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(54) **CONTAINER WITH INCREASED RESISTANCE TO FIRE**

(57) The invention relates to a cargo container with increased fire resistance.

The object of the invention is a cargo container 1 in the shape of a cuboid, which cuboid is defined by external partitions, which include a floor 2, a ceiling 3, two side walls 4, a rear wall 5 and a container door 6 forming the body of the cargo container 1. The cargo container 1 according to the present invention is further provided with container corner castings 7, corresponding to standard

container corner castings known in the state of the art. The outer partitions of the cargo container 1, excluding the floor 2, are manufactured from trapezoidal sheets, as is the case in conventional ISO cargo containers.

The basis for ensuring such resistance was the proper design of the insulation systems of external partitions, with particular emphasis on the insulation of container doors 6.

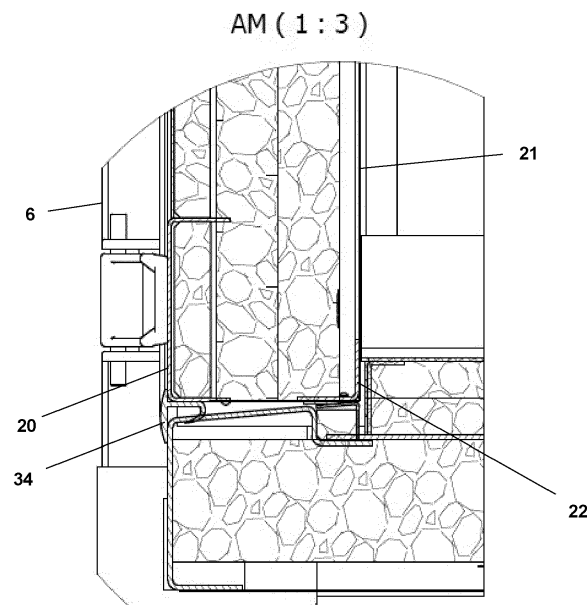


Figure 7

Description**Field of the invention**

5 **[0001]** The invention relates to a cargo container with increased fire resistance.

State of the art

10 **[0002]** Numerous types of storage units for storing hazardous materials are known in the state of the art, including fire-resistant storage units. Such warehouses are suitable for storing hazardous and flammable products, but the mobility of such warehouses is not ensured and they are used only as stationary warehouses.

15 **[0003]** The most common type of mobile warehouse is the cargo containers (ISO containers) used for loading and transporting various types of goods. Containers available in the state of the art allow goods to be stored and transported in containers, but such containers do not have safety features guaranteeing fire resistance, in particular fire resistance according to classification A60/REI60. Any known attempt to modify a container to achieve fire resistance properties deprives the container of cargo container properties under the Convention on Safe Containers (CSC Convention). The fact that a container has all the features indicated in the CSC Convention is extremely important, as it is a condition for the container to be certified and recognised by an accredited body as suitable for the transport of goods

20 **[0004]** An example of a fire-resistant container is disclosed in Russian patent RU2122967. This invention discloses a container for road, rail and water transport suitable for storing and transporting flammable liquids, including liquid gases. Such a container has a horizontal, cylindrical container, a shield insulating the container from the environment formed by coatings equally spaced from each other, the outer and/or inner surface of the coatings being coated with a fireproof layer. The fire protective layer is provided of a material that swells when exposed to very high temperatures. The coatings are connected to each other and to the container by threaded joints. The container is only suitable for transporting liquid substances.

Purpose of the invention

30 **[0005]** The purpose of the invention is to develop a container with fire-resistant features, which would enable the safe transport of flammable goods and which at the same time would meet the requirements for containers under the CSC Convention. Such a container should provide for both storage and transport of flammable goods. With the present invention it has been possible to achieve the above objective.

Essence of the invention

35 **[0006]** The subject matter of the invention is a cargo container with increased fire resistance, formed from trapezoidal sheets into a cuboidal shape. The cuboid is defined by a floor, a ceiling, two side walls, a rear wall and a double container door. The cargo container is also equipped with container corner castings. The container is characterized in that the floor, the ceiling, the side walls, the rear wall and the container door are internally covered with mineral wool, preferably with at least two layers of mineral wool panels, arranged so that the contacts between the mineral wool panels do not overlap. The floor shall include a structural floor plate. Each container door wing comprises an expanding seal on a surface of the container door wing facing the sill beam in the floor, the upper door bar in the ceiling and the door posts in the side walls, and, on a surface of the upper door bar in the ceiling and the door posts in the side walls, substantially opposite the expanding seal when the container door is closed. The container door comprises chamber seals in the upper and lower door slots attached to the upper door beam in the ceiling and the sill beam in the floor, respectively. One wing of the container door comprises a rebate located on the inner side of the container door on the side of the inter-wing gap such that it overlaps the other wing of the container door, and at least one seal is attached to the rebate on the side of the inter-wing gap. Advantageously, the seals are fixed substantially symmetrically at each end of the rebate and the seal is fixed in the middle of the rebate, spaced from the seals, and advantageously spans the width of the inter-wing gap, wherein the seal is an expanding seal. The container door further comprises at least one pair of additional seals located on the side surface of the container door wings on the side of the inter-wing gap, so that the corresponding seals of one pair are opposite to each other in the closed position of the container door.

50 **[0007]** Advantageously, in the cargo container there is an outer sheet below the structural floor plate and between the structural floor plate and the outer sheet there is mineral wool. Even more advantageously, the mineral wool layer has a thickness of between 30 mm and 100 mm. In an advantageous embodiment of the invention, the mineral wool is fixed to the underlying metal surface by means of pins, wherein the pins preferably have a diameter of 3 mm and are made of steel.

55 **[0008]** Advantageously, the side walls and the rear wall of the cargo container are provided with a transom structure

on which the cladding forming the inner finishing layer of the cargo container is mounted, wherein such transom structure is in the form of a grid of alternately and parallel cold-formed angles and square tubes, where advantageously the cold-formed angles and square tubes are in contact only with the inner layer of mineral wool.

[0009] Advantageously, the ceiling of the cargo container is provided with a transom structure on which a lining is mounted to form the inner finishing layer of the cargo container, wherein such transom structure being in the form of a grid of square tubes arranged in parallel to each other, wherein the square tubes advantageously contacting only the inner mineral wool layer.

[0010] Advantageously, the floor of the cargo container is provided with a reinforcing grid of cold-formed angles, on which a finishing floor plate is mounted.

[0011] Advantageously, the contacting metal parts connecting the floor and the ceiling to the side walls and the rear wall of the cargo container are welded together.

[0012] Advantageously, mineral wool is additionally located in trapezoidal recesses of the trapezoidal metal sheet on the interior side of the cargo container.

[0013] Advantageously, the container door is provided with cold-formed angles forming an inner peripheral frame to which the cladding sheet is fixed. Advantageously the container door comprises thermally resistant "J" type seals positioned on the outer periphery of the container door so as to cover the side, top and bottom slots of the container door when the door is closed.

[0014] Advantageously, the cargo container has a gravity ventilation system comprising an intake and an exhaust, the intake being provided with a fire-proof swelling ventilation grating and the exhaust being provided with a shut-off damper, the shut-off damper advantageously being located inside the exhaust.

[0015] Advantageously, the exhaust is built into the structure of the side wall of the cargo container, so that fireproof linings and mineral wool are provided between the exhaust and the steel structures holding it.

[0016] Advantageously, the shut-off damper comprises a thermocouple.

Brief description of the figures

[0017] The subject matter of the invention in an example of implementation is illustrated in the figure wherein:

Fig. 1 illustrates a cargo container in front, bottom, side, top and rear view,

Fig. 2 illustrates a cross-section through the side wall of the container,

Fig. 3 illustrates cross-section through the container's ceiling,

Fig. 4 illustrates a cross-section through the place of joining the floor with the side wall 4,

Fig. 5 illustrates an example of a mounting bracket in the form of an eye,

Fig. 6 illustrates a cross-section through the container door, with marked detail AL showing the place of connection of the container door with the ceiling (in cross-section) and detail AM showing the place of connection of the container door with the floor (in cross-section),

Fig. 7 illustrates detail AM showing the place of connection of the container door with the floor in cross-section,

Fig. 8 illustrates detail AL showing the place of connection of the container door with the ceiling in cross-section,

Fig. 9 illustrates the cross-section through the container door and the floor 2,

Fig. 10 illustrates the longitudinal section through the container door,

Fig. 11 illustrates the "J" type seal,

Fig. 12 illustrates a view of a fragment of side wall 4 of cargo container with an air intake,

Fig. 13 illustrates a cross-section through the air intake 35 with visible ventilation grating,

Fig. 14 illustrates a view of a fragment of a side wall of a cargo container with an exhaust,

Fig. 15 illustrates a cross-section through the exhaust with a visible shut-off damper.

