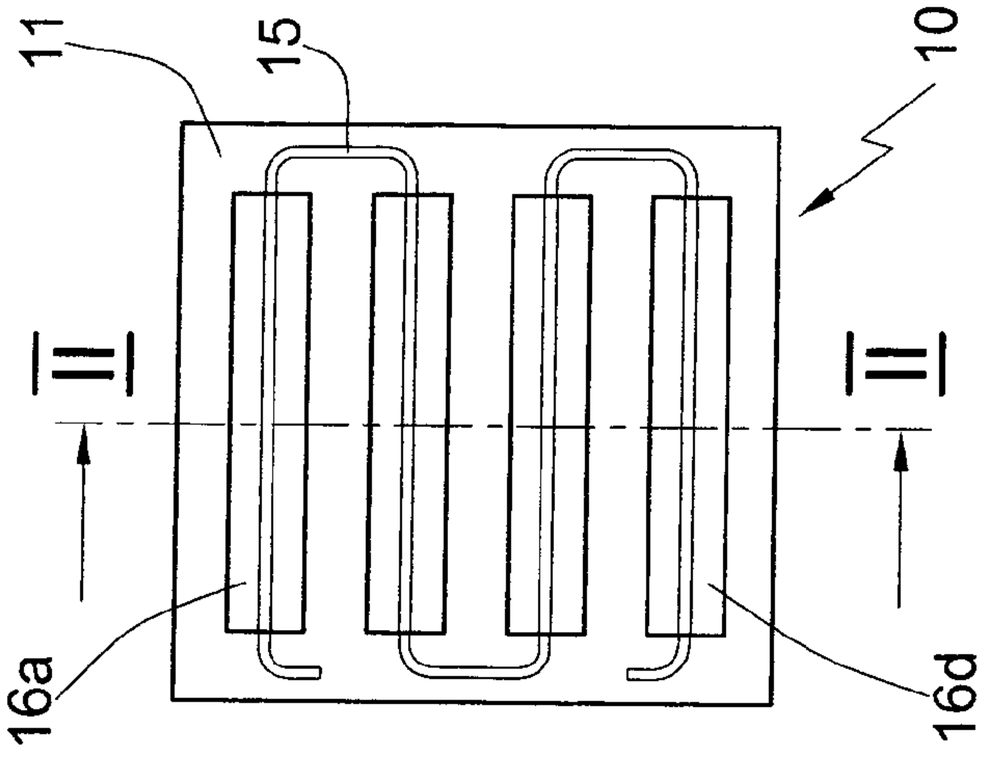


Fig. 1d

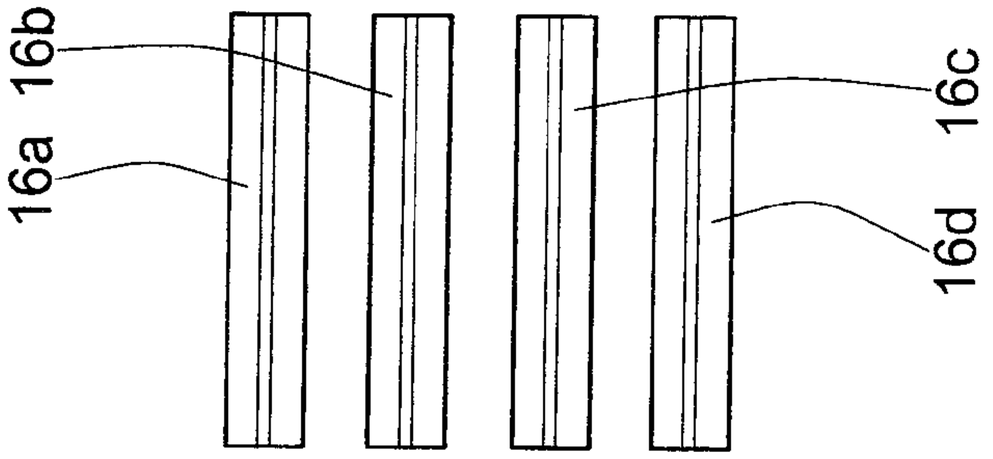


