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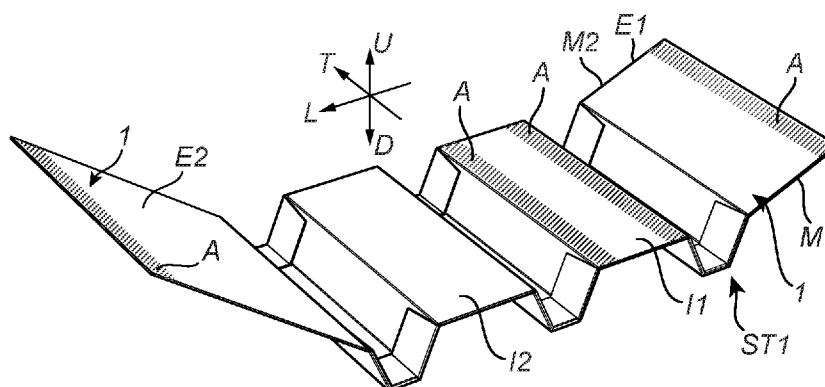


Fig. 2

(57) Abstract: The disclosure relates to a blank (10) having on each side of a respective set (S1, S2) of stringer panels, a set (R1, R2) of reinforcing panels extending transversely (T) outward from a respective main edge (M1, M2) and is configured to be folded into a respective stringer (ST1, ST2) or pillar (SP1, SP2), wherein the set (R1, R2) of reinforcing panels includes: a first wall panel (R1a, R2a) being configured to be folded into abutment with a first wall panel (S1a, S2a) of the set (S1, S2) of stringer panels, a bottom panel (R1b, R2b) being configured to be folded into abutment with a bottom wall (S1b, S2b) of the set (S1, S2) of stringer panels, and a second wall panel (R1c, R2c) being configured to be folded into abutment with a second wall panel (S1c, S2c) of the set (S1, S2) of stringer panels. The disclosure also relates to a pallet (20) and a method of producing a pallet (20).



BLANK, PALLET AND METHOD FOR PRODUCING A PALLET

Field of invention

The invention relates to a blank having a first major surface and a second a major surface opposite the first major surface and being configured
5 to be folded into a pallet.

The invention also relates to a pallet produced from such a blank.

The invention also relates to a method for producing a pallet from such a blank.

10 Technical Background

EP 1 304 293 B1 discloses a pallet formed from corrugated board. The pallet comprises at least two runners and a connecting surface between the runners. The runners are made by folding of a flat blank so that each of them is a fully sealed, closed box having joints, openings or cracks only at the top
15 side of each runner.

DE 92 16 776.4 U discloses a pallet formed from corrugated board. The pallet comprises two runners and a connecting surface. It is also disclosed to provide supporting members inside the stringers. It is e.g. mentioned to provide an upright standing paper tube inside the stringer. It is
20 mentioned to provide a separate piece of a diagonally extending board inside the stringer. It is also mentioned to provide two separate pieces and provide them with half-half cuts and interconnect them to form a cross inside the stringer.

Still, there is room for improvements e.g. when it comes to addressing
25 combined issues, such as moisture resistance, possibility to provide three stringers and sufficient load bearing capacity.

Summary of invention

It is an object of the invention to provide a solution addressing the
30 combined issues; moisture resistance, possibility to provide three stringers, and sufficient load bearing capacity. When it comes to sufficient load bearing capacity it may be noted that this property often is related to the strength at the outer edges of the load bearing surface, and especially the corners thereof. This is partly due to the fact that the edges and corners often are
35 subjected to great loads and partly due to the fact that compressive forces

caused by load at the edges cannot be distributed to neighbouring parts of the load bearing surface to the same extent as compressive forces due to a load at the centre of the load bearing surface may be distributed in all directions to neighbouring parts of the pallet.

5 This object of the invention has been achieved by a blank having a first major surface and a second a major surface opposite the first major surface and being configured to be folded into a pallet, wherein the blank comprises, in consecutive order along a longitudinal direction,

10 a first end panel configured to be folded such that the second major surface of the first end panel is facing upwardly,

 a first set of stringer panels including a first wall panel, a bottom panel and a second wall panel being defined by four transversely extending fold lines and being configured to form a first downwardly and transversely extending stringer or a first set of transversely distributed downwardly
15 extending pillars,

 a first intermediate panel configured to face with its first surface upwardly,

 a second set of stringer panels including a first wall panel, a bottom panel and a second wall panel being defined by four transversely extending
20 fold lines and being configured to form a second transversely extending stringer or a second set of transversely distributed downwardly extending pillars, and

 a second end panel configured to be folded such that the second major surface of the second end panel is facing upwardly,

25 wherein the first end panel and the second end panel are configured to be adhesively attached onto the first surface of the first intermediate panel,

 wherein the first end panel, the first set of stringer panels, the first intermediate panel, the second set of stringer panels and the second end panel each have a transversal extension from a first main side edge to a
30 second main side edge, opposite the first main side edge,

 wherein the blank further comprises, on each side of the respective set of stringer panels, a set of reinforcing panels,

 wherein the respective set of reinforcing panels extends transversely outward from the respective main edge and is configured to be folded into the
35 respective stringer or pillar,

 wherein the set of reinforcing panels includes

a first wall panel being configured to be folded into abutment with the first wall panel of the set of stringer panels,

a bottom panel being configured to be folded into abutment with the bottom wall of the set of stringer panels, and

5 a second wall panel being configured to be folded into abutment with the second wall panel of the set of stringer panels.