Advantages of the invention

[0018] The container which is the subject of the present invention is suitable for both storage and transport of flammable goods. It has both the fire resistance characteristics according to the A60/REI60 classification and the specified performance characteristics of a cargo container, which ensures its compliance with the CSC Convention.

[0019] This provides the flammable goods container with unprecedented versatility, as it can perform both the storage function itself and the transport function, with the possibility of being transported by any means of transport designed for the transport of cargo containers. Thanks to its compliance with the CSC Convention, it meets all the requirements for the safe transport of ISO containers - whether by road or sea - throughout its lifetime.

[0020] Furthermore, when the container according to the invention is implemented in an industrial infrastructure, the storage of hazardous and flammable substances in the form of a container according to the present invention can be repositioned on the plant site any number of times, which is very important in case of technological changes or devel-

opment of the industrial infrastructure. The costs of such relocation are disproportionately small compared to the costs of construction or reconstruction of a similar warehouse in the form of a traditional room or building.

[0021] An additional advantage resulting from the mobility of the container is that, in the event of a fire inside it, the danger resulting from such a situation can be reduced by transporting the container to a place where it does not endanger human life or health or where the risk of fire spreading is lower, e.g. to a safe zone, where an extinguishing operation can be carried out.

Detailed description of the invention

[0022] The object of the invention is a cargo container 1 in the shape of a cuboid, which cuboid is defined by external partitions, which include a floor 2, a ceiling 3, two side walls 4, a rear wall 5 and a container door 6 forming the body of the cargo container 1. The cargo container 1 according to the present invention is further provided with container corner castings 7, corresponding to standard container corner castings known in the state of the art. The outer partitions of the cargo container 1, excluding the floor 2, are manufactured from trapezoidal sheets, as is the case in conventional ISO cargo containers. An example of a cargo container 1 is shown in Fig. 1.

[0023] The container door 6 is a double door and is embedded in a container door frame formed respectively by a lower door beam, also referred to as a sill beam 26 forming a structural element of the floor 2, an upper door beam (not shown) forming a structural element of the ceiling 3 and two door pillars (not shown) forming a structural element of each of the side walls 4.

[0024] For the purposes of the present invention, the trapezoidal sheets and other metal sheets or plates used in the present invention are collectively referred to as metal surfaces.

[0025] In an advantageous embodiment of the invention, a state-of-the-art ISO 20' cargo container known in the state of the art is used as a base for the fire-resistant cargo container 1, which has been modified in terms of its construction to provide it with fire resistance.

[0026] The basis for ensuring such resistance was the proper design of the insulation systems of external partitions, with particular emphasis on the insulation of container doors 6.

[0027] The first design modification applied was the use of certified mineral wool 8 for fire insulation of the outer partitions. Mineral wool 8 was laid on the inside of the trapezoidal sheet metal on the ceiling 3, side walls 4, rear wall 5 and container door 6. Advantageously the mineral wool 8 used was a wool used in marine structures, such as Rockwool Searox SL620. In order to provide the most favourable fire insulation conditions, two layers of mineral wool 8 are advantageously used, each of which advantageously had a thickness of 50 mm. The mineral wool 8 slabs are arranged so that the contact lines of the slabs of the first layer of mineral wool 8 do not overlap with the contact lines of the slabs of the second layer of mineral wool 8. This arrangement of the slabs ensures that, in the event of a fire, heat enters the contact line between the plates in the first mineral wool 8 layer and encounters the plate surface of the second mineral wool 8 layer, rather than the contact line of the plates of the second mineral wool 8 layer, which could cause heat to escape outside the cargo container 1 through such a contact line.

[0028] The layers of mineral wool 8 are advantageously fastened directly to the trapezoidal sheets by means of pins 9, advantageously made of steel and even more advantageously having a diameter of 3 mm, although an expert in the field will know other ways of fastening the mineral wool 8 to the elements of the cargo container 1. As a method of fastening, in the case of the pins 9, a condenser welding method has been selected. This fastening method is quick and easy to perform and at the same time provides a very good connection between the mineral wool 8 and the trapezoidal sheet metal forming the outer surface of the cargo container 1. By using such a solution, none of the places of attachment of the mineral wool 8 layers to the external surface of the cargo container 1 is through from the inside to the outside, which further improves the fire resistance of the cargo container 1.

[0029] Another design change was the provision of transom structures on the side walls 4 and the rear wall 5 of the cargo container 1 for serving as a base for the installation of the sheet metal cladding forming the inner finishing layer of the cargo container 1. The transom structures are provided in the form of grids from cold-formed angles 10, in embodiment made from angles L50x50x3, and square tubes 11, in embodiment made from tubes RKW 50x50x2. The cold-formed angle brackets 10 and square pipes 11 are arranged parallel and alternately with respect to each other, in embodiment, at intervals of 628 mm. The arrangement of the transom structures is such that the cold-formed angles 10 and square tubes 11 come into contact only with the first, inner layer of mineral wool 8, as shown in Fig. 2. A similar solution was introduced for the ceiling 3 of cargo container 1, but in this solution cold-formed angles were not used. The transom structure for ceiling 3 was made of square tubes 11, in the embodiment made of RKW 50x50x2 tubes, placed parallel to each other at intervals of 416 mm, as shown in Fig. 3. Such transom structure on the side walls 4, rear wall 5 and ceiling 3 ensures that, in the event of fire, heat can bridge along the steel profiles of the transom structure only to the thickness of the first of the two layers of mineral wool 8, while the second, outer layer serves to cut off heat penetration outside the cargo container 1.

[0030] The modifications made also applied to the floor 2 of the cargo container 1. In the floor structure, the 28 mm

layer of container plywood present in the conventional container has been removed and replaced by a layer of structural steel floor plate 12. Advantageously, a structural floor plate 12 with a thickness of 4.0 mm, preferably made of S235 steel, has been used to obtain an adequate strength of the floor 2. The structural floor plate 12 has been tightly welded circumferentially to the side walls 4 and the rear wall 5 of the cargo container 1 and to the longitudinal and transverse floor beams of the floor 2, at the point of contact therewith. These beams previously provided support for the plywood layer and are not a modification of the structure of a conventional cargo container. Two layers of hard mineral wool 8, advantageously floor wool, are placed on the structural floor plate 12. The layers of mineral wool 8 have been arranged with mutual contact displacement, as described above. An example of mineral wool 8 suitable for this application is Rockwool Searox SL480. A reinforcing grid of cold-formed angles 13, preferably angles 30x30x3, is placed on top of the mineral wool 8. The ends of the cold-formed angles 13 were welded to the lower cold-formed angles 10 of the grates of the side walls 4 and the rear wall 5 to strengthen the cargo container structure 1. The arrangement of the cold-formed angles 10 and 13 with respect to each other is shown in Fig. 4. On the grating of the cold-formed angles 13, another layer of the finishing floor sheet 14 was placed, constituting the top layer of the floor. For this purpose, sheet metal is used in one of the variants, in the example made of S235 structural steel.

[0031] Additionally, in the container 1, rolled angles 15 may be used which are positioned and welded along the contact edge of the floor finish layer 2 with the cladding - of the side walls 4 or the rear wall 5 of the cargo container 1, respectively. In the embodiment, the rolled angle bars 15 are L100x50x8. The rolled angles 15 provide a base for stable fastening of the cargo to be transported.

[0032] In one variant of the invention, mounting brackets 16 are additionally welded to the rolled angles 15, such as welded brackets DIN 1677-1, eye form D, class 8. An example of a mounting bracket 16 is shown in Fig. 5. The mounting brackets 16 were arranged, in the embodiment, at intervals of 1150 mm.

[0033] The mounting brackets 16, together with the rolled angles 15, form a stable and sturdy set for restraining the transported load, so that during transport the load does not move and, at the same time, an appropriate distribution of forces inside the container 1 is ensured.

[0034] In one of the embodiments, illustrated in Fig. 4, the floor is also provided with an additional layer of mineral wool 8. This layer is located below the structural floor plate layer 12 and fills the spaces between the transverse frames (not shown) of the floor. Advantageously, the additional mineral wool layer 8 has a thickness of 100 mm. An example of mineral wool 8 suitable for this application is Rockwool Searox SL620. In the embodiment, the mineral wool 8 is fixed to the structural floor plate 12 with pins (not shown) in the same way as when fixing the mineral wool 8 to the walls of the cargo container 1. Underneath the additional mineral wool 8 layer, an outer sheet 17 of steel was mounted, in the embodiment made of S235 steel. In the example, the outer sheet 17 had a thickness of 1.5 mm. The outer plate 17 was fixed by welding it to the perimeter beams 18 of the cargo container 1 and at the point of its contact with the transverse frames of the container to those frames (not shown).