Fig. 1c

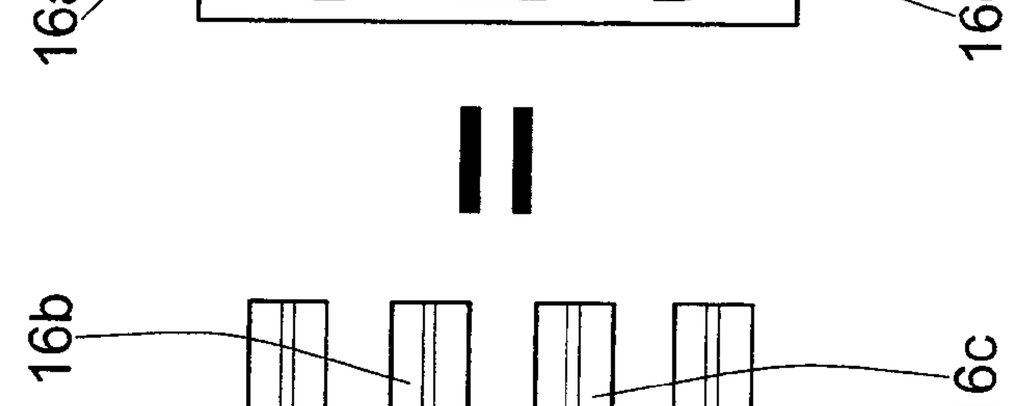


Fig. 1b