By providing sets of reinforcing panels extending outwardly outside the main side edges it is possible to provide reinforcement all the way out to the longitudinally extending the main side edges as seen in the transverse
10 direction. Moreover, by folding the first wall panel into abutment with the first wall panel of the set of stringer panels, the bottom panel into abutment with the bottom wall of the set of stringer panels, and the second wall panel into abutment with the second wall panel of the set of stringer panels, a number of advantages are achieved. The wall panels of the stringer or pillars may be
15 oriented in any desired angle. In the preferred embodiment the stringers or pillars are designed with a trapezoid shape narrowing downwardly towards the lower end of the stringer or pillar. This angle typically provides a stronger pallet compared to pallets having vertically oriented wall panels. Moreover, the folded edges along the longitudinal fold line between the wall panels of
20 the stringer panels and the wall panels of the reinforcement panels will act as beams strengthening the edge of the stringer or pillar; both when it comes to increased bending resistance and also when it comes to crash resistance which may be important if a forklift driver accidentally hits the stringer or pillar with the forks. Moreover, the exposed side surface of the pallet will present
25 folded edges all the way up till the height where the side edges of the intermediate panel(s) is exposed, thereby improving moisture resistance. Any non-folded edges at a lower height will be facing inwardly into the respective stringer or pillar and will thereby not be exposed to moisture to any great extent and will not result in deterioration of the load bearing capacity of the
30 pallet to the same extent as if they would have been at an exposed side surface of the pallet. Moreover, the basic design allows for provision of an arbitrary number of stringers, such as two or three stringers. Moreover, the basic design allows for an arbitrary design change from a stringer to a plurality of pillars disposed along a transverse direction. The design change
35 for one of the stringers into pillars may be performed without setting any constraints on whether the other stringer(s) are kept as stringers or designed as pillars.

It may be noted that the term consecutive order relates to the order of the panels mentioned in the list of panels. There may be other panels in between the panels disclosed being in consecutive order. In the preferred embodiment the consecutive panels/portions are consecutive to each other
5 without any additional panels between them expect for those explicitly mentioned (such as the second intermediate panel and the third set of stringer panels).

It may be noted that upwardly and downwardly are orientations relative to gravity as seen when the pallet is oriented according to actual use. The
10 pallet is in actual use typically positioned on a base, such as a floor of a building or a truck, a shelf, or the like, with any goods positioned on top of the pallet.

The pallet disclosed above may sometimes be referred to as a skid. Sometimes the term skid is used for pallets not having any pieces of material
15 interconnecting the pillars or stringers on the underside of said pillars or stringers. In other instances, the term pallet is used irrespective of if there are any such pieces of interconnecting material on the underside of the pillars or stringers. The pallet disclosed above is in accordance with the preferred embodiment intended to be used without any such interconnecting material
20 on the underside of the pillars or stringers. However, it is conceivable that for same use scenarios it may be suitable to add an additional piece of material interconnecting the undersides of the pillars or stringers.

The set of reinforcing panels may include two transversely extending fold lines defining the bottom panel between the first and second wall panels,
25 wherein one of the two transversely extending fold lines preferably coinciding with a fold line between the first wall panel and the bottom panel of the set of stringer panels and the other one of the two transversely extending fold lines preferably coinciding with a fold line between the second wall panel and the bottom panel of the set of stringer panels.

30 This facilitates the folding of the reinforcing panels into the stringers or pillars and into abutment of the panels of the stringers or pillars.

The set of reinforcing panels may be foldable relative to the respective set of stringer panels about a longitudinally extending fold line extending along the first wall panel, the bottom panel, and the second wall panel, and
35 coinciding with the respective main side edge.

This facilitates the folding of the reinforcing panels into the stringers or pillars and into abutment of the panels of the stringers or pillars.

The blank may further comprise, in consecutive order along the longitudinal direction,

a third set of stringer panels including a first wall panel, a bottom panel and a second wall panel being defined by four transversely extending fold lines and being configured to form a third transversely extending stringer or a third set of transversely distributed pillars, with a third set of reinforcing panels being provided in association with the third set of stringer panels, and

a second intermediate panel configured to face with its first surface upwardly,

wherein the third set of stringer panels and the second intermediate panel are positioned between the first intermediate panel and the second set of stringer panels.

Thereby it is possible to form a pallet having three stringers or three longitudinally disposed sets of transversely distributed pillars.

The respective set of reinforcing panel may include a first cross member forming panel.

The first cross member forming panel may be positioned as a longitudinal extension and connected along a transversely extending fold line to the first or second wall panel of respective set of reinforcing panels.

The first cross member forming panel may thereby extend alongside an end panel or an intermediate panel.

The first cross member forming panel may be separated or separable from the respective end panel or intermediate panel.

The first cross member forming panel may be folded relative said first or second wall panel and form a diagonally extending cross member inside the stringer or pillar as the reinforcing panels are folded into the stringer or pillar.

The respective set of reinforcing panel may include a second cross member forming panel.

The second cross member forming panel may be positioned as a longitudinal extension and connected along a transversely extending fold line to the other one of the first or second wall panel of respective set of reinforcing panels compared to the first cross member of respective set of reinforcing panels.

The second cross member forming panel may thereby extend alongside an end panel or an intermediate panel.

The second cross member forming panel may be separated from the respective end panel or intermediate panel a distance being at least equal to a transversal extension of the first cross member forming panel may be folded relative said first or second wall panel and form a diagonally extending cross member beside the first cross member inside the stringer or pillar as the reinforcing panels are folded into the stringer or pillar.

At least one of, and preferably all, the set of stringer panels may along the transversal direction be divided into at least two pillar forming sets of panels.

Portions of the stringer panels between the pillar forming sets of panels may be configured into internal reinforcing panels.

Portions of the stringer panels between the pillar forming sets of panels may be configured into internal reinforcing panels by the provision of a longitudinally extending fold line extending along the first wall panel, the bottom panel and the second panel, thereby defining a demarcation between respective set of pillar forming panels and the associated internal reinforcing panels.

Portions of the stringer panels between the pillar forming sets of panels may be configured into internal reinforcing panels by the provision of a longitudinally extending cut extending along the first wall panel, the bottom panel and the second panel, thereby separating internal reinforcing panels associated with a first pillar forming set of panels from internal reinforcing panels associated with a neighbouring pillar forming set of panels.

Portions of the stringer panels between the pillar forming sets of panels may be configured into internal reinforcing panels by the provision of a transversely extending cut along the internal reinforcing panels between the first wall panel and a neighbouring end panel or intermediate panel, and a transversely extending cut along the internal reinforcing panels between the second wall panel and a neighbouring end panel or intermediate panel.

The blank may be formed a paper board material, preferably a corrugated paper board material.