[0035] One of the most significant modifications to the cargo container 1, which ensures its fire resistance, is the modification made to the container doors 6. Firstly, as part of the modification, the conventional container door 6 has been retrofitted with mineral wool insulation 8. Two layers of mineral wool 8, each of which is advantageously 50 mm thick, are used and placed with staggered joints relative to each other as previously described. In the embodiment, the mineral wool 8 used to insulate the container door 6 was Rockwool Searox SL620. In one of the embodiments, illustrated in Fig. 6, the mineral wool 8 was additionally placed in the trapezoidal cavities 19 of the trapezoidal sheet constituting the outer layer of the container door 6. The thickness of this additional layer of mineral wool 8 was 30 mm. The mineral wool 8 was fastened to the trapezoidal sheeting by means of 3 mm pins 9 of steel in an analogous manner to that used to fasten the mineral wool 8 to the side walls 4 and the rear wall 5 of the cargo container 1 such that the pins 9 passed through two or three layers of mineral wool 8, respectively, depending on where they were placed and the application of the additional layer of mineral wool 8. The mineral wool 8 is then covered by a sheet, such as for example a sheet 1.5 mm thick, which forms the inner lining 21 of the container door 6. To secure the inner cladding 21 in each of the wings of the container door 6, a cold-formed angle 22 is welded to a cold-formed perimeter channel 20, which is one of the structural members of the conventional container door 6, as shown in Fig. 7. Once welded, the cold-formed angles 22 formed a peripheral frame to which a plate forming the inner lining 21 of the container door 6 was attached by means of rivets. Advantageously, in one example implementation, L50x50x3 angles were used as cold-formed angles 22.

[0036] A further modification to ensure the fire resistance of the cargo container 1 is to provide a swelling seal 23 along each wing of the container door 6 on the upper surface of each wing of the container door 6 at a position opposite the upper door beam (not shown). An identical swelling seal 23' is provided on the ceiling 3 of the cargo container 1, on the upper door beam, at a location opposite the first swelling seal 23 when the container door 6 is closed. Specifically, the second swelling seal 23' is positioned on the lower surface of the square tube 11 which forms the upper door beam in the frame of the container door 6. The arrangement of the swelling seals 23, 23' is shown in Fig. 8. Advantageously, as swelling seals 23, 23' Promaseal 2.5x30 seals are used.

[0037] In order to further increase the fire resistance of the cargo container 1 with respect to the tightness of the container door 6 in case of fire, a cold-formed profile comprising two welded cold-formed angles 24, 24' is welded to the

same square tube 11 closest to the door opening, to its side surface furthest from the door opening of the cargo container 1, as shown in Fig. 8. Advantageously, a cold-formed angle L50x50x3 as a cold-formed angle 24, 24' and a cold-formed angle L47x15x3 as a cold-formed angle 24', respectively, were used. As can be seen in Fig. 8 one of the arms of the cold-formed angle bar 24' is directed towards the container door 6 and a chamber seal 25 has been glued between the arms of the cold-formed angle bar 24'. In one variant, the chamber seal 25 is made of a silicone-based rubber compound with a thermal improver. Preferably, this is a 40x20 (3x8) seal. The chamber seal 25 provides cushioning when closing the container door 6, and additionally closes the upper gap between the container door 6 and the upper door beam in the ceiling 3 of the cargo container 1. Its function during a fire is to prevent heat and fire from escaping through the gap between the container door 6 and the upper door beam in the ceiling 3 outside the cargo container 1. The chamber seal 25 is mainly used in the first phase of the fire, after which the function of keeping the fire inside the cargo container 1 is taken over by the swelling seals 23, 23' which are behind it, when viewed in an external direction, which provide an even more effective closure of the upper door gap during the fire.

[0038] The lower surface of each of the wings of the container door 6 is also provided with a swelling seal 23 along each of the wings, analogously as it occurs on the upper surface of each of the wings. The place of attachment of such a seal 23 is shown schematically in Fig. 9. The swelling seal 23 increases its volume in the event of a fire by sealing the empty space between the wing and the sill beam 26 of the cargo container 1 when the container door 6 is closed. Additionally, the gap remaining between the container door 6 and the floor 2 when the container door 6 is closed is sealed by bonding the chamber seal 25 to the vertical surface of the sill beam 26, on the side of the container door 6, in such a way that the chamber seal 25 can also perform a cushioning function when the container door 6 is closed. The exact place of attachment of the chamber seal 25 is indicated in Fig. 9. Advantageously, such a chamber seal 25 is a seal made of a silicone-based rubber compound with a heat enhancer. For example, it is a 40x20 (3x8) seal.

[0039] Another problematic point in the container door 6, which required modification in order to make the cargo container 1 suitable for transporting and storing flammable materials, was the contact line of the wings of the container door 6, in the present invention referred to as the inter-wing gap 27, which is illustrated in Fig. 10. In order to ensure the tightness of the connection of the wings of the container door 6, the inter-wing gap 27 at the contact of the wings was covered on the inner side of the cargo container 1 by a metal-made rebate 28 riveted to the wing opening second (or closing first). Between the metal rebate 28 and the container door wing 6, to which the rebate 28 is riveted, there is a seal 29 acting as a spacer. The same seal 29' is symmetrically glued (see Fig. 10) on the other side of the rebate 28 so as to ensure a tight contact between the second wing and the rebate 28. Advantageously, the seals 29, 29' are manufactured from a silicone-based rubber compound with a thermal improver. Advantageously, another seal 30 is provided on the metal rebate 28 at the height of the inter-wing gap 27 to provide an additional seal at the location of the inter-wing gap 27. For example, such a seal 30 may be a Promaseal PL-SK 2.5x35 seal.

[0040] As additional protection against heat escaping through the inter-wing gap 27 in the event of a fire, additional seals 31, 32 are introduced on the wings of the container door 6, arranged opposite to each other on each of the wings of the container door 6, as shown in Fig. 10. At least one pair of such seals, such as a pair of seals 31 or a pair of seals 32, is provided in the wing gap 27. In an advantageous variant, the inter-wing gap 27 between the wings of the container door 6 is provided with four seals 31 arranged in pairs opposite each other at the height of the insulation of the container door 6 with mineral wool 8. The seals 31, 32 may be of any suitable thickness and length. For example, they are Promaseal PL-SK 2.5x30 seals. Advantageously, at the height of the rectangular tubes 33 constituting the frames of the container door 6, two additional seals 32 are arranged opposite to each other, advantageously with a smaller size than the seals 31. Advantageously, these seals are Promaseal PL-SK 2.5x15.

[0041] In conventional cargo containers 1, the container door 6 is provided on its outer side with "J" type seals, of such a configuration as shown in Fig. 11, which are intended to protect the cargo container 1 during its normal use against the entry of water and moisture when the container door 6 is closed. The "J" type seals are intended to cover the outer edges of the container door 6 along the frame, and due to their attachment along the lower and upper edges of the container door 6 they also partially cover the inter-wing gap 27 of the container door 6. In the present invention, in order to further ensure the fire resistance of the cargo container 1, the conventional "J" type seals are replaced by "J" type seals 34 of analogous cross-section, but manufactured from silicone-based rubber with a thermal improver. Due to the changed composition, the Type "J" seal 34 is resistant to increased temperatures in the range up to 350°C, maintaining its full functionality at this increased temperature.

[0042] In one of the embodiments, a gravity ventilation system specifically tailored to the expected functionality of the cargo container 1 is additionally provided. Such a system comprises an intake 35 and an exhaust 36. The intake 35 is located in the front part of the side wall 4 of the container just above the floor 2 (see Fig. 12). The intake 35 is provided with a fire-resistant, swelling ventilation grating 37, positioned as shown in Fig. 13. In the embodiment, a ventilation grating 37 is chosen with fire resistance class EI120, such as, for example, Tecsel, model TECSEL V60 EI120 300x300. The swelling grating 37 reacts to the increased temperature accompanying the occurrence of the fire by swelling rapidly, which results in the immediate blocking of the ventilation opening.

[0043] At the other end of the ventilation duct, on top of the side wall 4 opposite the one on which the air intake 35 is

mounted, an exhaust 36 is placed, as shown in Fig. 14. The exhaust 36 comprises a shut-off damper 38, such as, for example, the RK370M "Frapol" damper. The exhaust 36 is incorporated in the structure of the side wall 4 of the cargo container 1 inside steel structures 40, advantageously attached to square tubes 11 forming part of the structure of the side wall 4, as shown in Fig. 15. The exhaust 36 has been isolated from the steel structures 40 supporting it by means of fireproof claddings 39, in the example implementation with a Promatect cladding of 10 mm or 20 mm thickness. In addition, additional insulation in the form of mineral wool 8, preferably Rockwool Searox SL620, is provided between the fire-resistant linings 39 and the exhaust 36. The shut-off damper 38 forming part of the exhaust 36 is designed so that, in the event of a fire, a thermocouple (not shown) located inside the cargo container 1 burns out due to the increase in temperature, as a result of which the shut-off damper 38 immediately mechanically closes. The spring (not shown) is released, thereby cutting off the airflow in the cargo container 1.

