

Title: Mobile partitioning wall**Description**

The invention is based on a mobile partitioning wall according to the generic part of patent claim 1. The mobile
5 partitioning wall has several wall elements, which are displaceably disposed at a running rail.

A mobile partitioning wall with several wall elements, which are displaceably guided in a running rail, is known from DE-OS 24 04 784. Each wall element has a supporting
10 structure, which is formed by a surrounding frame consisting of profiles. Covering panels are mounted on both sides of the frame and, moreover, additional add-on and accessory parts are attached thereto. The hollow space between the covering panels and the frame is filled
15 with thermally insulating and sound-absorbent materials.

The frame-based supporting structure results in wall elements having a high weight and requires therefore suspension devices with a correspondingly stable configuration. With such a structure, the increasing
20 requirements with regard to thermal and sound-insulation can only be satisfied, when using additional or thicker covering panels, while increasing the overall weight.

As mobile partitioning walls, due to varying installation situations and dimensions, are individually manufactured,

in particular the realization of the frame requires an expensive and precise dimensional manufacturing and connection of profiles. A provision and production of standardized components for such wall elements is
5 possible to a very limited extent only.

Moreover, integrating optional structural elements into such wall elements requires an exact definition of the interfaces to the frame. For example, the usual equipment of the wall elements, with sealing mechanisms on the top and bottom
10 sides is expensive and, due to structural circumstances of a frame, restricted with regard to the universal application. Variants in the structure or the installation situation require an individual fabrication again. Modifications on-site are only possible within the given tolerance.

15 EP 0 629 752 B1 describes a mobile partitioning wall, in which upper and lower terminal strips are activated by pneumatic lifting members for the purpose of sound insulation and for guaranteeing the stability of the individual wall elements. Complicated manufacturing and limited
20 repair possibilities are caused by the central disposition of the lifting mechanism within the respective wall element and, using said mechanism in a transparent wall, results in a negative appearance.

The partitioning wall elements in the Austrian patent
25 specification AT 325262 consist of different materials. In

order to achieve a high sound insulation, the gap to a floor guiding rail and the gap to a running rail respectively to the ceiling are closed by a profile being movable upwards and out of the floor guiding rail.

- 5 The object of the invention is to provide a mobile partitioning wall according to the generic part of patent claim 1, which has a simple manufacturing and mounting technique, and is designed to be universally applicable, and provides simple and variable possibilities for optional
10 completion with add-on parts.

This problem is solved with the features indicated in the characterizing part of patent claim 1. Advantageous configurations of the subject matter of patent claim 1 are indicated in the dependent claims, the invention being
15 applicable to both automatically and manually displaceable wall elements of partitioning walls.

The mobile partitioning wall according to the patent claim 1 has the advantage that, on account of the inventive self-supporting configuration of the wall elements,
20 manufacturing and mounting are considerably simplified. Unlike the already known supporting frame structure, a panel-shaped and layered composite structure in sandwich technique allows for a simple and extensively automated manufacturing.

With the wall elements, the add-on parts are disposed at the edge sides, because any intervention in the surface plane is avoided and the advantageous, in particular sound-insulating and weight-reducing properties of the layered structure are not altered. Such add-on parts have a modular design and they are mounted as pre-fabricated structural units to mounting elements, which are disposed at horizontal and/or vertical edges of the wall element.

Preferably, the mounting elements have a uniform basic structure for all variants and application purposes and are manufactured and kept in stock in an excess length. When realizing the wall elements, the mounting elements are cut to the corresponding length, mounted and equipped with modular structural units. Thus, the expensive manual individual assembly at/in the wall element is thus foregone.

The mounting elements, on the side of the edges, are either disposed to be concealed within a recess in the wall element or they are surface-mounted on the respective edge of the wall element. By disposing the mounting element in a recess, it becomes completely invisible. In the surface-mounted embodiment, the positioning and fastening is realized without forming a recess. Positively cooperating contours between the mounting element and the recess respectively the edge are particularly advantageous, because this achieves an additional

anchoring of the mounting elements in addition to the fastening described hereinafter.

