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- (73) Patenthaver: **Buck, Peter, Eichhaldestr. 123, 72574 Bad Urach, Tyskland**
- (72) Opfinder: **Buck, Peter, Eichhaldestr. 123, 72574 Bad Urach, Tyskland**
- (74) Fuldmægtig i Danmark: **PLOUGMANN & VINGTOFT A/S, Rued Langgaards Vej 8, 2300 København S, Danmark**
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Technical field

The present invention relates to a modular partition such as is used for example in buildings, particularly in offices, in order to damp (absorb) the sound so that the health of the persons working there is not impaired by the high noise level, or the reverberation time in the room is reduced, and so that for example telephone conversations are not impaired by the other conversations taking place in the room. This is achieved amongst other things by sound-absorbing screens (free-standing) or screening close to the workstation.

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State of the art

DE 20 2008 017 363 U1 and AT 24 80 82 disclose a dividing or partition wall according to the introductory part of claim 1.

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These dividing walls have the drawback that their versatility is low when requirements of the degree of sound damping change.

Furthermore, DE 20 2008 007 112 U1 relates to a room divider element which is suitable for dividing a room such as an office, exhibition space or living space. In this case the room divider element is constructed from different base bodies, the base bodies being provided with a magnetic force-applying connecting means on at least one narrow face.

25 US 6,585,028 B2 relates to a modular room divider system in which, in order to ensure the stability of the system, a vertical support element which is substantially tubular must be provided. Depending on the height of the room divider system, the height of the vertical support element must be adapted.

30 Furthermore, US 6,393,782 B1 relates to a wall panel system in which a rail is necessary for connecting upper and lower wall panels or also for connecting wall panels disposed laterally adjacent thereto. Attached to this rail are for example both the upper and the lower panel.

35 All of the above publications are not designed for the absorption of sound.

US 2008/0115434 A1 relates to a modular partition system, wherein in one embodiment reference is made to a central transparent panel which is attached to a frame. The central transparent panel is light-transmitting, while it defines an
5 aperture for the passage of noise to these regions.

US 5,896,710 A1 relates to an acoustic panel system for partially acoustically insulating a section of a room in e.g. a recording studio. The acoustic panel system is modular in design and comprises a plurality of differently dimensioned
10 acoustic panels which can be assembled.

DE 27 25 156 A1 relates to a multi-layer soundproof component which can be used for side panels for roads, railway sections, etc.

15 Account of the invention

It is the object of the invention to provide a modular partition which solves the known problems from the state of the art and which is further suitable for being quick to construct and adapted with versatility to changing sound damping
20 requirements as well as spatial alterations.

The object is achieved by the subjects of the independent claims. Preferred embodiments of the partition according to the invention are apparent from the subsidiary claims.

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The invention is based on the concept of designing the partition in such a way that it can be adapted routinely and within a short time to changing noise levels or noise levels which occur to a different degree to that which is expected.

30 According to the invention the partition is distinguished in that each partition element is provided with a locking element in the form of a tension lock for ensuring the connection of two partition elements disposed one above the other, wherein the tension lock is disposed in the interior of the partition element and preferably can be operated without a tool. In this way it is possible, particularly
35 advantageously, to quickly lock together partition elements disposed one above

the other, and visibility of the locking element from the outside can advantageously be avoided.

Furthermore, the partition element is distinguished in that it is substantially
5 hollow inside and/or in that a damping element, in particular a damping mat, can
be introduced into the interior of the partition element, or a damping element is
located in the interior of the partition element. In this way it is possible,
particularly advantageously, to substantially increase the degree of sound
damping of the partition. Further, damping elements can have the advantage that
10 in addition they have insulating properties.

Accordingly, the partition or dividing wall according to the invention has, for
erecting in rooms, a plurality of substantially cuboid partition elements, wherein
the upper sides of the partition elements are suitable for being received in the
15 lower sides of stackable, additional partition elements.