The above mentioned object of the invention has also been achieved by a pallet formed of a blank according to the disclosure above, wherein the first surface of the first end panel and the second end panel are adhesively attached onto the first surface of an intermediate panel, preferably to the same intermediate panel.

A separate reinforcing member may be positioned in a stringer or pillar. The separate reinforcing member may be adhesively connected at its bottom to the bottom wall and/or adhesively connected at its top to one of the end panels.

5 The above mentioned object of the invention has also been achieved by a method of producing a pallet from a blank according to the disclosure above, the method comprising

 folding the respective set of reinforcing panels on top of the respective set of stringer panels,

10 folding the stringer panels and the reinforcing panels about the longitudinal fold lines relative to the intermediate panel or panels and optionally also relative to the end panels, thereby forming an underside of a pallet by pressing the stringer panels and the reinforcing panels into a fixture defining a desired shape of an underside of the pallet,

15 folding and adhesively attaching the first surface of the end panels on the first surface of an intermediate panel while keeping the blank, and thereby fixing the underside in the fixture.

 The invention may also in short be said to relate to a blank having on each side of a respective set of stringer panels, a set of reinforcing panels
20 extending transversely outward from a respective main edge and is configured to be folded into a respective stringer or pillar, wherein the set of reinforcing panels includes: a first wall panel being configured to be folded into abutment with a first wall panel of the set of stringer panels, a bottom panel being configured to be folded into abutment with a bottom wall of the
25 set of stringer panels, and a second wall panel being configured to be folded into abutment with a second wall panel of the set of stringer panels.

Brief description of the drawings

 The invention will by way of example be described in more detail with
30 reference to the appended schematic drawings, which shows a presently preferred embodiment of the invention.

 Figure 1 discloses a blank according to one embodiment of the invention.

 Figure 2 discloses an intermediate state of a folding operation
35 according to which the blank of figure 1 is folded into a pallet.

 Figure 3 discloses a pallet formed of the blank of figure 1.

Figure 4 corresponds to figure 2 and discloses an alternative in which additional support members are included in the stringers of the pallet.

Figure 5 discloses a blank according to an alternative embodiment of the invention.

5 Figure 6 discloses a pallet formed of the blank of figure 5.

Figure 7 discloses a blank according to an alternative embodiment of the invention.

Figure 8 discloses an intermediate state of a folding operation according to which the blank of figure 7 is folded into a pallet.

10 Figure 9 discloses a detail of the pallet of figure 8.

Detailed description of preferred embodiments

With reference to figures 1, 5, 7 and 10, the blank 10 according to the various embodiments all have a first major surface 1 and a second a major
15 surface 2 (the second major surface 2 is e.g. visible in figures 3 and 6). The second major surface 2 is opposite the first major surface 1. The blank 10 may be formed a paper board material, preferably a corrugated paper board material. The blank 10 is configured to be folded into a pallet 20 as shown in figure 3 and figure 6. The blank 10 comprises, in consecutive order along a
20 longitudinal direction L, a first end panel E1, a first set S1 of stringer panels, a first intermediate panel I1, a second set S2 of stringer panels, and a second end panel E2.

It may be noted that the different embodiments 10, shown in figures 1, 5, 7 and 10, respectively, have a number of features in common and those
25 features will in this detailed description be discussed with reference to all embodiments simultaneously and the same reference numerals will be used for such features. Specific differences will be discussed with reference to the specific figures and different reference numerals will be used when it is considered necessary for the understanding of this detailed description. In the
30 figures 1, 5, 7 and 10, solid lines represent lines along which the blank 10 is cut, and dashed lines represent lines along which the blank 10 is configured to be folded, sometimes referred in the following as fold lines. The fold lines may e.g. so-called crease lines.

The first end panel E1 is configured to be folded such that the second
35 major surface 2 of the first end panel E1 is facing upwardly U (as shown in figure 3).

The first set S1 of stringer panels includes a first wall panel S1a, a bottom panel S1b and a second wall panel S1c. The first wall panel S1a, the bottom panel S1b and the second wall panel S1c are defined by four transversely extending fold lines FL1a, FL1b, FL1c, FL1d. The first wall panel S1a, the bottom panel S1b and the second wall panel S1c are configured to form a first downwardly D and transversely T extending stringer ST1 or a first set SP1 of transversely T distributed downwardly D extending pillars. The blank 10 of figures 1, 5 and 10 is configured to be folded into a pallet 20 having a first transversely extending stringer ST1 (as e.g. shown in figures 2, 3, 4 and 6). The blank 10 of figure 7 is configured to be folded into a pallet 20 having a first set SP1 of transversely T distributed downwardly D extending pillars.

The first intermediate panel I1 is configured to face with its first surface 1 upwardly U as e.g. shown in figures 2, 4 and 8.

The second set S2 of stringer panels including a first wall panel S2a, a bottom panel S2b and a second wall panel S2c being defined by four transversely extending fold lines FL2a, FL2b, FL2c, FL2d and being configured to form a second transversely extending stringer ST2 (as e.g. shown in figures 2, 3, 4 and 6) or a second set of transversely distributed downwardly extending pillars SP2 (as e.g. shown in figure 8).

The second end panel E2 is configured to be folded such that the second major surface 2 of the second end panel E2 is facing upwardly U (as e.g. shown in figure 3).

The blank 10 according to the preferred embodiments disclosed in figures 1, 5, 7 and 10 may further comprise, in consecutive order along the longitudinal direction L,

a third set S3 of stringer panels including a first wall panel S3a, a bottom panel S3b and a second wall panel S3c being defined by four transversely extending fold lines FL3a, FL3b, FL3c, FL3d and being configured to form a third transversely extending stringer ST3 (as shown e.g. in figures 3 and 6) or a third set SP3 of transversely distributed pillars (as e.g. shown in figure 8), and a second intermediate panel I2 configured to face with its first surface 1 upwardly U.

The third set S3 of stringer panels and the second intermediate panel I2 are positioned between the first intermediate panel I1 and the second set S2 of stringer panels.

It may be noted that the term consecutive order relates to the order of the panels mentioned in the list of panels. There may be other panels in between the panels disclosed being in consecutive order. In the preferred embodiment the consecutive panels/portions are consecutive to each other without any additional panels between them except for those explicitly mentioned (such as the second intermediate panel and the third set of stringer panels).