[0044] Although in the above description of the invention specific commercially available types of seals, wool or steel types and specific container models have been indicated, those skilled in the art will know that other components and raw materials with analogous or similar functions and parameters may be used, and will be able to easily select them within the scope of the basic knowledge in the field. The purpose of indicating specific, currently commercially available elements and raw materials was not to narrow the scope of protection to those elements and raw materials, and it is clear that such alternative elements and raw materials are also intended to be within the scope of the present invention.

List of numerical designations used:

1 cargo container	21 inner lining
2 floor	22 cold-formed angle section
3 ceiling	23, 23' swelling seal
4 side wall	24, 24' cold-formed angle sections
5 rear wall	25' chamber seal
6 container door	26 sill bar
7 container corner casting	27 inter-wing gap
8 mineral wool	28 rebate
9 pin	29, 29' seal
10 cold-formed angle section	30 seal
11 square tube	31 seal
12 structural floor plate	32 seal
13 cold-formed angle section	33 rectangular tube
14 finishing floor plate	34 "J" seal
15 rolled angle	35 air intake
16 assembly bracket	36 exhaust
17 external metal sheet	37 ventilation grating
18 perimeter bar	38 shut-off damper
19 trapezoidal recess	39 fire-resistant cladding
20 perimeter channel	40 steel structure

Claims

1. A cargo container (1) with increased fire resistance, formed from trapezoidal sheets in the shape of a cuboid, which cuboid is defined by the floor (2), the ceiling (3), two side walls (4), the rear wall (5) and a double-wing container door (6), and which cargo container (1) is further equipped with container corners (7), **characterised in that** the floor (2), the ceiling (3), the side walls (4), the rear wall (5) and the container door (6) are internally lined with mineral wool (8), preferably with at least two layers of mineral wool (8) slabs, arranged so that the contacts between the mineral wool slabs (8) do not overlap,

wherein the floor (2) comprises a structural floor plate (12),

wherein each container door wing (6) comprises a swelling seal (23) on the surface of the container door wing (6) facing the sill beam (26) in the floor (2), the upper door beam in the ceiling (3) and the door pillars in the side walls (4), and, there are swelling seals (23') on the surface of the upper door beam in the ceiling (3) and the door posts in the side walls (4), substantially opposite the swelling seal (23) when the container door (6) is closed,

wherein the container door (6) comprises, in the upper and lower door slots, chamber seals (25) fixed respectively to the upper door beam in the ceiling (3) and the sill beam (26) in the floor (2),
 wherein one container door wing (6) comprises a rebate (28) on the inside of the container door (6) on the side of the wing gap (27) so that it overlaps with the other container door wing (6), and at least one seal (29, 29', 30) is attached to the rebate (28) on the side of the wing gap (27),
 wherein the seals (29, 29') are advantageously fixed substantially symmetrically at each end of the rebate (28), and the seal (30) is fixed in the middle of the rebate (28), spaced from the seals (29, 29'), and advantageously extending across the width of the wing gap (27), the seal (30) being a swelling seal,
 and wherein the container door (6) further comprises at least one pair of additional seals (31, 32) located on the side surface of the wings of the container door (6) on the side of the wing gap (27), so that the corresponding seals (31, 32) of one pair are opposite each other in the closed position of the container door (6).

2. The cargo container (1) according to claim 1, wherein below the structural floor plate (12) there is an outer plate (17) and between the structural floor plate (12) and the outer plate (17) there is mineral wool (8).
3. The cargo container (1) according to claim 1 or 2, wherein the mineral wool layer (8) has a thickness of between 30 mm and 100 mm.
4. The cargo container (1) according to any one of claims 1 to 3, wherein the mineral wool (8) is attached to the underlying metal surface by pins (9).
5. The cargo container (1) according to claim 4, wherein the pins (9) have a diameter of 3 mm and are manufactured from steel.
6. The cargo container (1) according to any one of claims 1 to 5, wherein the side walls (4) and the rear wall (5) are provided with transom structures on which the cladding forming the inner finishing layer of the cargo container (1) is mounted, Whereby such transoms are in the form of grids made of alternately and parallel to each other cold-formed angles (10) and square tubes (11), advantageously the cold-formed angles (10) and square tubes (11) are in contact only with the inner layer of mineral wool (8).
7. The cargo container (1) according to any one of claims 1 to 6, wherein the ceiling (3) of the cargo container (1) is provided with a transom structure on which is mounted a lining forming an inner finishing layer of the cargo container (1), wherein said transom structure is in the form of a grid of square tubes (11) arranged parallel to each other, wherein advantageously the square tubes (11) are in contact only with the inner mineral wool layer (8).
8. The cargo container (1) according to any of claims 1 to 7, wherein the floor (2) of the cargo container (1) is provided with a reinforcing grating of cold-formed angles (13) on which a finishing floor plate (14) is mounted.
9. The cargo container (1) according to any of claims 1-8, wherein the contacting metal elements connecting the floor (2) and the ceiling (3) with the side walls (4) and the rear wall (5) are welded together.
10. The cargo container (1) according to any of claims 1 to 9, wherein the mineral wool (8) is additionally located in trapezoidal recesses (19) of the trapezoidal plate on the inner side.
11. The cargo container (1) according to any one of claims 1 to 10, wherein the container door (6) is provided with cold-formed angles (22) forming an inner circumferential frame to which the cladding sheet is attached.
12. The cargo container (1) according to any of claims 1 to 11, wherein the container door (6) comprises thermally resistant "J" type seals (34) positioned on the outer perimeter of the container door (6) so as to shield the side, top and bottom slots of the container door (6) when the door is closed.
13. The cargo container (1) according to any one of claims 1 to 12, wherein there is provided a gravity ventilation system comprising an intake (35) and exhaust (36), the intake (35) being provided with a fire-resistant intumescent ventilation grating (37) and the exhaust (36) being provided with a shut-off damper (38), the shut-off damper (38) preferably being located inside the exhaust (36).
14. Cargo container (1) according to claim 13, wherein the exhaust (36) is built into the structure of the side wall (4) of the cargo container (1) so that fireproof linings (39) and mineral wool (8) are provided between the exhaust (36)

and the steel structures (40) holding it.

15. The cargo container (1) according to claim 13 or 14, wherein the shut-off damper (38) comprises a thermocouple.

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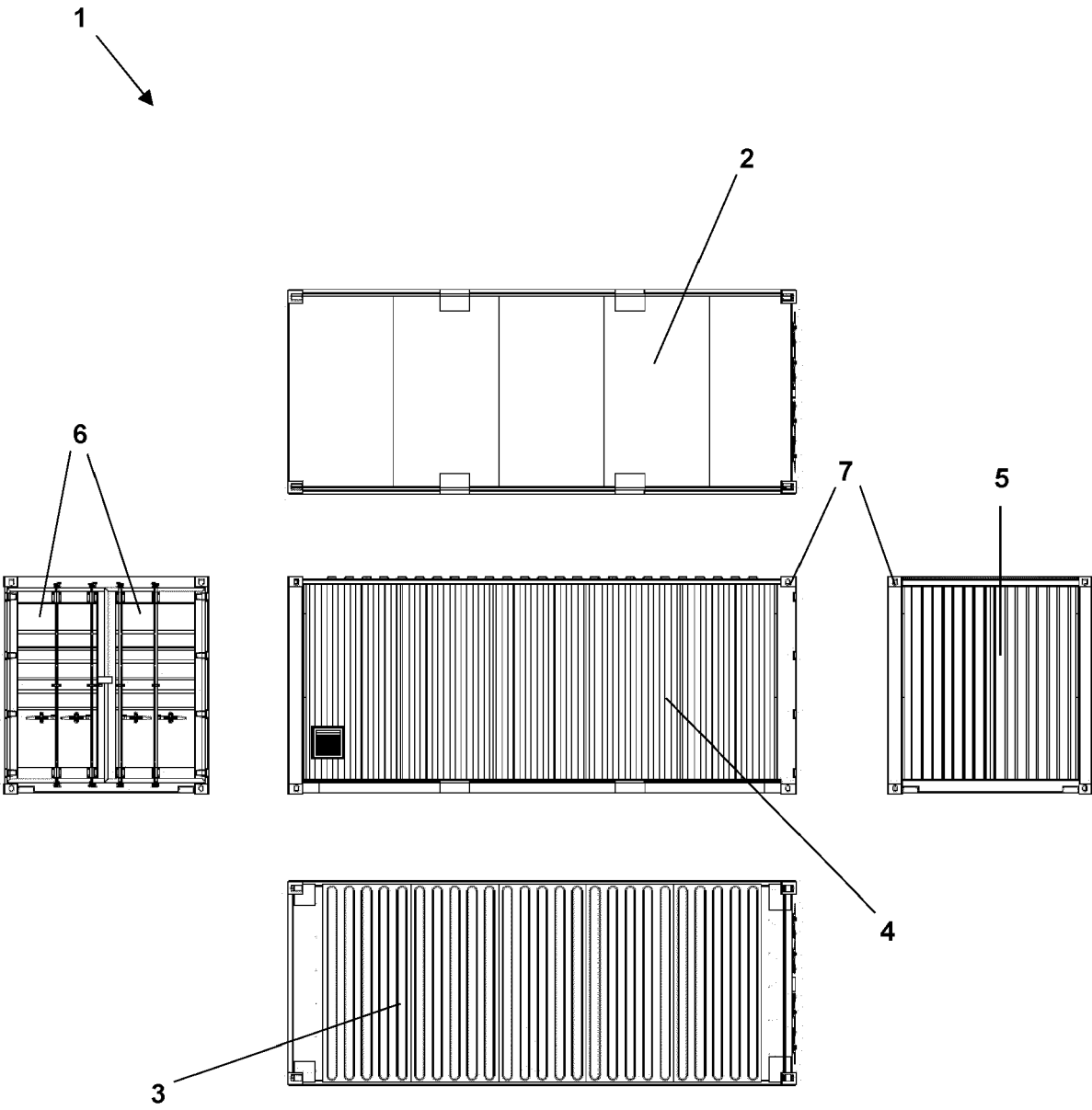