Preferably, the fastening of the mounting elements is realized such as to be integral with the layer-forming structure of the wall elements, because, on the one hand, the establishing of a core of the wall element is used to form a recess and, on the other hand, the bonding of the layers is simultaneously utilized for fastening the mounting elements with the result that no separate process steps are necessary. If required, corresponding recesses can be milled into the panel on the site of installation and the mounting elements can be mounted therein or the mounting elements can be surface-mounted and fastened.

Preferably, the mounting elements are used in the shape of profiles, thus creating exactly defined and form-stable mounting spaces. The profiles are adapted to the shape of the recess respectively to the shape of the edge and preferably they are formed to be U-shaped or H-shaped. On the inside, the profiles have a variety of channels, chambers and bores, in order to position and fasten the different structural units. Overall, the profiles create a uniform, preferably surrounding mounting area so that modular structural units can be disposed at optional locations.

The vertically disposed mounting elements preferably consist of plastic material because a sound decoupling of adjoining wall elements is thus realized, whereas, in particular at the upper horizontal edges, metallic mounting
5 elements are used, because there, the wall element is mounted and supported.

Altogether the manufacturing and mounting expense is substantially reduced, because individual mounting solutions do not need to be figured out and system
10 components are mainly used. In particular the manual manufacturing steps are substantially reduced, because a major portion is now automatized. The wall element can be also shipped as an assembly kit. Final measures of cutting the panel to size, in particular for the add-on parts, and
15 their final mounting can be done on the site of installation as well.

In order to realize, for example, a functional exterior termination for rooms or for buildings with regard to an acceptable thermal, sound and/or fire insulation at the floor
20 and ceiling areas, sealing modules, which seal in relation to the running rail respectively in relation to the floor, are inserted horizontally at the top and bottom of each wall element. Even slight irregularities in the floor can be compensated for by such sealing modules. Projecting and
25 retracting is effected via a mechanism, which is operated

via an automatically or manually activated drive unit. Horizontally disposed mounting elements are preferably made from metal, because the heavy and in particular load-transferring structural units are disposed at that
5 location.

The vertical border areas of each wall element, at least in sections, are formed as a profile, in order to achieve a positive connection to the border areas of adjoining wall elements. For this purpose, mounting elements are
10 disposed in particular at the vertical edges, wherein sealing profiles or moulded parts are mounted, which cooperate with a complementarily formed border area of the adjoining wall element and provide a soundproof and stable connection. Preferably, vertically disposed mounting
15 elements are made from plastic material, because on account of the material a sound decoupling is thus realized.

Profiling can be made based on a tongue and groove system. Other positive configurations, such as undulated, circular, semicircular, trapezoidal, convex or concave are
20 suitable as well. In addition joints made from rubber or magnetic materials, for example, may be placed at these borders as well.

The corresponding profiling can be done, without using a mounting element, directly through shaping measures
25 during the manufacturing of the core.

In addition to structural sealing units, further system components can be integral with the mounting elements. Such components include further sealing strips, floor guides, power supply elements, control devices, servicing
5 means, suspension devices, etc.

The selection of the materials of a wall element and their layering is done in particular based on weight-specific and acoustic aspects, the external layers being additionally selected based on visual and practical aspects. A
10 complicated manufacturing of a supporting frame structure is foregone, because just the cutting to size and the connecting of the layers is required to provide the basic structure for a wall element.

The different materials of a layer are kept in stock as
15 supplies in panel-shape and are cut to the required dimension when needed. Preferably, dimensioning in a raster measure is advantageous in this case, in order to be able to efficiently realize different dimensions. Building the basic structure of the wall element is realized by a layered
20 arrangement of the panels and by feeding adhesives and filling compounds. Thus, the variable selection and disposition of layers and of filling compounds allow to quickly and easily satisfy specific customer needs at any time.

A wall element according to the inventive structure has a core which, on both sides, is covered by respectively one exterior shell. Preferably, the exterior shell is multi-layered and consists of an exterior cover layer, a middle layer, and
5 an interior layer. Overall, the two exterior shells are formed to be heavy and soundproof and are sonically separated by the preferably soft core material. Through the full connection, preferably bonding, all layers and materials of the wall element are combined to a self-supporting unit.
10 The sound insulation can be realized at a smaller expense, because the selection of appropriate materials and their assembling technique already result in a considerable improvement. With the intention to improve the rigidity of the wall element while maintaining the sound insulation, the
15 contact surfaces of the layers, depending on the material selection, are profiled.