With reference to figures 2, 4 and 8 and as indicated by the dashed areas A on the first end panel E1, on the second end panel E2 and on the first intermediate panel I1, the first end panel E1 and the second end panel E2 are configured to be adhesively attached onto the first surface 1 of the first intermediate panel I1 when the blank 10 is folded into a pallet 20 as shown in figures 3 and 6. The second end panel E2 may be adhesively attached onto the first surface 1 of the second intermediate panel I2.

As shown e.g. in figures 1, 5, 7 and 10, the first end panel E1, the first set S1 of stringer panels, the first intermediate panel I1, the second set S2 of stringer panels, the second intermediate panel I2, the third set S3 of stringer panels, and the second end panel E2, each have a transversal extension from a first main side edge M1 to a second main side edge M2, opposite the first main side edge M1.

As shown e.g. in figures 1, 5, 7 and 10, the blank 10 further comprises, on each side of the respective set of stringer panels S1, S2, S3 a set R1, R2, R3 of reinforcing panels. Respective set R1, R2, R3 of reinforcing panels extends transversely outward from the respective main edge M1, M2 and is configured to be folded into the respective stringer ST1, ST2, ST3 or pillar SP1, SP2 SP3.

The respective set of reinforcing panels R1, R2, R3 includes: a first wall panel R1a, R2a, R3a being configured to be folded into abutment with the first wall panel S1a, S2a, S3a of the set S1, S2, S3 of stringer panels, a bottom panel R1b, R2b, R3b being configured to be folded into abutment with the bottom wall S1b, S2b, S3b of the set S1, S2, S3 of stringer panels, and a second wall panel R1c, R2c, R3c being configured to be folded into abutment with the second wall panel S1c, S2c, S3c of the set S1, S2, S3 of stringer panels. Although the reinforcing panels are provided on both sides they are for clarity reasons in figures 1, 5 and 7 only indicated along the second side edge M2 whereas they are indicated along both side edges M1, M2 in figure 10.

The blank 10 is as mentioned above configured to be folded into a pallet 20. This may e.g. be performed by folding the respective set R1, R2, R3 of reinforcing panels on top of the respective set S1, S2, S3 of stringer panels. Thereafter, the stringer panels S1, S2, S3 and the reinforcing panels R1, R2, R3 are folded about the longitudinal fold lines FL1a-d, FL2a-d, FL3a-d relative to the intermediate panel I1 or panels I1, I2 and optionally also relative to the end panels E1, E2, thereby forming an underside of a pallet 20 by pressing the stringer panels S1, S2, S3 and the reinforcing panels R1, R2, R3 into a fixture (not shown) defining a desired shape of an underside of the pallet 20. At this stage the partly folded pallet 20 may have the shape as shown in figures 2, 4 and 8. Thereafter, the end panels E1, E2 are folded and adhesively attaching with the first surface 1 of the end panels E1, E2 on the first surface 1 of an intermediate panel I1, I2 while keeping the blank 10, and thereby fixing the underside in the fixture. In the preferred embodiments the first and second end panels E1, E2 are adhesively attached to the same intermediate panel. In the preferred embodiments, the first surface 1 of the second end panel E2 is also adhesively attached to the first surface 1 of the second intermediate panel I2.

As e.g. is shown in figures 2, 3, 4, 6 and 8, the provision of sets R1, R2, R3 of reinforcing panels extending outwardly outside the main side edges M1, M2 makes it is possible to provide reinforcement all the way out to the longitudinally extending the main side edges M1, M2 of the finally folded pallet 20. Moreover, by folding the first wall panel into abutment with the first wall panel of the set of stringer panels, the bottom panel into abutment with the bottom wall of the set of stringer panels, and the second wall panel into abutment with the second wall panel of the set of stringer panels, a number of advantages are achieved. The wall panels of the stringer or pillars may be oriented in any desired angle. In the preferred embodiments the stringers or pillars are designed with a trapezoid shape narrowing downwardly towards the lower end of the stringer or pillar. This angle typically provides as stronger pallet compared to pallets having vertically oriented wall panels. Moreover, the folded edges along the longitudinal fold line between the wall panels of the stringer panels and the wall panels of the reinforcement panels will act as beams strengthening the edge of the stringer or pillar; both when it comes to increased bending resistance and also when it comes to crash resistance which may be important if a forklift driver accidentally hits the stringer or pillar with the forks. Moreover, the exposed side surface of the pallet will present

folded edges all the way up till the height where the side edges of the intermediate panel(s) is exposed, thereby improving moisture resistance. Any non-folded edges at a lower height will be facing inwardly into the respective stringer or pillar and will thereby not be exposed to moisture to any great extent and will not result in deterioration of the load bearing capacity of the pallet to the same extent as if they would have been at an exposed side surface of the pallet. Moreover, the basic design allows for provision of an arbitrary number of stringers, such as two or three stringers. Moreover, the basic design allows for an arbitrary design change from a stringer to a plurality of pillars disposed along a transverse direction. The design change for one of the stringers into pillars may be performed without setting any constraints on whether the other stringer(s) are kept as stringers or designed as pillars.

As shown in figures 1, 5, 7, and 10, respective set R1, R2, R3 of reinforcing panels may include two transversely extending fold lines defining the bottom panel R1b, R2b, R3b between the first and second wall panels R1a, R1c, R2a, R2c, R3a, R3c, wherein one of the two transversely extending fold lines preferably coinciding with a fold line FL1b, FL2b, FL3b between the first wall panel S1a, S2a, S3a and the bottom panel S1b, S2b, S3b of the set S1, S2, S3 of stringer panels and the other one of the two transversely extending fold lines preferably coinciding with a fold line FL1c, FL2c, FL3c between the second wall panel S1c, S2c, S3c and the bottom panel S1b, S2b, S2c of the set S1, S2, S3 of stringer panels.

The respective set R1, R2, R3 of reinforcing panels may be foldable relative to the respective set S1, S2, S3 of stringer panels about a longitudinally extending fold line FLM1, FLM1 extending along the first wall panel, the bottom panel, and the second wall panel of the respective set R1, R2, R3 of reinforcing panels, and coinciding with the respective main side edge M1, M2.