In this way it is possible, particularly advantageously, to adapt the partition in
height to the requirements, in particular the sound damping requirements, by
stacking, without support elements of the partition having to be replaced or
20 altered. The inventor of this application recognised that different sound damping
requirements arise sometimes in the course of using a room or using an office.
Thus for example it may be necessary, if an office was initially equipped mainly
with "quiet" computer workstations and is then used as a so-called call centre,
when the noise level in the office rises considerably and so existing partitions have
25 to be altered. However, prior-art partitions are designed in such a way that they
have fixed dimensions, and furthermore they are not suitable for being stacked. If
therefore the sound-damping requirements now change, it has been necessary
hitherto, because the system was not convertible, to remove the complete
partition system from the room and erect a different one. Here, however, the
30 partition according to the invention affords substantial advantages, because the
height of the partition can be changed, depending on changing sound damping
requirements. This advantage is also manifest when a newly erected partition
does not meet the sound damping requirements to full satisfaction and so the
client can be offered a favourable improvement, as it is now not necessary to
35 dispose of the newly erected partition, but only the height of the partition has to

be altered. The advantage of an increase in the degree of sound absorption is manifest in particular when increasing the height of the partition in conjunction with low audible frequencies, particularly in the range of low frequencies, in particular 125-315 Hz. The partition can advantageously also be used as a visual
5 screen and/or as a room divider.

According to one embodiment, the upper side and/or the lower side of the partition element have recesses and projections complementary to each other. In this way it is possible, particularly advantageously, to stack the partition elements
10 rapidly and easily to the desired height.

The partition is further distinguished in that it can be made capable of being connected to a foot. In this way it is possible for example either to introduce the partition into a foot and/or to introduce the foot into the partition. In this way the
15 versatility of the partition is further increased, as the bottom partition elements do not have to be kept in stock separately, but every partition element can be connected to the foot.

In this case it may be provided that a stabilising element which is disposed
20 substantially at right angles to the foot and which is designed so as to prevent the partition element from being knocked over accidentally is provided. This stabilising element is here attached to the foot by a joining method, in particular by welding. In this way it is possible to design the partition in such a way that even at heights of 2.34 m, it withstands a test method standardised according to
25 DIN technical reports 123 DIN EN 1023-2 and DIN EN 1023-3. In this way the partition according to the invention advantageously fulfils all of the requirements in order to be erected in both public and non-public offices.

According to a further particularly preferred embodiment, the partition element is
30 shaped at its narrow faces in such a way that it can be connected to further partition elements disposed laterally and/or behind it. In this way it is possible, particularly advantageously, to erect the partition with versatility and over a large area in a room. Connection is effected by means of known partition connecting mechanisms, for example magnetically, by wing bolts and wing nuts, or by push-
35 fit, click and/or sliding connections.

Furthermore, according to the invention it is provided that the surface of the partition element at least in some sections has sound damping properties. In this way it is possible to substantially increase the degree of sound damping or the
5 degree of sound absorption of the partition. Due to this increased degree of sound absorption (or due to the improved acoustic screening), it is further possible advantageously to substantially reduce the reverberation time.

According to a further particularly preferred embodiment the partition has a
10 degree of sound absorption α_s in the region of over 0.3, preferably up to 0.74, in the low frequency range of approximately 100-315 Hz, a degree of sound absorption α_s in the region of over 0.90, preferably up to 0.95, in the medium frequency range of approximately 400-1250 Hz, and a degree of sound absorption α_s in the region of over 0.55, preferably up to 0.90, in the high frequency range of
15 approximately 1600-5000 Hz. In this way it is possible, particularly advantageously, with the partition according to the invention to fulfil all of the requirements of sound damping or sound absorption in rooms, particularly in offices. Testing is carried out in accordance with DIN EN ISO 354.

20 The invention is further distinguished by a method for erecting a partition of variable height which has the characteristics according to claim 7.

According to the invention the method is distinguished in that the partition elements have a cavity inside, and a damping element, in particular a damping
25 mat, is introduced into the latter. In this way it is possible, particularly advantageously, to substantially increase the sound damping properties or the degree of sound absorption of the partition, so that the desired sound damping requirements are met.

30 The modular partition according to the invention or a partition erected by the method described is particularly suitable for use as a room divider and/or as a sound absorber in a building, particularly in an office. In this way it is possible, particularly advantageously, by using the partition, to reduce the noise level in a building substantially and according to requirements.

Brief description of the drawings

- Figure 1 shows an exploded view of a partition according to the invention,
- 5 Figure 2 shows an exploded view of a partition according to the invention with a damping element introduced into it,
- Figure 3 shows a laterally sectioned partition according to the invention which is disposed adjacent to a foot for the partition, and
- 10 Figure 4 shows by way of example the material used in the partition element in a front view (a), a lateral sectional view (b) and in a view from behind (c).
- 15 Detailed description of preferred embodiments of the invention

Below, an embodiment of a modular partition according to the invention by way of example is described with reference to the attached drawings.