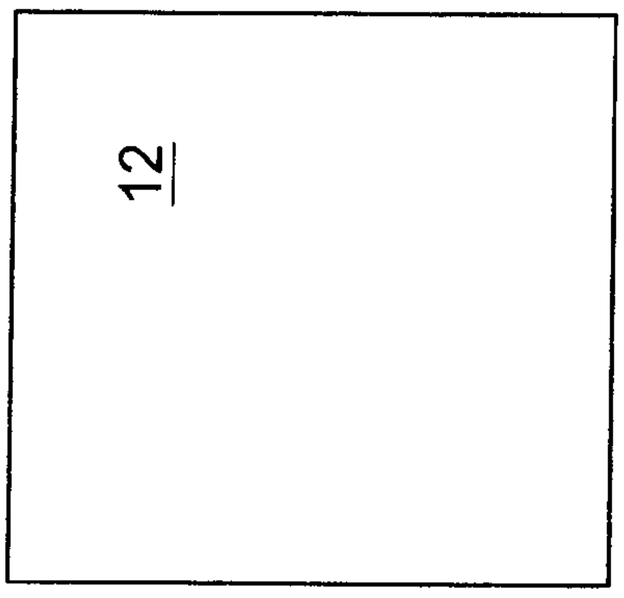


Fig. 1a

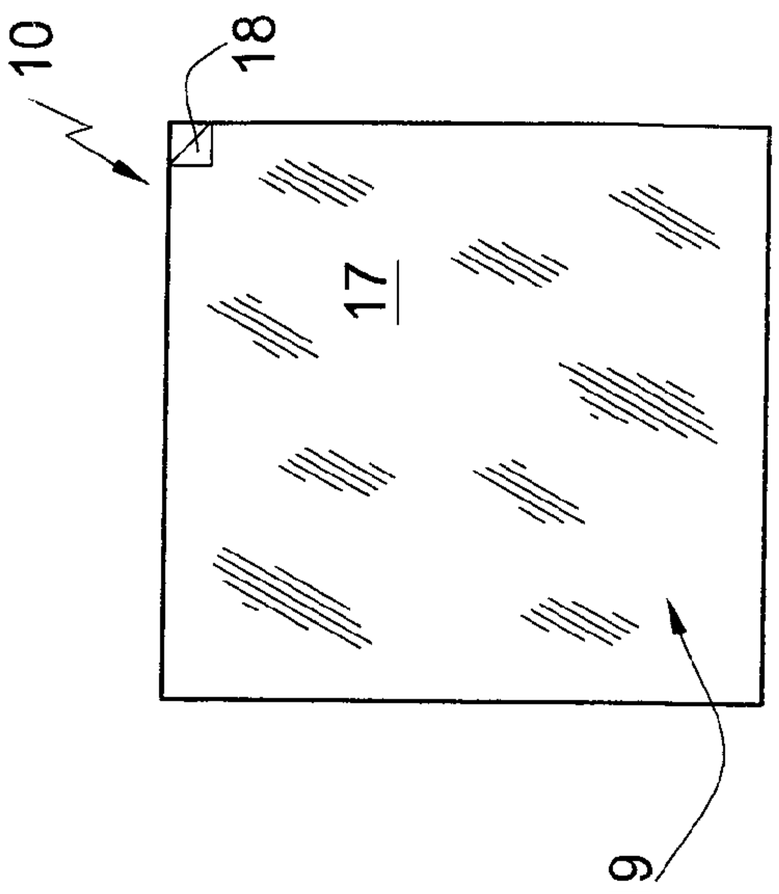


Fig. 1e