Figure 1

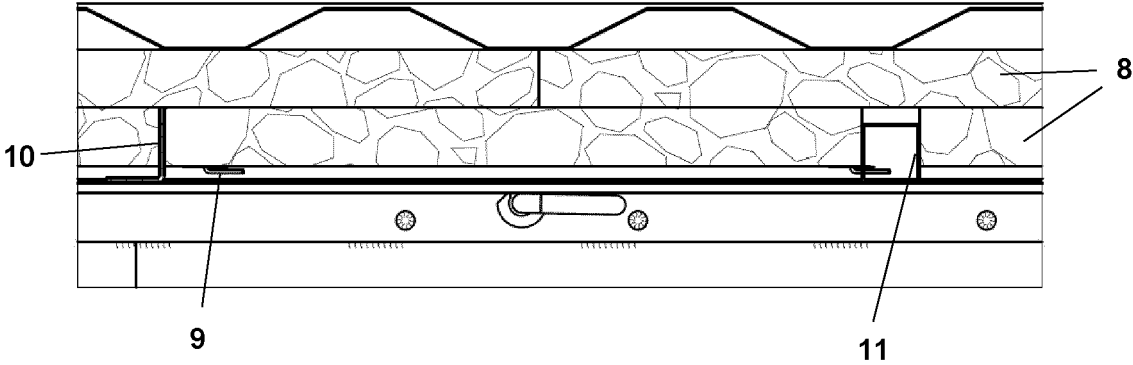


Figure 2

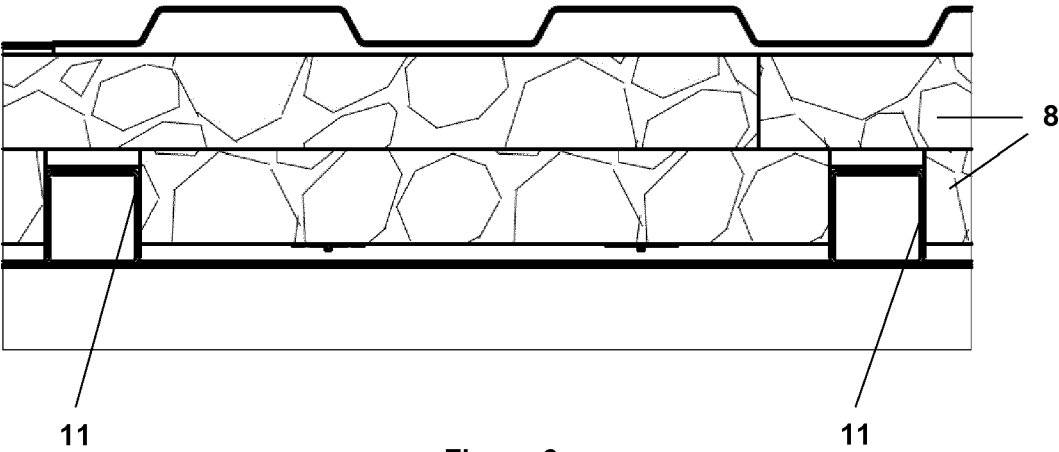


Figure 3

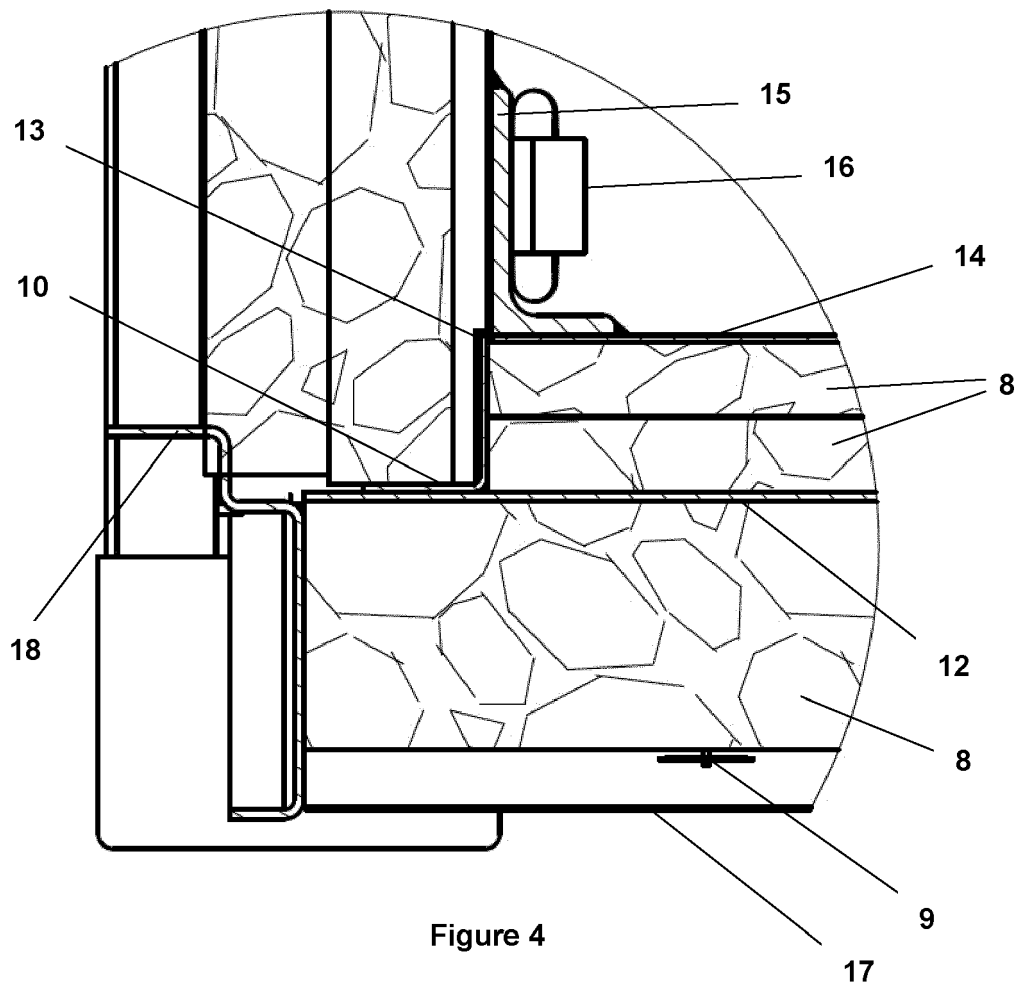


Figure 4

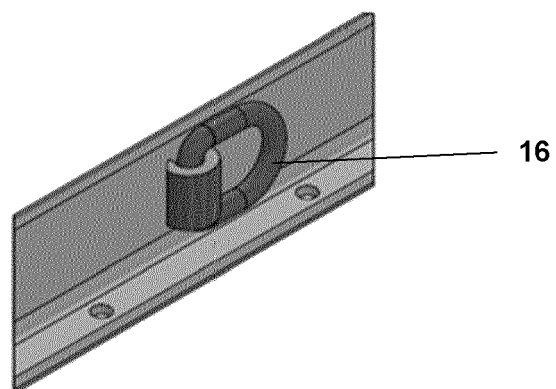


Figure 5

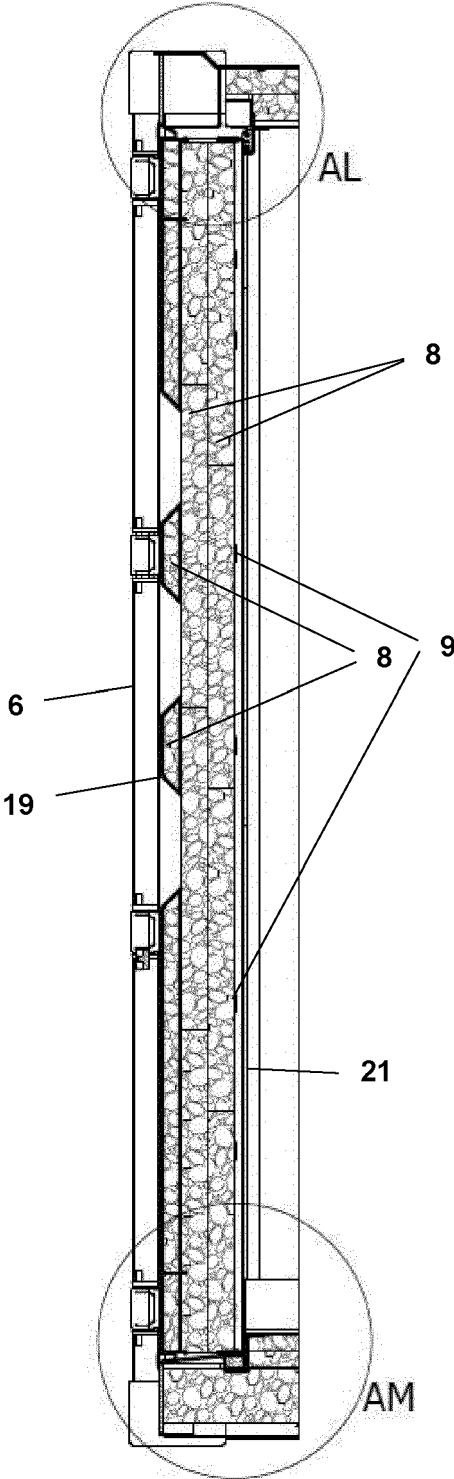


Figure 6

AM (1 : 3)