- 20 Here, Figure 1 shows a modular partition 10 which is constructed from a plurality of partition elements 12 disposed one on top of the other. The partition elements 12 are in this case designed in such a way that their upper and lower sides in each case have recesses and projections complementary to each other, so that the individual partition elements are easy to stack one on top of the other. In the
- 25 embodiment shown, the connection is made by a slot and key connection.

- To guarantee a reliable connection between two partition elements 12 disposed one on top of the other, a locking element 18, in particular a tension lock, can be provided. This tension lock is shown laterally beside the partition 10 in Figure 1,
- 30 greatly enlarged. The tension lock 18 is preferably disposed in the interior of two partition elements 12 disposed one above the other in such a way that an upper section 19 is attached to the upper partition element 12 and a lower section 20 is attached to the lower partition element. The manner of operation of the tension lock 18 is not described in more detail, as it is known for example from office
- 35 cases or extendable dining tables.

The individual partition elements are preferably at least 12 cm deep (side face b in Figure 1) and have a height of at least approximately 13 cm (side face c in Figure 1). In this way it is possible to stack the partition elements up to a height of 2.5 m, preferably up to 1.9 m. The width (marked a in Figure 1) of the partition elements 12 is variable. The partition elements 12 are preferably made of the material shown in Figure 4. Furthermore, it is possible to make the partition elements from suitable sound-absorbing materials which meet the static requirements.

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To increase the stability of the partition against overturning, the bottom partition element 12 is introduced into a foot 14, wherein the foot 14 can additionally be provided with laterally projecting stabilising elements 15 (see Figure 3). The foot 14 and the stabilising element 15 are here connected to each other in such a way, in particular welded, that unwanted overturning of the partition 10 can be prevented. The partition element 12 is here bolted to the foot 14 at a connecting point 30, wherein the connecting point is preferably disposed on the upper side of the foot, so that when it is bolted to the partition element 12 using a favourable leverage, a reliable and firm connection is achieved.

20

The top partition element 12 can be provided with a cover 16, wherein the cover 16 can be rigidly connected to the top partition element 12 and/or can be made detachable from the latter. The cover 16 can in this case also have sound damping properties. However, it is also possible to design the cover without sound damping properties.

25

To increase the sound damping properties of the partition, the individual partition elements 12 can be made hollow inside. The partition 10 can preferably be used as a visual screen, as a room divider and/or as a sound absorber.

30

When a building or room is equipped with a partition 10, several partitions 10 can be disposed one behind the other, adjacent to each other and/or at an angle to each other. The partitions can be connected to each other at their adjoining faces by suitable connecting means which can also have sound absorption properties. In the case of an angular arrangement of the partitions 10 relative to each other, it

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is possible to dispose the partitions 10 on one side with edges adjoining each other and on the other side to attach an angle connector, for example a suitably adapted insert.

- 5 Figure 2 shows a further embodiment of a modular partition 10 according to the invention. This embodiment substantially corresponds to the modular partition shown in Figure 1, so that a repeat description of identical or similar elements is dispensed with. The modular partition 10 has a damping element 24 inside, wherein the damping element can be designed in one or more pieces, so that
- 10 either after erecting the partition 10 an individual damping element 24 can be introduced, or when erecting the partition 10 a damping element 24 is already introduced in each partition element. The damping element 24 can, in addition to the damping properties, also have insulating properties.
- 15 In addition, at least one partition element 12 of the partition 10 can be provided with a socket 20, a mains connection 21 and/or a light switch 22. Bulbs or the like can likewise be provided on the partition 10. The cables needed for wiring these elements can run inside the partition. The surface of the modular partition elements 12 is provided with a sound absorption surface. For this surface, all
- 20 suitable surfaces to be found on the market can be used, but preferably slotted and/or drilled surfaces. With the partition 10 according to the invention it is possible to obtain high degrees of sound absorption in the low, medium and high frequency ranges. All materials used are non-allergenic.
- 25 In Figures 4a-c purely by way of example the outer material of the partition 10 or partition elements 12 is shown in various views.