Fig. 2

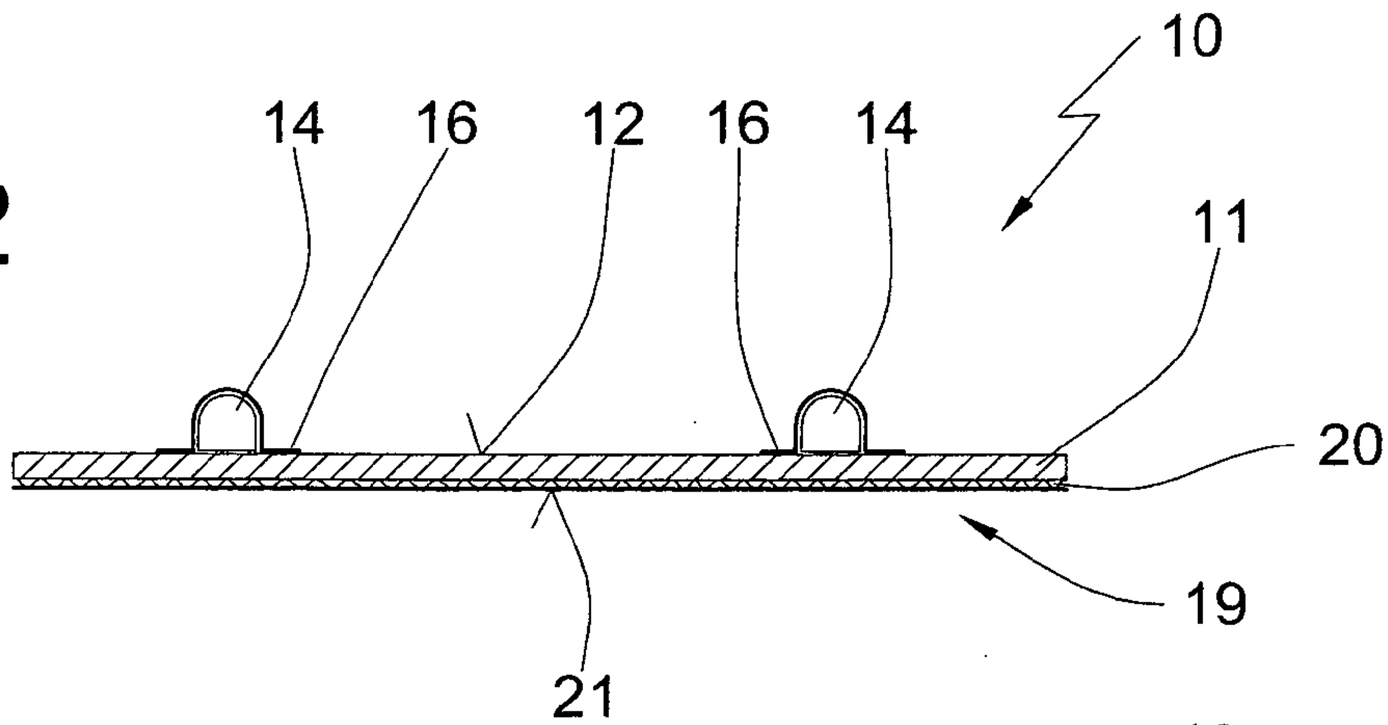


Fig. 3

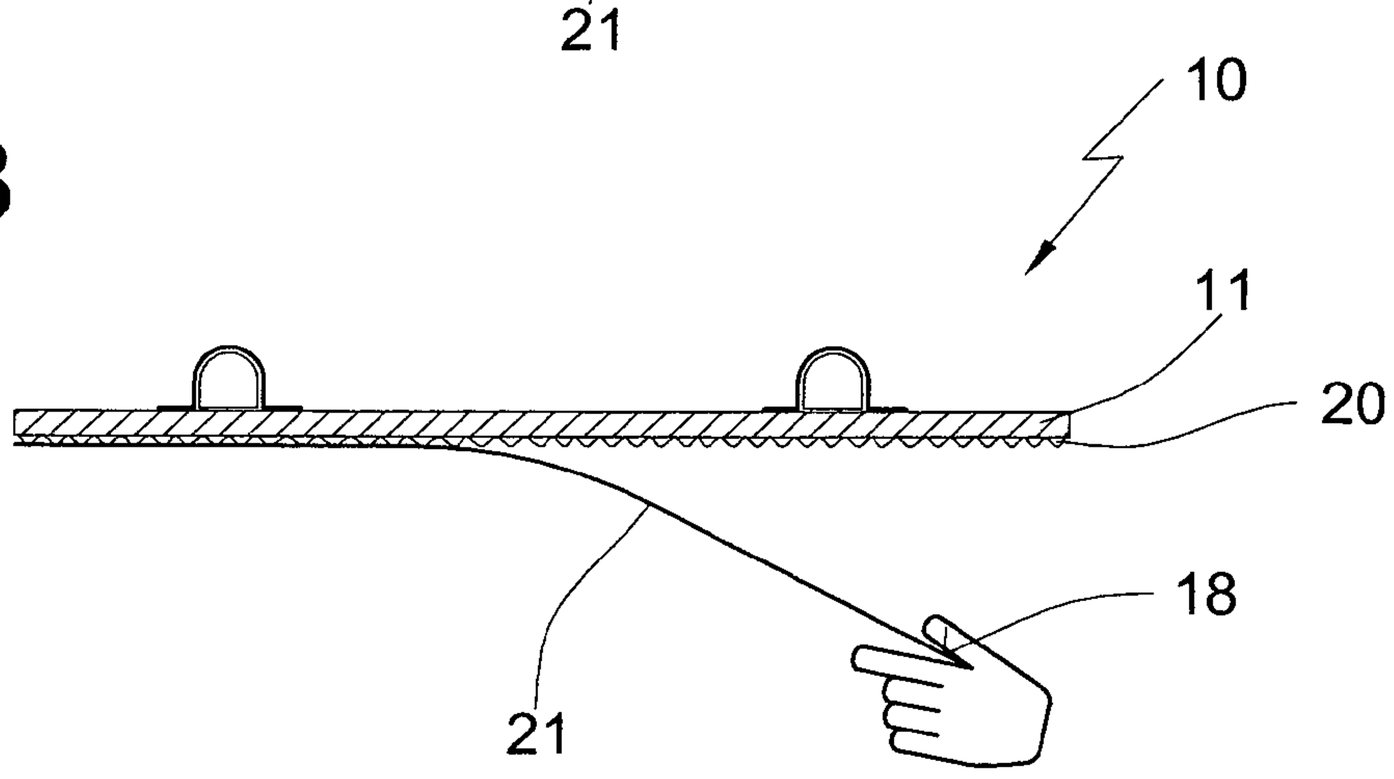