As shown in figures 5, 7, 10, the respective set R1, R2, R3 of reinforcing panel may include a first cross member forming panel C1. The first cross member forming panel C1 may be positioned as a longitudinal extension and connected along a transversely extending fold line C1L to the first R1a, R2a, R3a or second wall panel R1c, R2c, R3c of respective set R1, R2, R3 of reinforcing panels. For clarity reasons the transversely extending fold line C1L is only marked for the first cross member forming panel C1 being positioned at the lower most corner of respective one of figures 5, 7 and

10. The respective first cross member forming panel C1 is configured to be folded about the respective fold line C1L and to thereby extend diagonally inside the respective stringer ST1, ST2, ST3 or pillar SP1, SP2, SP3, from the connection at along the fold line CL1 into abutment with the inside of the diagonally opposing corner of the trapezoid cross-sectional shape of the respective stringer, as is e.g. shown in figure 6 and figure 8.

As may be noted in the figures 5, 7 and 10, some of the first cross member forming panels C1 are connected to one of the first wall panels R1a, R2a, R3a and some of the first cross member forming panels C1 are connected to one of the second wall panels R1c, R2c, R3c of respective set R1, R2, R3 of reinforcing panels. The configuration may thereby be chosen to provide a pallet 20 having a reinforcement against shear forces both along the longitudinal direction and counter the longitudinal direction.

It may be noted from figures 5, 7 and 10, that the first cross member forming panel C1 may thereby extend alongside an end panel E1, E2 or an intermediate panel I1, I2. The first cross member forming panel C1 may be separated or separable from the respective end panel E1, E2 or intermediate panel I1, I2.

As shown in figure 10, the respective set R1, R2, R3 of reinforcing panel may further include a second cross member forming panel C2. The second cross member forming panel C2 may be positioned as a longitudinal extension and connected along a transversely extending fold line C2L to the other one of the first or second wall panel of respective set R1, R2, R3 of reinforcing panels compared to the first cross member C1 of respective set R1, R2, R3 of reinforcing panels. The second cross member forming panel C2 may thereby extend alongside an end panel E1, E2 or an intermediate panel I1, I2. The second cross member forming panel C2 may, as shown in figure 10, be separated from the respective end panel or intermediate panel a distance d being at least equal to a transversal extension e of the first cross member forming panel C1 and may be folded relative said first or second wall panel and form a diagonally extending cross member beside the first cross member inside the stringer ST1, ST2, ST3 or pillar as the reinforcing panels are folded into the stringer ST1, ST2, ST3 or pillar.

As shown in figures 7 and 8, at least one of, and preferably all, the set S1, S2, S3 of stringer panels may along the transversal direction T be divided into at least two, preferably three pillar forming sets SP11, SP12, SP13, SP21, SP22, SP23, SP31, SP32, SP33 of panels. As shown in figure 7,

portions of the stringer panels between the pillar forming sets of panels may be configured into internal reinforcing panels IR1, IR2, IR3. Portions of the stringer panels between the pillar forming sets of panels may be configured into internal reinforcing panels IR1, IR2, IR3 by the provision of a

- 5 longitudinally extending fold line IRL extending along the first wall panel, the bottom panel and the second panel, thereby defining a demarcation between respective set of pillar forming panels and the associated internal reinforcing panels.

- 10 Portions of the stringer panels between the pillar forming sets of panels may be configured into internal reinforcing panels by the provision of a longitudinally extending cut IRCL extending along the first wall panel, the bottom panel and the second panel, thereby separating internal reinforcing panels associated with a first pillar forming set of panels from internal reinforcing panels associated with a neighbouring pillar forming set of panels.

- 15 Portions of the stringer panels between the pillar forming sets of panels may be configured into internal reinforcing panels by the provision of a transversely extending cut IRCT along the internal reinforcing panels between the first wall panel and a neighbouring end panel or intermediate panel, and a transversely extending cut along the internal reinforcing panels between the
20 second wall panel and a neighbouring end panel or intermediate panel.

- It may also be noted, with reference to figure 4, that a separate reinforcing member 30 may be positioned in a stringer or pillar. The separate reinforcing member may be adhesively connected at its bottom to the bottom wall and/or adhesively connected at its top to one of the end panels. The
25 reinforcing member may e.g. be formed from a well-paper block, a paper roll. It may alternatively be of other kinds of materials, such as a polymeric or wooden material. The separate reinforcing member 30 may be used as a replacement to the cross members C1, C2 or as a complement to the cross members C1, C2. It may e.g. be used in the same pillar. Alternatively, some
30 of the pillars may be provided with cross members C1, C2 and others may be provided with separate reinforcing member 30. In the case of a stringer, some of the stringers may be provided with cross members C1, C2 and other stringers may be provided with separate reinforcing members 30.

- Alternatively, one or more of the stringers may be provided with both cross
35 members C1, C2 and reinforcing elements 30.

It is contemplated that there are numerous modifications of the embodiments described herein, which are still within the scope of the invention as defined by the appended claims.

- 5 The pallet may e.g. be provided with two stringers or two sets of transversely distributed pillars. In such a case the blank and pallet includes the first end panel, the first set of stringer panels, the first intermediate panel, the second set of stringer panels, and the second end panel. In such a design there is no third set of stringer panels and no second intermediate panel.