Through the selection of most different materials, the use of panel-shaped and foamed layers and their connection to a structure in a sandwich technique, the individual
20 properties are advantageously combined in such a way that they sum up to a considerable improvement. The wall element has considerably higher bending and torsional rigidities, for example, than the sum of the properties when separately using the layers of the exterior shell and the
25 core. Such structured panels are able to transfer substantial loads. In this case, the structure of the exterior

shell, as well as the thickness and density of the core are decisive factors. Compared to a frame structure, the result is a reduced wall thickness and a lower weight for an increased stability.

- 5 The core material is made from a honeycomb structure, which in particular consists of paper or aluminium. Furthermore, solid material made from polystyrene foam, PU-foam, mineral wool, rock wool or the like can be used.

Preferably, the exterior shells are multi-layered. Metallic
10 materials, such as sheet steel or sheet aluminium, and furthermore, plastic material (PVC, PC), laminar materials, fibreglass reinforced plastics (GRP), gypsum, wood, cork, etc. are suitable for the middle layer. The layer, disposed on the inside between the middle layer of the exterior shell
15 and the core, serves as an increase in shell weight and as a damping material and preferably consists of bitumen. This middle layer serves at the same time as the support for the exterior cover layer, which forms the visible surface. This may be a priming film, a laminate, laminar material or
20 melamine resin. Furthermore, veneers, textiles, glass or magnetic surfaces are possible.

Bonding materials and bonding techniques are used for connecting the individual layers of the exterior shell. The so-called long-fibre-injection method (LFI) is used as a
25 preferred method. In this case, fibreglass strands are cut

and, in a single operational step, are fed simultaneously with PUR-components to a tool device and blended. The finished mixture is then sprayed between the corresponding layers of the exterior shell and, once
5 hardened, creates a permanent connection.

A particularly advantageous structure of the wall element is achieved with a soft core of PUR-foam or melamine foam, which, on both sides, is surrounded by a weighting layer of bitumen. Then the middle layer of the exterior shell follows,
10 consisting of GRP enveloped paper honeycombs filled with PU-foam, and an exterior cover layer, depending on customer specifications. Such a combination of materials has excellent acoustic properties and constitutes an optimum solution with regard to the parameters of sound
15 insulation and weight per unit area.

Such structured wall elements are suitable to build partitioning walls having the most different configurations. In particular the substantial weight reduction achieves a lower load on the suspension devices and on the drive
20 means and, on the other side, by increasing the sound insulation, the multiplicity of application possibilities increases.

The wall elements can be formed as solid elements, passage door, angle element, window element,
25 compensating element, swing leaf, double-action leaf or as

following automatic doors. All wall elements can be moved out of the axis of the partitioning wall and parked at a predetermined location in a space-saving manner. Each wall element is displaceable by means of a carriage, at one
5 or two points, in a running rail, which is attached to the ceiling.

The overall partitioning wall fulfils the requirements of the thermal insulation regulation such that, even at low outside temperatures, there are no disadvantages as to energy and
10 cost.

The invention will now be described in more detail by means of exemplary embodiments in conjunction with the drawings, in which:

Figure 1: shows a diagrammatical structure of a wall
15 element.

Figure 2: partially shows a diagrammatical view of a wall element with a mounting element disposed on the top side in a recess.

Figure 3: partially shows a diagrammatical view of a wall
20 element with a mounting element disposed on the top side in a recess, according to another embodiment.

Figure 4: partially shows a diagrammatical view of a wall element with a mounting element disposed surface-mounted on the top side.

5 Figure 5: partially shows a diagrammatical view of the corner of a wall element with horizontally and vertically disposed mounting elements, according to another embodiment.

10 Figure 6: partially shows an enlarged cross-section of adjoining wall elements with vertical mounting elements and sealing profiles.

Figure 7: partially shows a diagrammatical angle view of a wall element with horizontally and vertically disposed mounting elements, according to another embodiment.

15 Figure 8: shows a diagrammatical layered structure of a wall element in an enlarged illustration according to Figure 1.

In the Figures, similar or similarly functioning structural elements are identified with the same reference numerals.