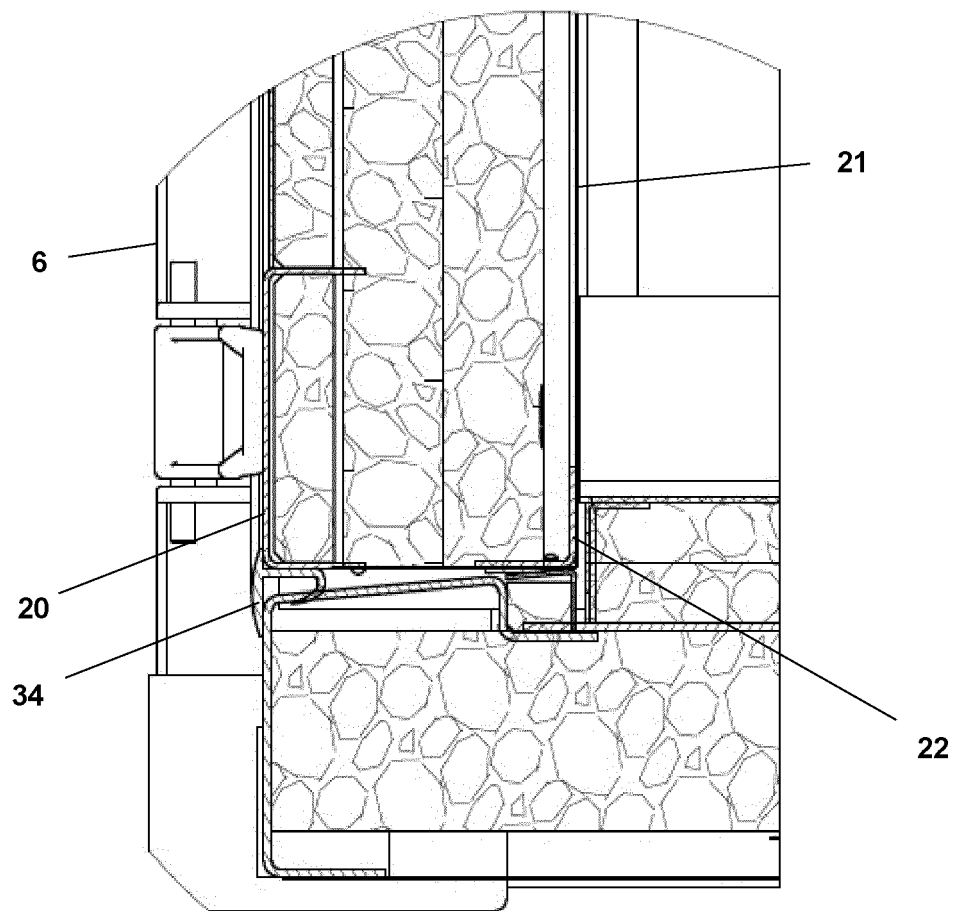


Figure 7

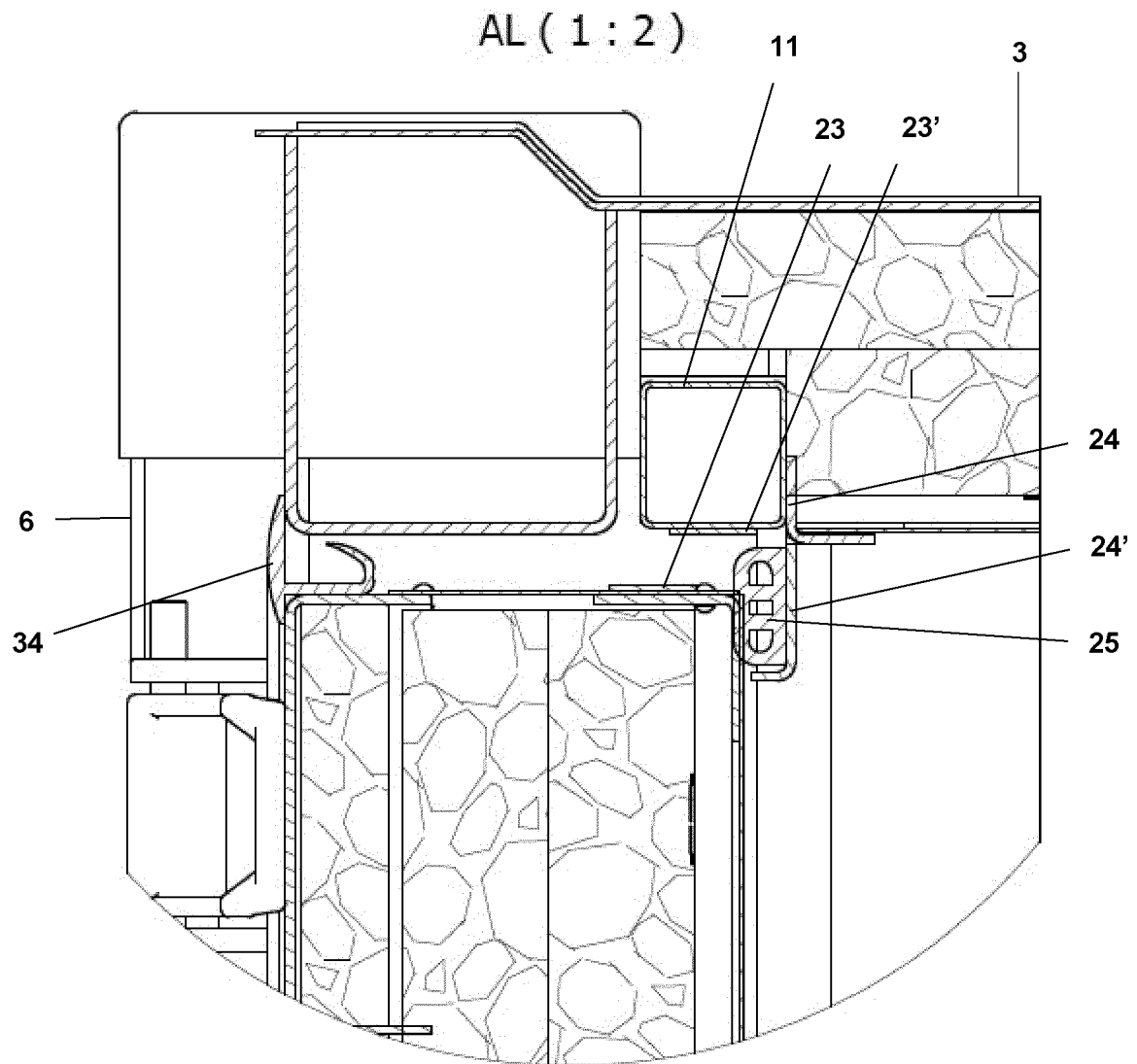


Figure 8

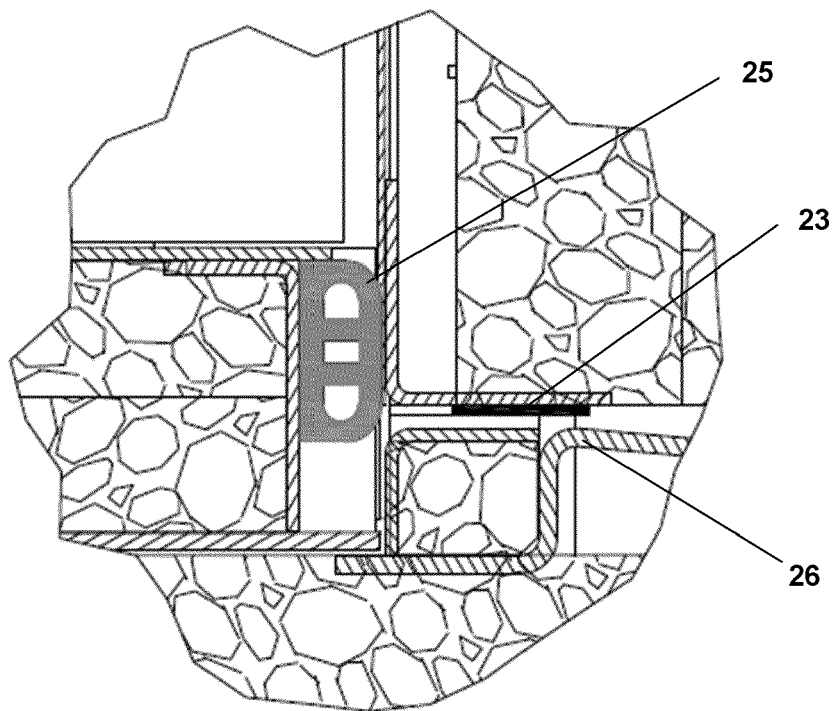


Figure 9

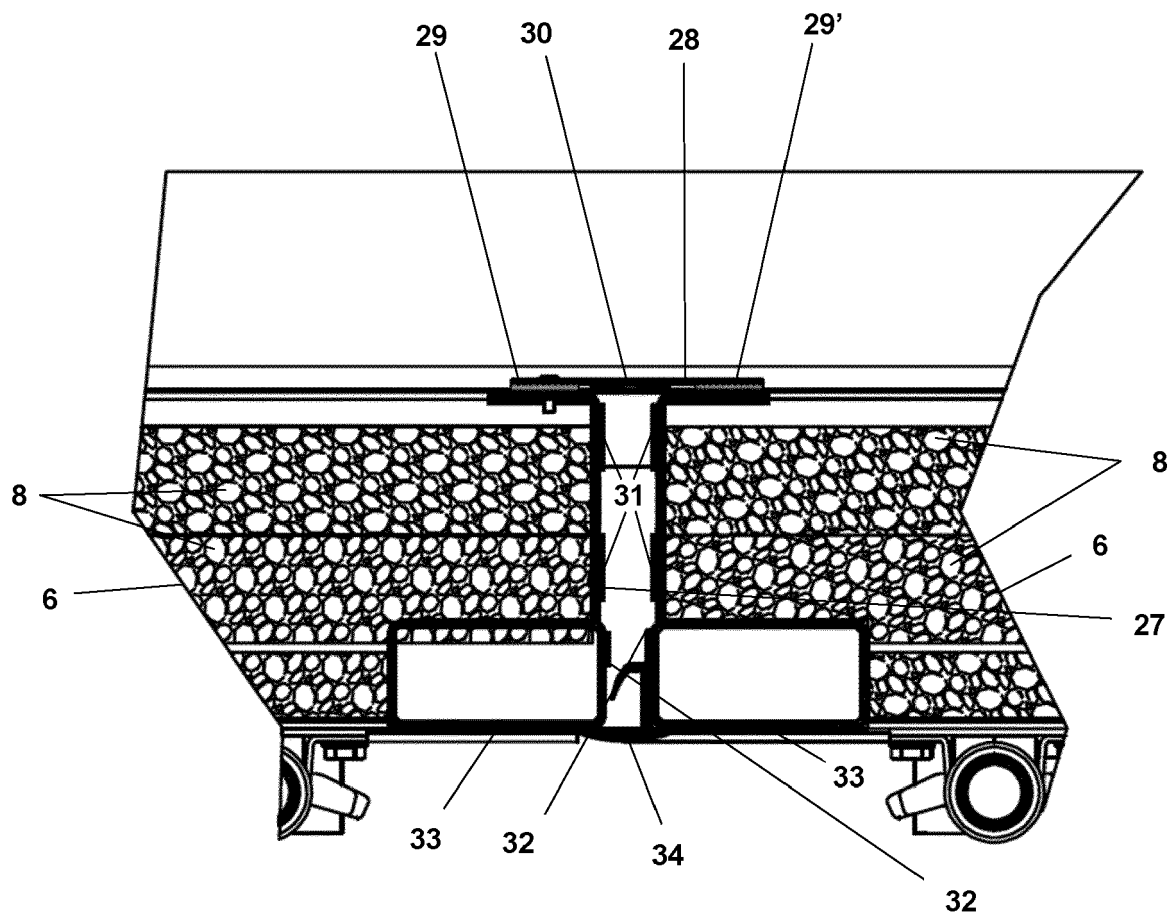


Figure 10

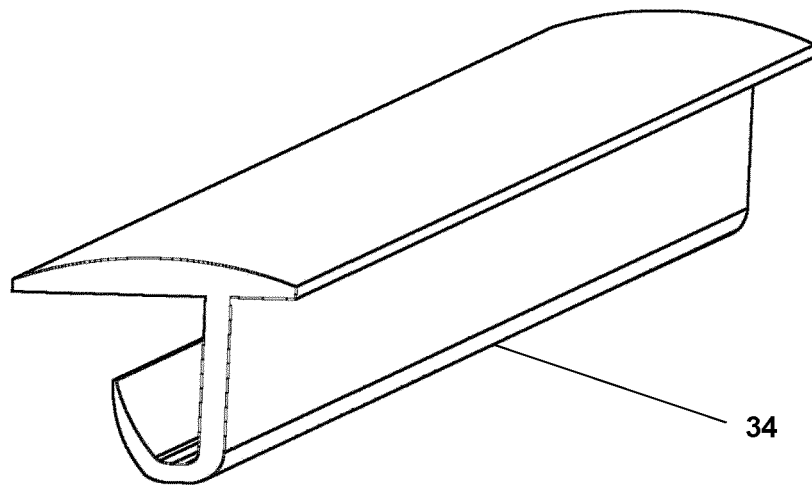


Figure 11

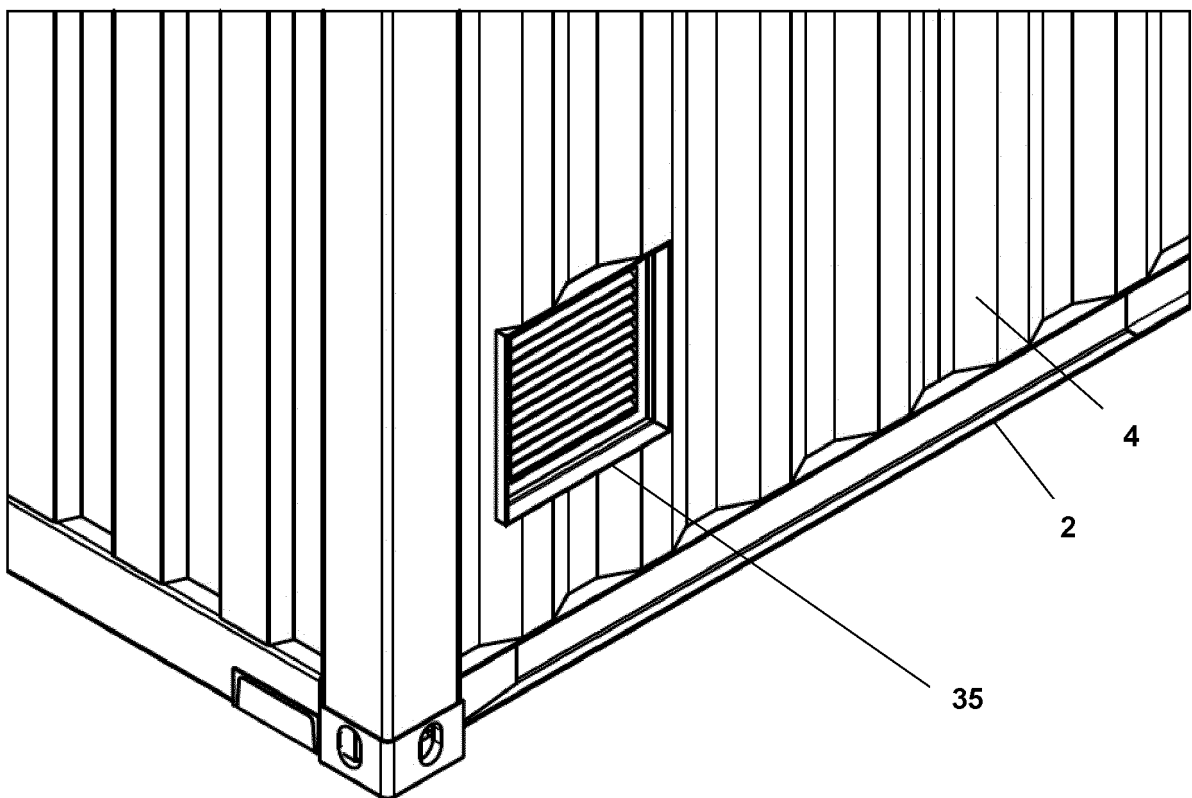


Figure 12

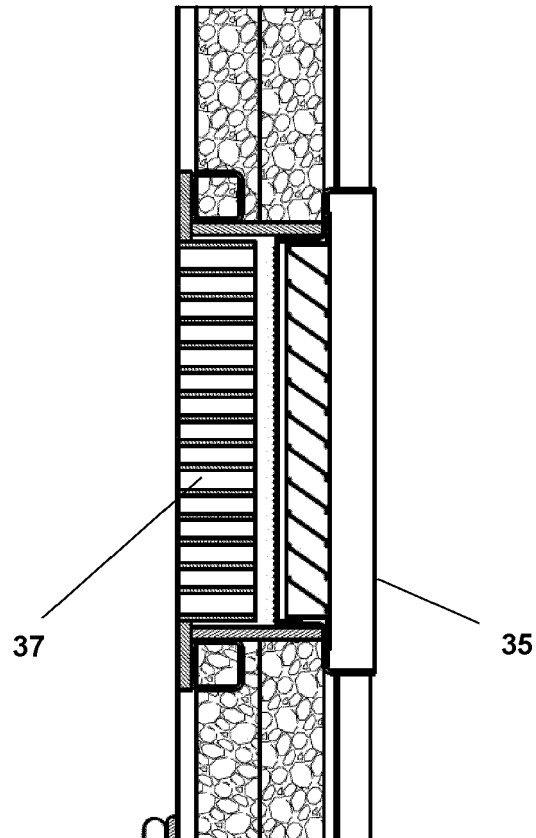


Figure 13

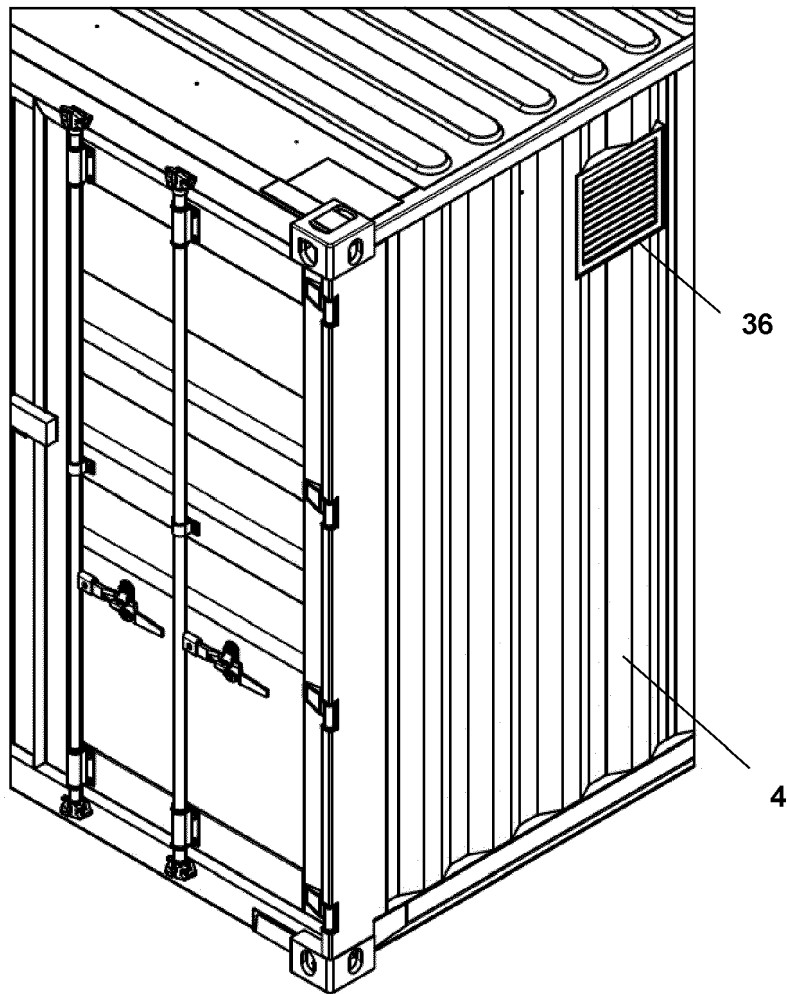


Figure 14

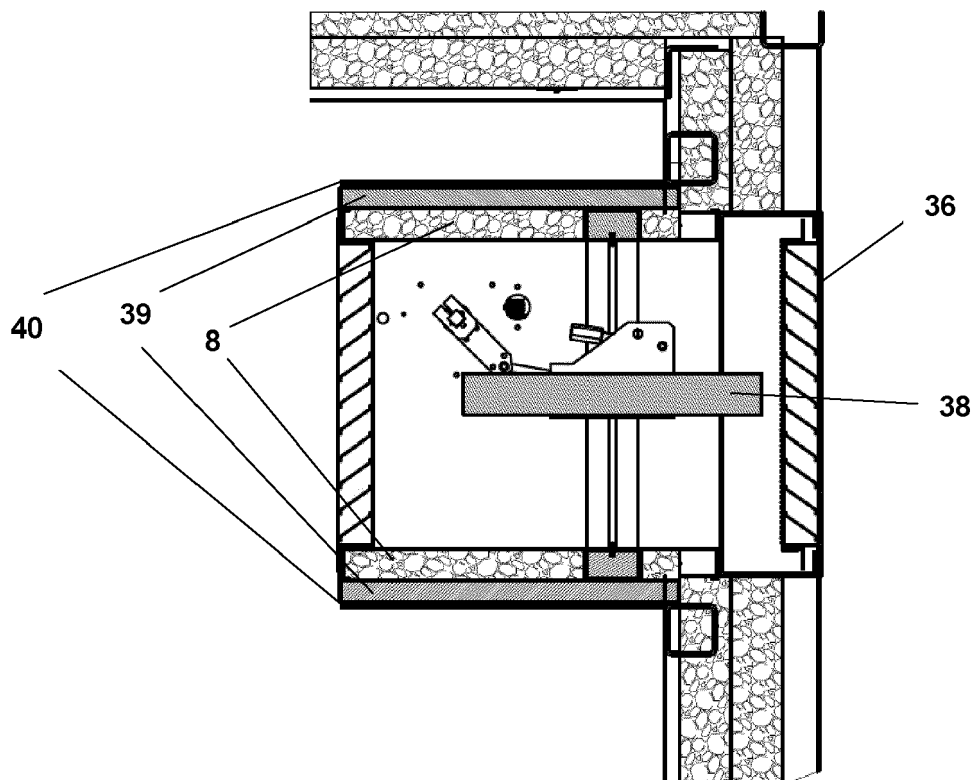


Figure 15



EUROPEAN SEARCH REPORT

Application Number

EP 22 17 0607

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 3 330 447 A1 (PROVENTIA EMISSION CONTROL OY [FI]) 6 June 2018 (2018-06-06) * column 13, paragraph 79 - column 14, paragraph 84 * * figures 7, 8 *	1	INV. B65D88/12 B65D90/00 B65D90/02 B65D90/22
A	FR 3 100 832 A1 (FIVE SERVICES [FR]) 19 March 2021 (2021-03-19) * page 4, paragraph 31 - page 6, paragraph 47 * * figures 1-3 *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			B65D
The present search report has been drawn up for all claims			

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EPO FORM 1503 03.82 (P04C01)

Place of search Munich	Date of completion of the search 27 September 2022	Examiner Piolat, Olivier
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		
T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document		

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 22 17 0607

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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27-09-2022

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		US 2018238770 A1	23-08-2018
FR 3100832 A1	19-03-2021	NONE	

REFERENCES CITED IN THE DESCRIPTION

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