CLAIMS

1. Blank (10) having a first major surface (1) and a second a major surface (2) opposite the first major surface (1) and being configured to be
5 folded into a pallet (20), wherein the blank (10) comprises, in consecutive order along a longitudinal direction (L),
a first end panel (E1) configured to be folded such that the second major surface (2) of the first end panel (E1) is facing upwardly(U),
a first set (S1) of stringer panels including a first wall panel (S1a), a
10 bottom panel (S1b) and a second wall panel (S1c) being defined by four transversely extending fold lines (FL1a-d) and being configured to form a first downwardly (D) and transversely (T) extending stringer (ST1) or a first set (SP1) of transversely (T) distributed downwardly (D) extending pillars,
a first intermediate panel (I1) configured to face with its first surface (1)
15 upwardly (U),
a second set (S2) of stringer panels including a first wall panel (S2a), a bottom panel (S2b) and a second wall panel (S2c) being defined by four transversely extending fold lines (FL2a-d) and being configured to form a second transversely (T) extending stringer (ST2) or a second set (SP2) of
20 transversely (T) distributed downwardly (D) extending pillars, and
a second end panel (E2) configured to be folded such that the second major surface (2) of the second end panel (E2) is facing upwardly (U),
wherein the first end panel (E1) and the second end panel (E2) are configured to be adhesively attached onto the first surface (1) of the first
25 intermediate panel (I1),
wherein the first end panel (E1), the first set of stringer panels (S1), the first intermediate panel (I1), the second set (S2) of stringer panels and the second end panel (E2) each have a transversal extension from a first main side edge (M1) to a second main side edge (M2), opposite the first main side
30 edge (M1),
wherein the blank (10) further comprises, on each side of the respective set (S1, S2) of stringer panels, a set (R1, R2) of reinforcing panels,
wherein the respective set (R1, R2) of reinforcing panels extends transversely (T) outward from the respective main edge (M1, M2) and is
35 configured to be folded into the respective stringer (ST1, ST2) or pillar (SP1, SP2),
wherein the set (R1, R2) of reinforcing panels includes

a first wall panel (R1a, R2a) being configured to be folded into abutment with the first wall panel (S1a, S2a) of the set (S1, S2) of stringer panels,

5 a bottom panel (R1b, R2b) being configured to be folded into abutment with the bottom wall (S1b, S2b) of the set (S1, S2) of stringer panels, and

a second wall panel (R1c, R2c) being configured to be folded into abutment with the second wall panel (S1c, S2c) of the set (S1, S2) of stringer panels.

10

2. Blank (10) according to claim 1, wherein the set (R1, R2) of reinforcing panels includes two transversely extending fold lines (FL1b, FL1c, FL2b, FL2c) defining the bottom panel (R1b, R2b) between the first and second wall panels (R1a, R1c, R2a, R2c), wherein one of the two
15 transversely extending fold lines (FL1b, FL1c, FL2b, FL2c) preferably coinciding with a fold line (FL1b, FL1c) between the first wall panel (S1a, S2a) and the bottom panel (S1b, S2b) of the set of stringer panels and the other one of the two transversely extending fold lines (FL1b, FL1c, FL2b, FL2c) preferably coinciding with a fold line (FL2b, FL2c) between the second wall
20 panel (S1c, S2c) and the bottom panel (S1b, S2b) of the set of stringer panels.

3. Blank (10) according to claim 1 or 2, wherein the set (R1, R2) of reinforcing panels is foldable relative to the respective set (S1, S2) of stringer
25 panels about a longitudinally extending fold line (FLM1, FLM2) extending along the first wall panel (R1a, R2a), the bottom panel (R1b, R2b), and the second wall panel (R1c, R2c), and coinciding with the respective main side edge (M1, M2).

30 4. Blank (10) according to any one of claims 1-3, wherein the blank (01) further comprises, in consecutive order along the longitudinal direction (L),

a third set (S3) of stringer panels including a first wall panel (S3a), a bottom panel (S3b) and a second wall panel (S3c) being defined by four
35 transversely (T) extending fold lines (FL3a-d) and being configured to form a third transversely extending stringer (ST3) or a third set (SP3) of transversely

(T) distributed pillars, with a third set (R3) of reinforcing panels being provided in association with the third set (S3) of stringer panels, and

a second intermediate panel (I2) configured to face with its first surface (1) upwardly (U),

5 wherein the third set (S3) of stringer panels and the second intermediate panel (I2) are positioned between the first intermediate panel (I1) and the second set (S2) of stringer panels.

10 5. Blank (10) according to any one of claims 1-4, wherein the respective set (R1, R2, R3) of reinforcing panel includes a first cross member forming panel (C1);

being positioned as a longitudinal extension and connected along a transversely extending fold line (C1L) to the first or second wall panel (R1a, R1c, R2a, R2c, R3a, R3c) of respective set (R1, R2, R3) of reinforcing panels,

15 thereby extending alongside an end panel (E1, E2) or an intermediate panel (I1, I2), and being separated or separable from the respective end panel (E1, E2) or intermediate panel (I1, I2),

20 such that the first cross member forming panel (C1) may be folded relative said first or second wall panel (R1a, R1c, R2a, R2c, R3a, R3c) and form a diagonally extending cross member inside the stringer (ST1, ST2, ST3) or pillar (SP1, SP2, SP3) as the reinforcing panels are folded into the stringer or pillar.

25 6. Blank (10) according to claim 5, wherein the respective set (R1, R2, R3) of reinforcing panel includes a second cross member forming panel (C2); being positioned as a longitudinal extension and connected along a transversely extending fold line (CL2) to the other one of the first or second wall panel (R1a, R1c, R2a, R2c, R3a, R3c) of respective set (R1, R2, R3) of reinforcing panels compared to the first cross member (C1) of respective set (R1, R2, R3) of reinforcing panels,

30 thereby extending alongside an end panel (E1, E2) or an intermediate panel (I1, I2), and

35 being separated from the respective end panel (E1, E2) or intermediate panel (I1, I2) a distance (d) being at least equal to a transversal extension (e) of the first cross member forming panel (C1),

such that the second cross member forming panel (C2) may be folded relative said first or second wall panel (R1a, R1c, R2a, R2c, R3a, R3c) and form a diagonally extending cross member beside the first cross member (C1) inside the stringer (ST1, ST2, ST3) or pillar (SP1, SP2, SP3) as the
5 reinforcing panels are folded into the stringer or pillar.

7. Blank (10) according to any one of claims 1-6, wherein at least one of, and preferably all, the set (S1, S2, S3) of stringer panels is along the transversal direction divided into at least two pillar forming sets (SP11, SP12,
10 SP13, SP21, SP22, SP23, SP31, SP32, SP33) of panels,

wherein portions of the stringer panels between the pillar forming sets of panels are configured into internal reinforcing panels (IR1, IR2, IR3).