Here, Figure 4a shows the upper side of the material, Figure 4b a sectional view of the material and Figure 4c a view of the material from behind. In the embodiment

30 shown in Figure 4a the material is provided purely as an example with a wood-grain effect. Alternatively, the material can be provided with a colour. In the embodiment shown in Figure 4a the material has substantially circular openings 40. Alternatively the openings can also be lined by a bead which is provided on the surface in such a way as to connect a plurality of openings in the longitudinal

35 direction. Behind the openings are located approximately cylindrical cavities 42

which cause the sound entering the cavities 42 through the openings 40 to be trapped or deadened in these cavities and so no longer able to escape from them, and therefore a very good degree of sound absorption α_s or good degree of damping can be achieved, at the same time reducing the reverberation time.

5

In an alternative embodiment by way of example, the openings 40 as well as the cavities 42 can in each case be connected to each other, so that a substantially elongate opening or a substantially elongate cavity is formed.

10 On the inside, that is, on the reverse side of the material (see Figure 4c), a non-woven fabric can be provided in addition to increase the degree of sound absorption.

Patentkrav

1. Modulær skillevæg (10) til installation i rum omfattende en flerhed af i alt væsentligt kvadratformede skillevægselementer (12), hvor den øvre side af 5 skillevægselementerne (12) er egnet til at blive optaget i undersiden af stabelbare, yderligere skillevægselementer (12), overfladen af skillevægselementet (12) har mindst i afsnit lyddæmpningsegenskaber, skillevægselementerne (12) er i alt væsentligt hule i det indre og/eller at et dæmpningselement (24), i særdeleshed en dæmpningsmåtte, kan indføres i det 10 indre af skillevægselementerne (12), og skillevægselementerne (12) er forsynet med et låseelement (18) for at sikre forbindelsen af to skillevægselementer (12) anbragt over hinanden, hvor låseelementet (18) er anbragt i det indre af to skillevægselementer (12) anbragt over hinanden således at et øvre afsnit (19) er fastgjort til det øvre skillevægselement (12) og et nedre afsnit (20) er fastgjort til 15 det nedre skillevægselement, **kendetegnet ved at** låseelementet er en snaplås.

2. Skillevæg ifølge krav 1, **kendetegnet ved at** den øvre side og/eller undersiden af skillevægselementet (12) har recesser og fremspring som er komplementære med hinanden.

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3. Skillevæg ifølge et af de foregående krav, **kendetegnet ved at** skillevægselementet (12) kan forbindes til en indstillingsfod (14, 15).

4. Skillevæg ifølge krav 3, **kendetegnet ved at** indstillingsfoden (14) er forsynet 25 med et stabiliseringselement (15), hvor stabiliseringselementet er udformet således at utilsigtet vælten omkuld af skillevæggen (10) forhindres.

5. Skillevæg ifølge et af kravene 3 eller 4, **kendetegnet ved at** indstillingsfoden (14) og stabiliseringselementet (15) er svejset sammen med hinanden.

30

6. Skillevæg ifølge krav 5, **kendetegnet ved at** skillevæggen (10) har i lavfrekvensområdet på omkring 100 - 315 Hz en lydabsorptionskoefficient α_s i området på over 0,3, fortrinsvis op til 0,74, i mellemfrekvensområdet på omkring 400 - 1.250 Hz en lydabsorptionskoefficient α_s i området på over 0,90, fortrinsvis

op til 0,95, og i højfrekvensområdet på omkring 1.600 – 5.000 Hz en lydabsorptionskoefficient α_s i området på over 0,55, fortrinsvis op til 0,90.

7. Fremgangsmåde til at installere en skillevæg (10) med variabel højde, hvor
5 mindst to skillevægselementer (12) stables ovenpå hinanden, hvor overfladen af skillevægselementet (12) har mindst i afsnit lyddæmpningsegenskaber, hvor skillevægselementerne (12) stablet oven på hinanden låses sammen med hinanden, hvor låsningen udføres i særdeleshed uden et værktøj, hvor skillevægselementerne (12) er i alt væsentligt hule i det indre og/eller at et
10 dæmpningselement (24), i særdeleshed en dæmpningsmåtte, kan indføres i det indre af skillevægselementerne (12), og skillevægselementerne (12) er forsynet med et låseelement (18) for at sikre forbindelsen af to skillevægselementer (12) anbragt over hinanden, hvor låseelementet (18) er anbragt i det indre af to skillevægselementer (12) anbragt over hinanden således at et øvre afsnit (19) er
15 fastgjort til det øvre skillevægselement (12) og et nedre afsnit (20) er fastgjort til det nedre skillevægselement, **kendetegnet ved at** låseelementet er en snaplås.