Fig. 4

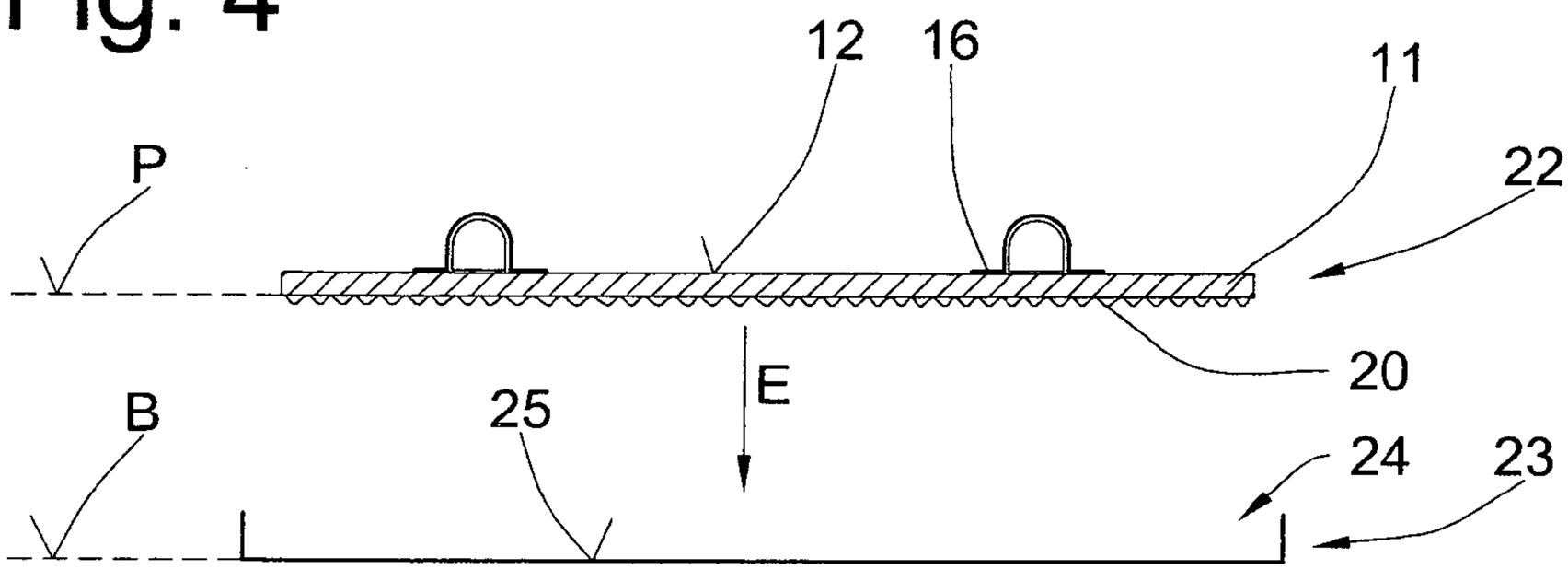


Fig. 5