8. Blank according to claim 7, wherein portions of the stringer panels
15 between the pillar forming sets (SP11, SP12, SP13, SP21, SP22, SP23, SP31, SP32, SP33) of panels are configured into internal reinforcing panels (IR1, IR2, IR3) by the provision of:

a longitudinally extending fold line (IRL) extending along the first wall panel, the bottom panel and the second panel, thereby defining a
20 demarcation between respective set (SP11, SP12, SP13, SP21, SP22, SP23, SP31, SP32, SP33) of pillar forming panels and the associated internal reinforcing panels (IR1, IR2, IR3), and

a longitudinally extending cut (IRCL) extending along the first wall panel, the bottom panel and the second panel, thereby separating internal
25 reinforcing panels (IR1) associated with a first pillar forming set (SP11) of panels from internal reinforcing panels (IR1) associated with a neighbouring pillar forming set (SP12) of panels,

a transversely extending cut (IRCT) along the internal reinforcing panels between the first wall panel and a neighbouring end panel or
30 intermediate panel, and

a transversely extending cut (IRCT) along the internal reinforcing panels between the second wall panel and a neighbouring end panel or intermediate panel.

35 9. Blank (10) according to any one of claims 1-8, wherein the blank is formed a paper board material, preferably a corrugated paper board material.

10. Pallet (20) formed of a blank (10) according to any one of claims 1-9, wherein the first surface (1) of the first end panel (E1) and the second end panel (E2) are adhesively attached onto the first surface (1) of an intermediate panel (I1, I2), preferably to the same intermediate panel (I1).

5

11. Pallet (20) according to claim 10, wherein a separate reinforcing member (30) is positioned in a stringer (ST1, ST2, ST3) or pillar (SP1, SP2, SP3), wherein the separate reinforcing member (30) preferably is adhesively connected at its bottom to the bottom wall (S1b, S2b, S3b) and/or adhesively
10 connected at its top to one of the end panels (E1, E2).

12. Method of producing a pallet (20) from a blank (10) according to any one of claims 1-9, the method comprising

15 folding the respective set (R1, R2, R3) of reinforcing panels on top of the respective set (S1, S2, S3) of stringer panels,

folding the stringer panels and the reinforcing panels about the longitudinal fold lines (FL1a-d, FL2a-d, FL3a-d) relative to the intermediate panel (I1) or panels (I1, I2) and optionally also relative to the end panels (E1, E2), thereby forming an underside of a pallet (02) by pressing the stringer
20 panels and the reinforcing panels into a fixture defining a desired shape of an underside of the pallet,

folding and adhesively attaching the first surface (1) of the end panels (E1, E2) on the first surface (1) of an intermediate panel (I1, I2,) while keeping the blank (10), and thereby fixing the underside, in the fixture.