8. Anvendelse af en skillevæg ifølge et af kravene 1 til 6 eller en skillevæg (10) installeret ifølge fremgangsmåden i krav 7 som en ruminddeler og/eller som en
20 lyddæmper i en bygning, i særdeleshed i en kontorbygning.

Fig. 1

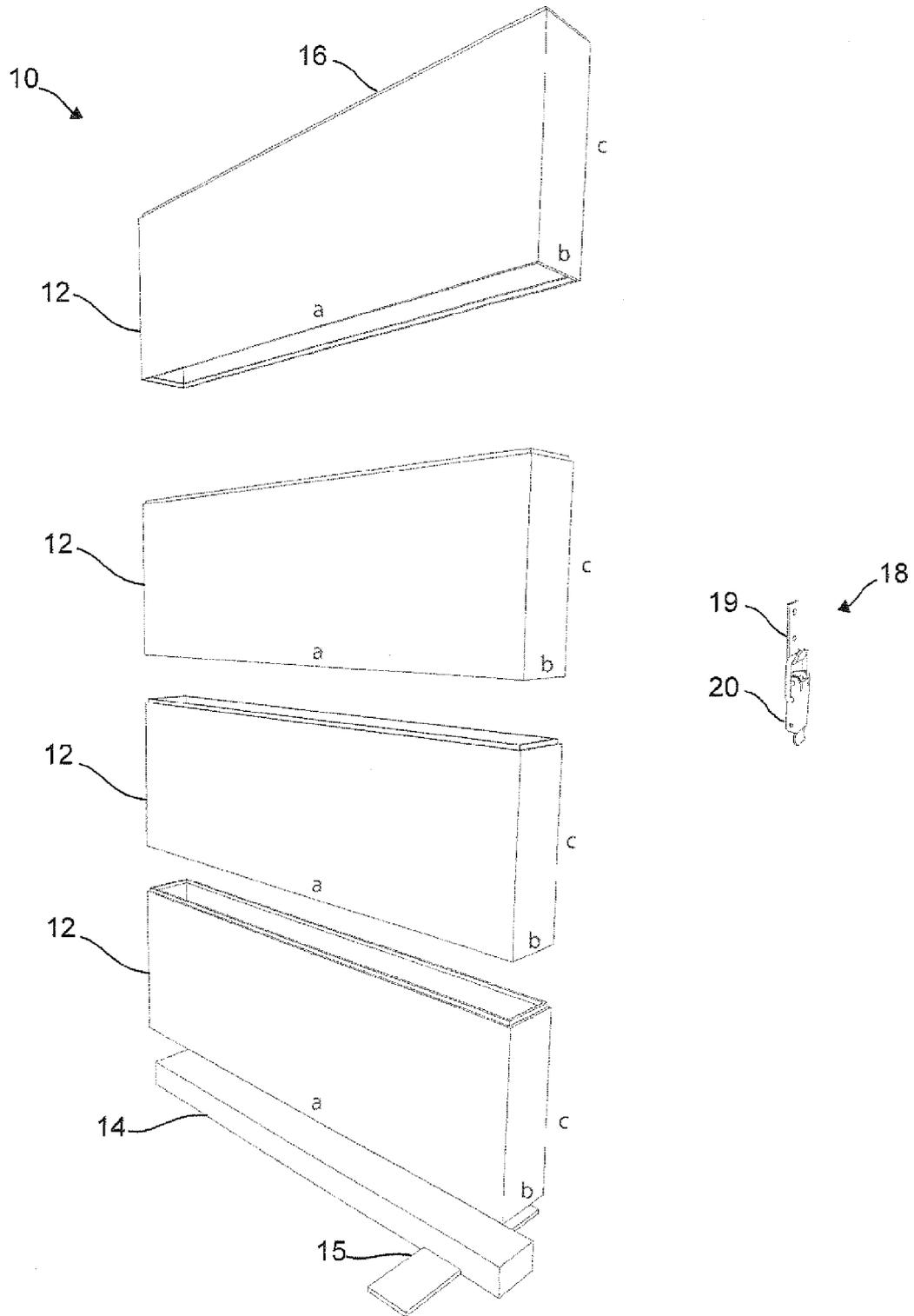
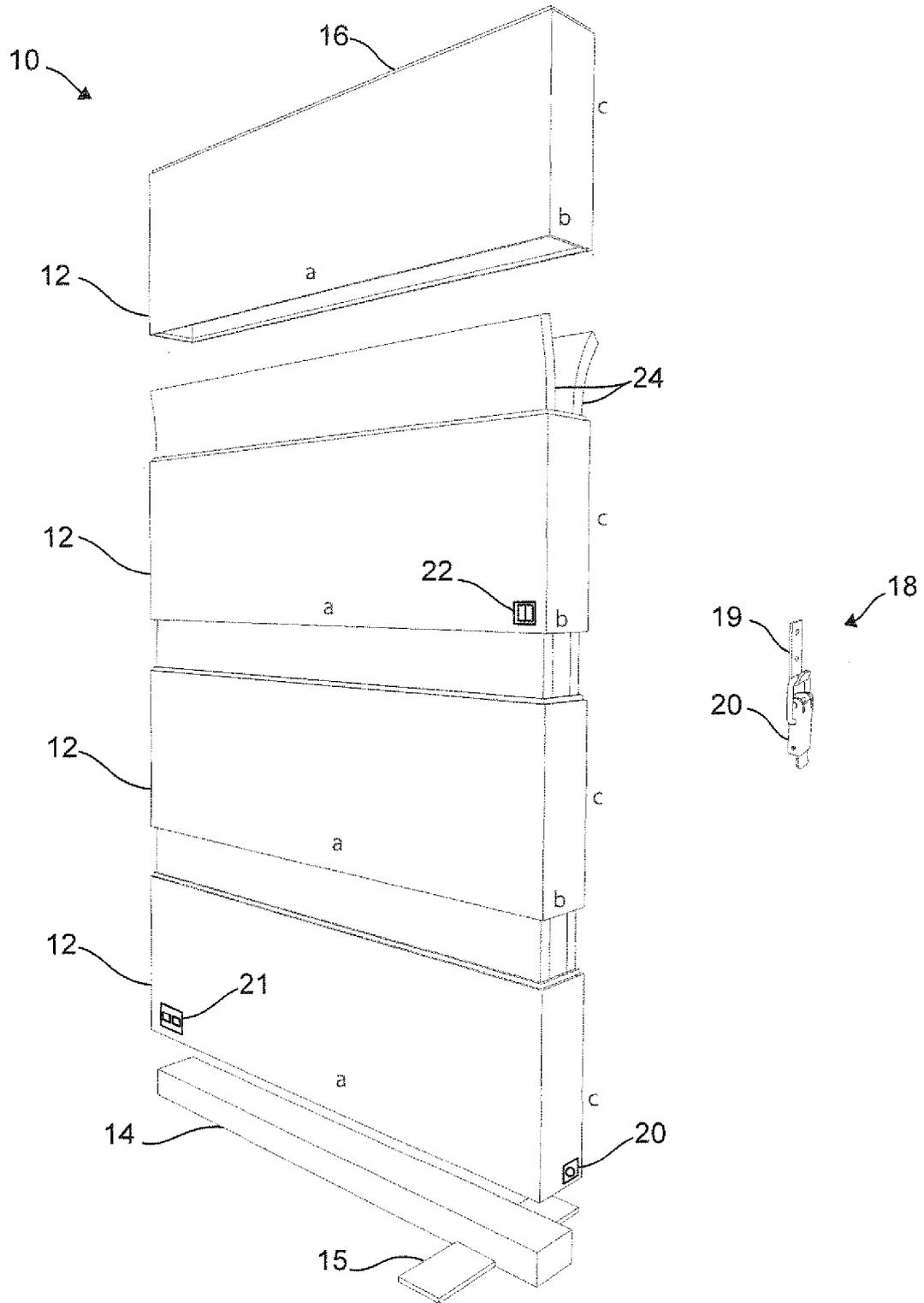