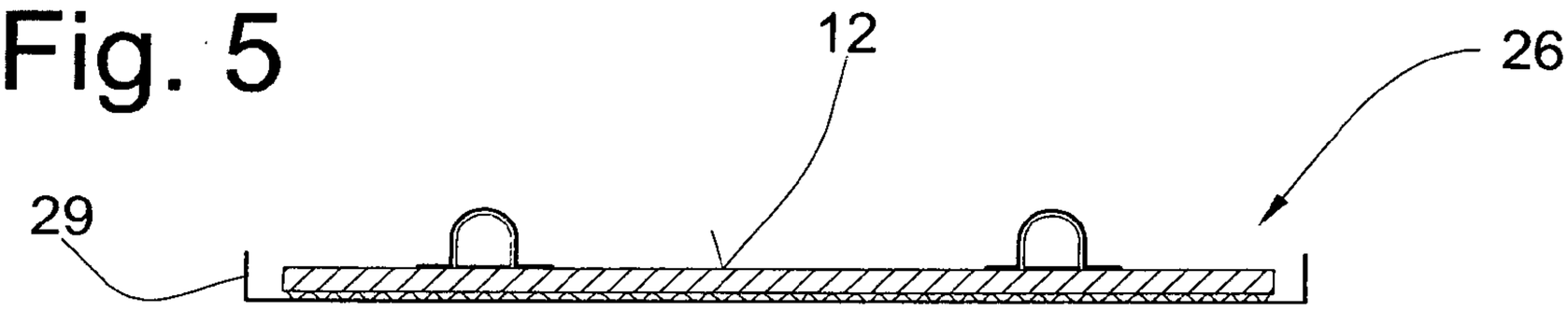


Fig. 6

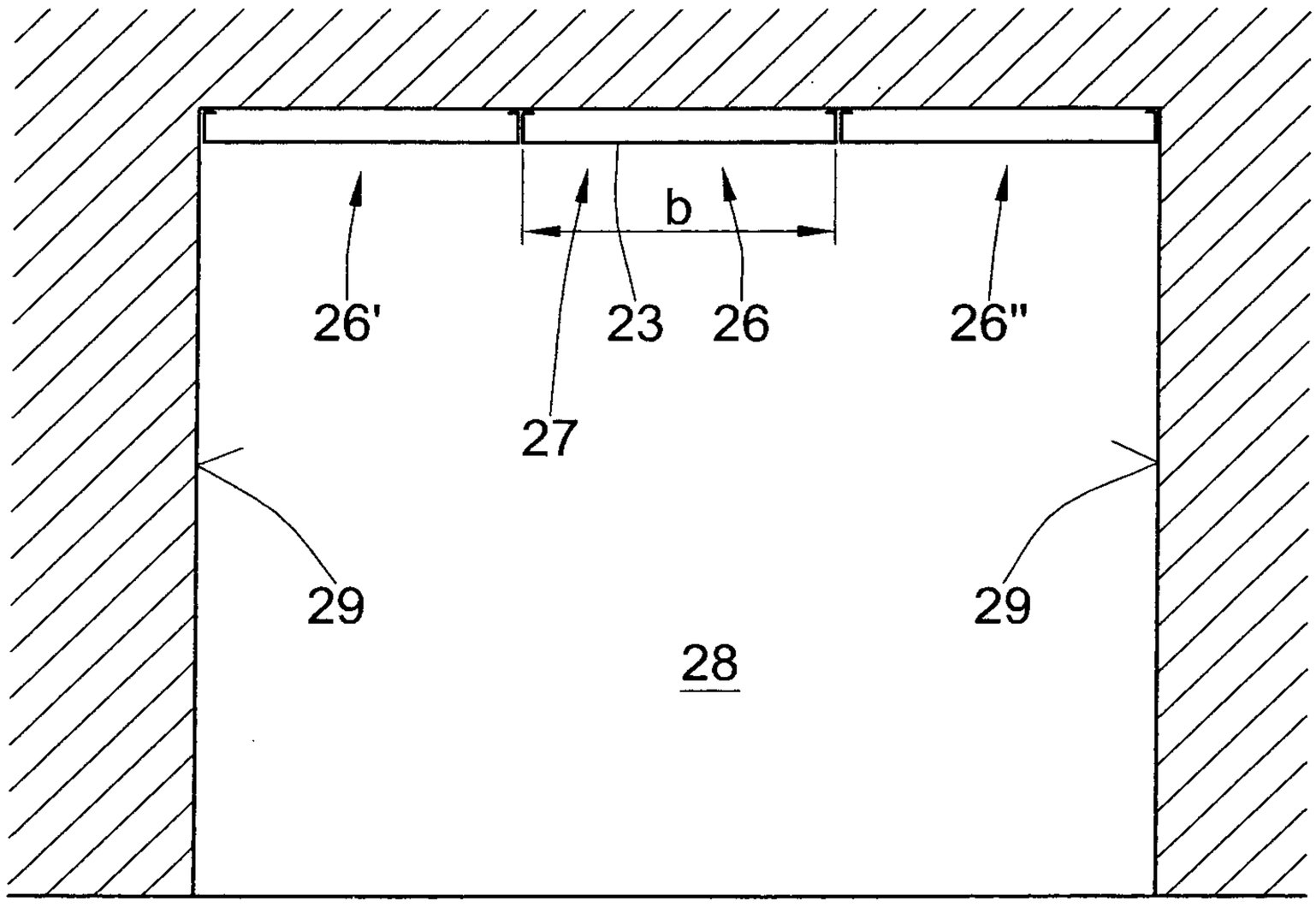


Fig. 7