20 A mobile partitioning wall is composed of several panel-shaped, independently displaceable, suspendedly supported wall elements 1 and suitable for subdividing a room or as an outside termination. Depending on the embodiment, the individual wall elements may be displaced

manually or driven by a motor. All wall elements can be moved out of a space saving parking position, a so-called stacking location, and into the axis of the partitioning wall and be secured there.

- 5 For the sake of clarity, in Figures 2 to 8, a wall element 1 is diagrammatically and partially illustrated, in order to be able to describe the respective structure in a correspondingly detailed form.

In the Figures 2 to 4, wall elements 1 are illustrated having
10 respectively one mounting element 9 disposed at their upper horizontal edge in various ways. The mounting elements 9 include for example a sealing mechanism 10 realizing a functional termination in rooms or buildings with regard to an acceptable thermal, sound and/or fire
15 insulation in the floor and ceiling areas. For sealing purposes, the sealing mechanism 10 is pressed out of the mounting element 9 against the running rail respectively against the floor, wherein, in the inactivated condition, all structural elements, which are associated to the
20 mechanical system, are disposed completely concealed in the respective mounting element 9. Even minor irregularities in the floor can be compensated for through the disposition of these sealing mechanisms 10. Projecting and retracting the sealing mechanisms 10 is realized via an
25 automatically or manually activated drive unit. At the upper

horizontal sides of the wall elements 1, carriages, which are not illustrated in more detail, are disposed, by means of which the wall elements 1 are displaceable in a running rail fastened to a ceiling of a building.

- 5 In this case, the mounting elements 9 include various structural units 12, such as coupling elements, lifting members, resetting members, drive elements, suspension devices, floor guides, sealing means and electrical equipment. The structural units 12, serving for the securing
10 or the sealing of the wall element 1, are completely disposed within the mounting element 9. The system is thus suitable for use in transparent partitioning walls, because there is no visual interference with the appearance.
- 15 Further mounting elements 9' are disposed at the vertical edges of the wall elements 1. Depending on the intended utilization, the mounting elements 9' include sealing strips, power supply elements, servicing means and further system components. In particular the first and last wall
20 elements 1 of a partitioning wall additionally have a sealing mechanism 10 at the corresponding vertical edge.

Mounting elements 9 are preferably used in the shape of profiles, thus creating exactly defined and form-stable mounting spaces. The profiles 9 are adapted to the shape
25 of the recess 11 respectively to the shape of the edge and

preferably they are formed to be U-shaped or H-shaped. On the inside, the profiles 9 have a variety of channels, chambers and bores, in order to be able to position and fasten the different structural units 12. Overall, the profiles
5 9 create a uniform, preferably surrounding mounting area so that modular structural units 12 can be disposed at optional locations.

The vertically disposed mounting elements 9' preferably consist of plastic material because thereby a sound
10 decoupling of adjoining wall elements 1 is realized, whereas, in particular at the upper horizontal edges, metallic mounting elements 9 are used, because there the wall element 1 is mounted in a supporting manner.

According to Figure 2 and 3, the mounting elements 9 are
15 disposed in a groove-shaped recess 11 such as to be concealed in the wall element 1. By mounting the respective mounting element 9 and its structural units in the recess 11, they are disposed completely invisible. The recesses 11 are preferably made in the factory when
20 realizing the basic structure of the wall element 1. The mounting element 9, preferably in the shape of a profile, is adapted to the shape of the recess 11, in this case, U-shaped, and is bonded therein.

A special embodiment is shown in Figure 3, where the
25 mounting element 9, in addition to the usual bonding, is

additionally fastened in the recess 11. In this case, a structural unit 12 is surrounded by a housing, which is positively inserted into the mounting element 9.

The mounting element 9 according to Figure 4 is disposed
5 such as to be surface-mounted on the side of the edge of the wall element 1. In this embodiment, the positioning and fastening of the mounting elements 9 is achieved at the horizontal edges in a surface-mounted manner, the structural units being fastened in the mounting element 9,
10 which is pre-mounted on the respective edge. The mounting element 9 is adapted to the shape of the edge and is formed in an H-shape.