Fig. 2



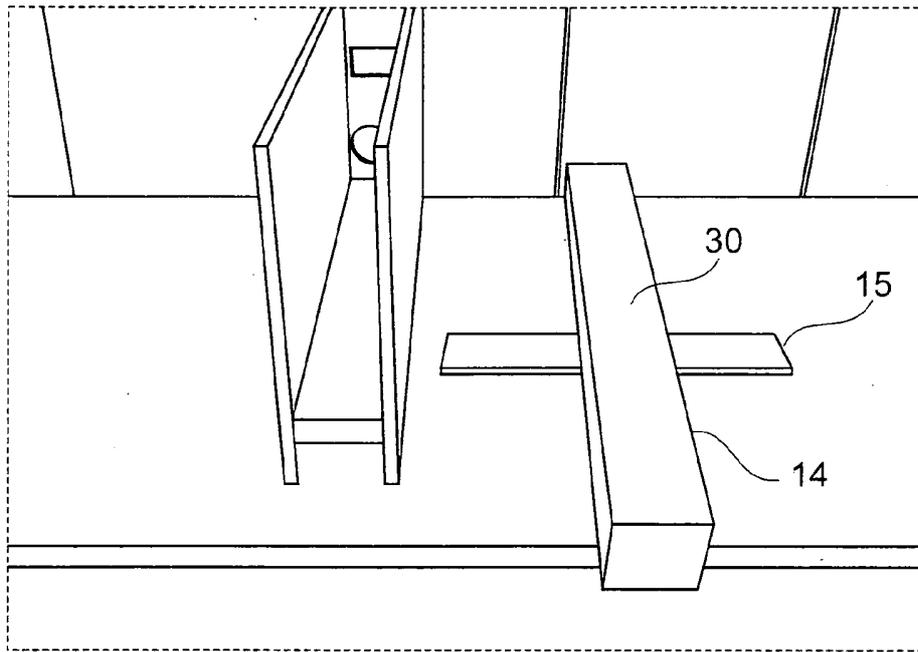


Fig. 3

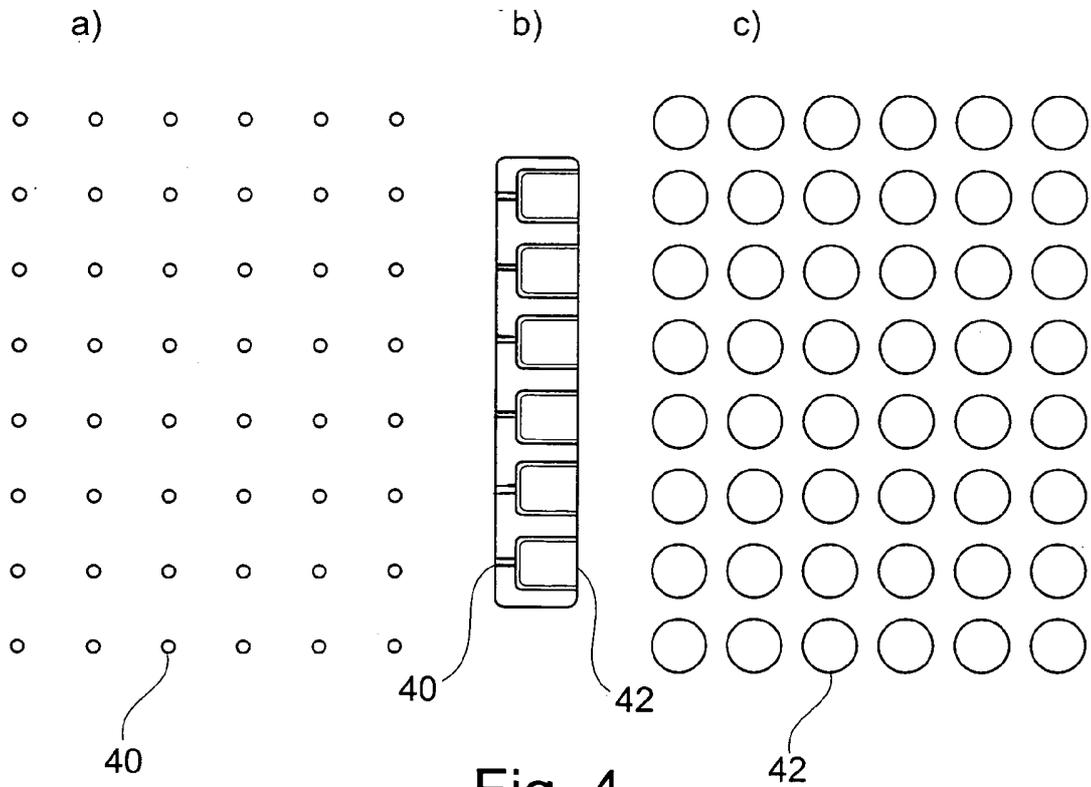


Fig. 4