Figure 5 shows mounting elements 9 at the vertical and horizontal edges of a wall element 1. A transitional element
15 13, which allows for a positive transition to the border areas 7 of adjoining wall elements 1, is mounted in the vertical mounting element 9'. The horizontal mounting element 9 is made from a metallic profile, because the supporting structures to the running rail are inserted there. The vertical
20 mounting elements 9' consist of plastic profiles fastened inside the exterior shells 3, 4, into which profiles a metallic sealing profile 13 is clipped in. The fastening is preferably increased/reinforced by a corner angle 14 pointing to the horizontal mounting element 9. The sealing profiles 13 of
25 adjoining wall elements 1 cooperate in a sealing manner by

means of concave and convex exterior structures 15 (Figure 6). This results in a sound-proof and stable connection. Further positive respectively complementary configurations are likewise suitable.

- 5 Further structural units 12 can be fastened in the mounting elements 9, 9', in particular in the corner area of the wall element 1. A service module 16 is disposed above the sealing profile 13, such that the energy supply from one wall element to another is guaranteed. The control
10 contacts, current contacts and servicing indicators are integral with the service module 16. The exterior structure 15 of the sealing profiles 13 is maintained for the service module as well.

In order to guarantee an optimal sealed transition in the
15 corner area, a moulded part 17, preferably made from elastic, form-stable material, is fastened as a termination above the sealing profile 13. On the one hand, it is realized through clipping it on the plastic profile of the vertical mounting element 9' and, on the other hand, through
20 positively inserting it into the horizontal mounting element 9. In a preferred embodiment, the service module 16 and the moulded part 17 form one structural element (Figure 7).

Figure 8 illustrates the layered structure of a wall element 1. In the exemplary embodiment, the wall element 1
25 consists of a core 2 and of exterior shells 3, 4 disposed on

both sides. This results in a homologous structure. The exterior shells 3, 4 are formed to be heavy and soundproof and are sonically separated by a preferably soft core material. In order to form a self-supporting unit, the exterior
5 shells 3, 4 and the core 2 are combined through a full bonding.

The core 2 is made from a honeycomb structure, which in particular consists of aluminium or paper. Furthermore, solid material made from polystyrene foam, PU-foam,
10 mineral wool, rock wool or the like can be used.

Both exterior shells 3, 4 are multi-layered and consist respectively on the inside of a weighting and sound insulating layer 301, 401, a middle layer 302, 402 made from honeycomb-shaped material and an exterior cover
15 layer 303, 403. The layers are bonded to each other by means of LFI filling technique.

Metallic materials, such as sheet steel or sheet aluminium, and furthermore, plastic material (PVC, PC), laminar materials (GRP), gypsum, wood, cork, etc. are suitable for
20 the middle layers 302 and 402. The layers 302 and 402 serve as the support for the visible cover layers 303 and 403. Their surface may consist of priming film, laminate, laminar materials, or melamine resin. Furthermore, veneers, textile or glass surfaces are possible.

A particularly advantageous structure of the wall element 1 is achieved with a soft core made from PUR integral foam or melamine foam. Preferably, the mass amounts to 25 to 75 kg/m³ with a thickness of 40 to 80 mm. Preferably, the
5 weight per unit area amounts to 10 to 40 kg/m². A weighting layer 301, 401 made from bitumen is disposed on both sides and has a thickness of about 5 to 8 mm and a weight per unit area of about 5 to 15 kg/m². The following middle layer 302, 402 is made from GRP enveloped
10 honeycomb paper filled with PU-foam. Finally the exterior cover layer 303, 403, which is 1 to 4 mm thick, is applied on both sides. Such a combination of materials has excellent acoustic properties, which constitute the optimum solution with regard to the parameters of sound insulation
15 and the weight per unit area, such as to reach a sound insulation factor of about 55 dB.

List of reference numerals

	1	wall element
	2	core
	3	exterior shell
5	301	interior layer
	302	middle layer
	303	cover layer
	4	exterior shell
	401	interior layer
10	402	middle layer
	403	cover layer
	7	border area
	8	structure, profiling
	9	mounting element, horizontal
15	9'	mounting element, vertical
	10	sealing mechanism
	11	recess
	12	structural unit
	13	transitional element, sealing profile
20	14	corner angle
	15	exterior structure
	16	service module
	17	moulded part

Patent claims

1. A mobile partitioning wall with several wall elements (1) displaceably suspended at running rails, characterized in that the wall elements (1) are formed without supporting frame and in that mounting elements (9, 9') are disposed horizontally and/or vertically at the edge sides of the wall elements (1).
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2. A mobile partitioning wall according to the preceding patent claim, characterized in that the mounting elements (9, 9') are disposed in a recess (11) of the wall element (1).
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3. A mobile partitioning wall according to one of the preceding patent claims, characterized in that the mounting elements (9, 9') are disposed such as to be surface-mounted on the wall element (1).
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4. A mobile partitioning wall according to one of the preceding patent claims, characterized in that the mounting elements (9, 9') are positively disposed in the recess (11) or on the edge.
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5. A mobile partitioning wall according to one of the preceding patent claims, characterized in that the

mounting elements (9, 9') are fastened in the recess (11) or onto the edge by bonding.

6. A mobile partitioning wall according to one of the preceding patent claims, characterized in that the mounting elements (9, 9') are formed to be H-shaped or U-shaped.
7. A mobile partitioning wall according to one of the preceding patent claims, characterized in that the mounting elements (9, 9') are disposed such as to be sound decoupled.
8. A mobile partitioning wall according to one of the preceding patent claims, characterized in that the mounting elements (9, 9') are formed from a profile made from plastic material or from metal.
9. A mobile partitioning wall according to one of the preceding patent claims, characterized in that the mounting elements (9, 9') have horizontally or vertically displaceable sealing mechanisms (10).
10. A mobile partitioning wall according to one of the preceding patent claims, characterized in that coupling elements, lifting members, resetting members and drive elements are disposed in the mounting elements (9, 9').

11. A mobile separating wall according to one of the preceding patent claims, characterized in that the mounting elements (9) have transitional elements (13).
- 5 12. A mobile separating wall according to one of the preceding patent claims, characterized in that adjoining wall elements (1) have complementarily cooperating transitional elements (13) in the shape of sealing profiles.
- 10 13. A mobile separating wall according to one of the preceding patent claims, characterized in that metallic sealing profiles (13) are fastened in mounting elements (9) made from plastic material by snapping in or by clipping in.
- 15 14. A mobile separating wall according to one of the preceding patent claims, characterized in that the sealing profiles (13) are connected to the horizontally disposed mounting elements (9) by means of corner connectors (14).
- 20 15. A mobile partitioning wall according to one of the preceding patent claims, characterized in that sealing moulded parts (17) are mounted in horizontally disposed mounting elements (9).

16. A mobile partitioning wall according to one of the preceding patent claims, characterized in that the mounting elements (9) have service modules (16).
- 5 17. A mobile partitioning wall according to one of the preceding patent claims, characterized in that the wall elements (1) are configured in layers by means of a sandwich technique.
- 10 18. A mobile separating wall according to one of the preceding patent claims, characterized in that the wall elements consist of a core (2) and of at least single-layered exterior shells (3, 4), disposed on both sides of the core (2).
- 15 19. A mobile partitioning wall according to one of the preceding patent claims, characterized in that the core (2) and the layers of the exterior shells (3, 4) are fully bonded.
- 20 20. A mobile partitioning wall according to one of the preceding patent claims, characterized in that profiled contact surfaces are formed between the core (2) and the exterior shells (3, 4).
21. A mobile partitioning wall according to one of the preceding patent claims, characterized in that border areas surrounding the wall element (1) are at least partially profiled.

22. A mobile partitioning wall according to one of the preceding patent claims, characterized in that the core (2) has a honeycomb structure and consists of paper or aluminium.
- 5 23. A mobile partitioning wall according to one of the preceding patent claims, characterized in that the core (2) is made from polystyrene foam, PUR-foam, melamine foam, mineral wool or rock wool.
24. A mobile partitioning wall according to one of the
10 preceding patent claims, characterized in that an interior layer (301, 401) of the exterior shells (3, 4) is formed to be weighting and consists of bitumen.
25. A mobile partitioning wall according to one of the
15 preceding patent claims, characterized in that a middle layer (302, 402) of the exterior shells (3, 4) consists of metal, plastic material, laminar material, wood, cork, glass or gypsum.
26. A mobile partitioning wall according to one of the
20 preceding patent claims, characterized in that a middle layer (302, 402) of the exterior shells (3, 4) consists of GRP enveloped paper honeycombs filled with PU-foam.
27. A mobile partitioning wall according to one of the preceding patent claims, characterized in that

exterior shells (3, 4) have an exterior cover layer (303, 403) for the surface coating.