25

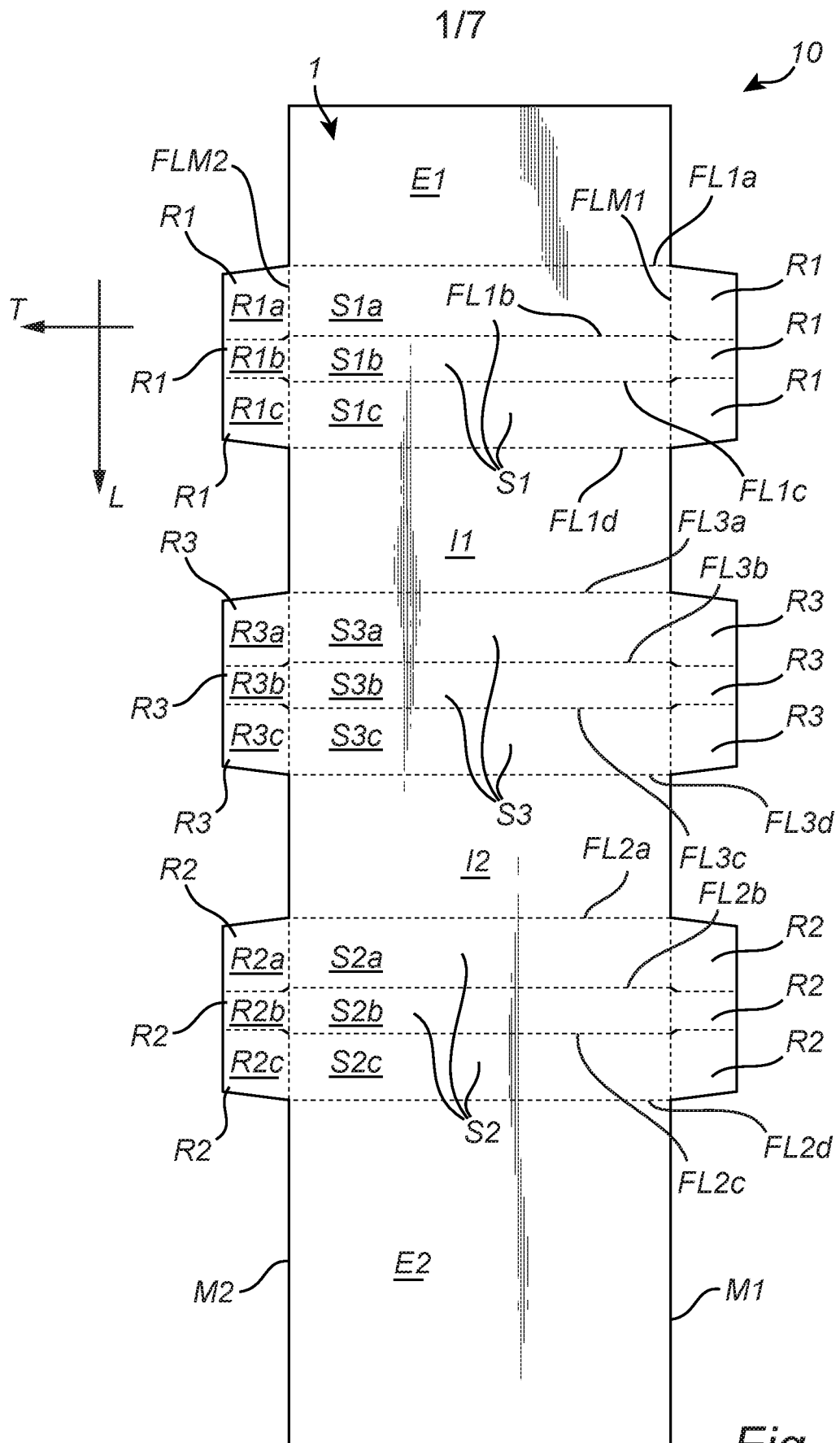
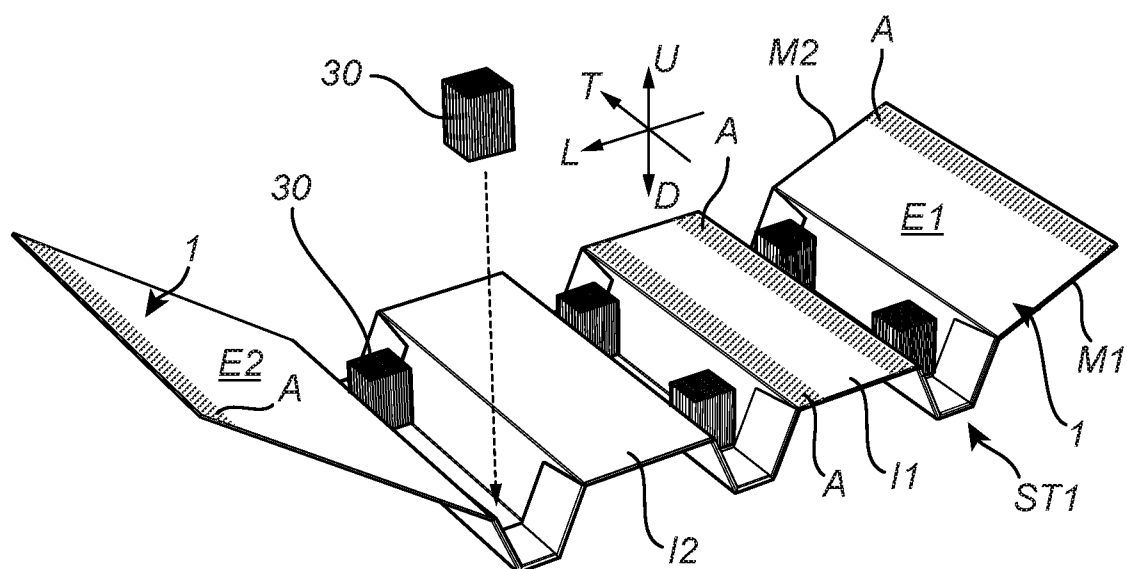
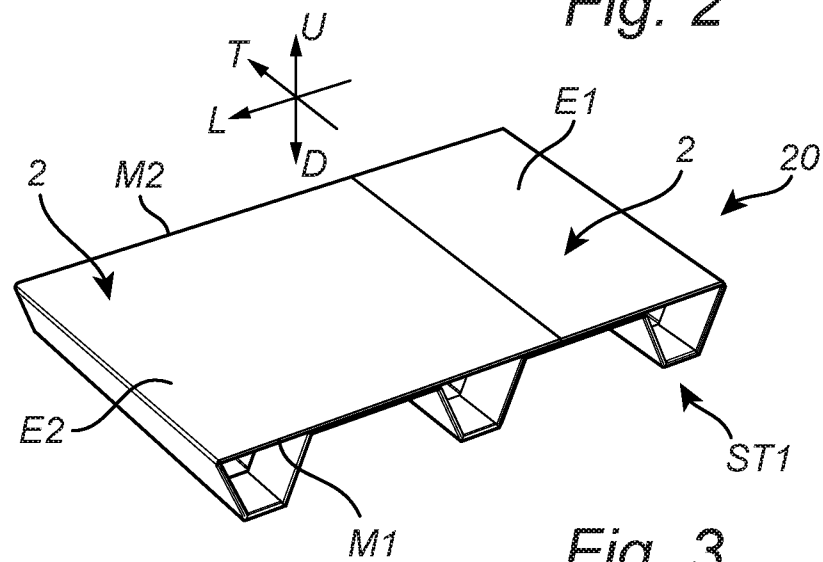
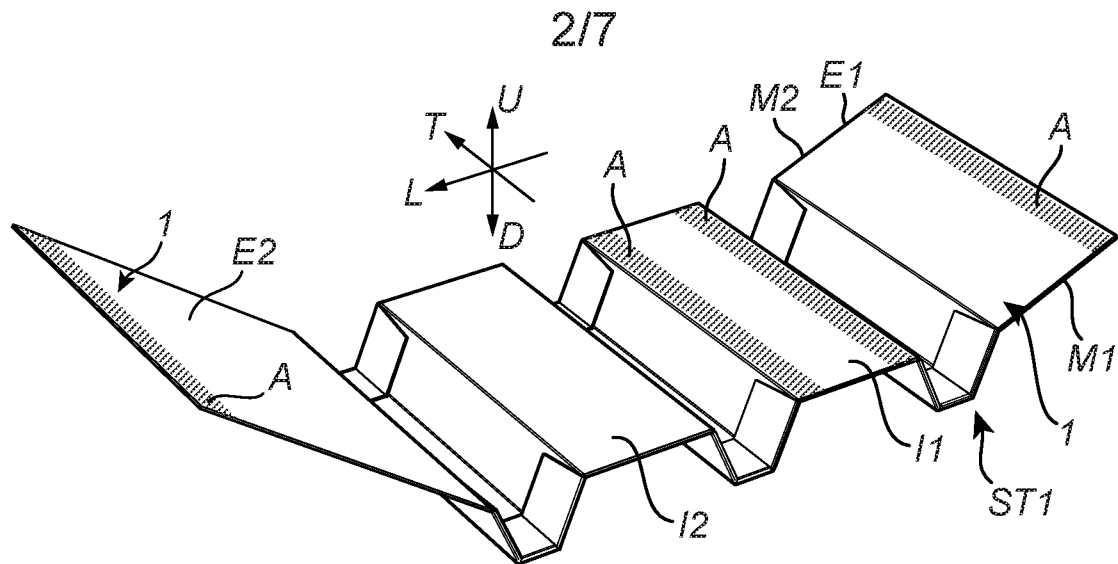


Fig. 1



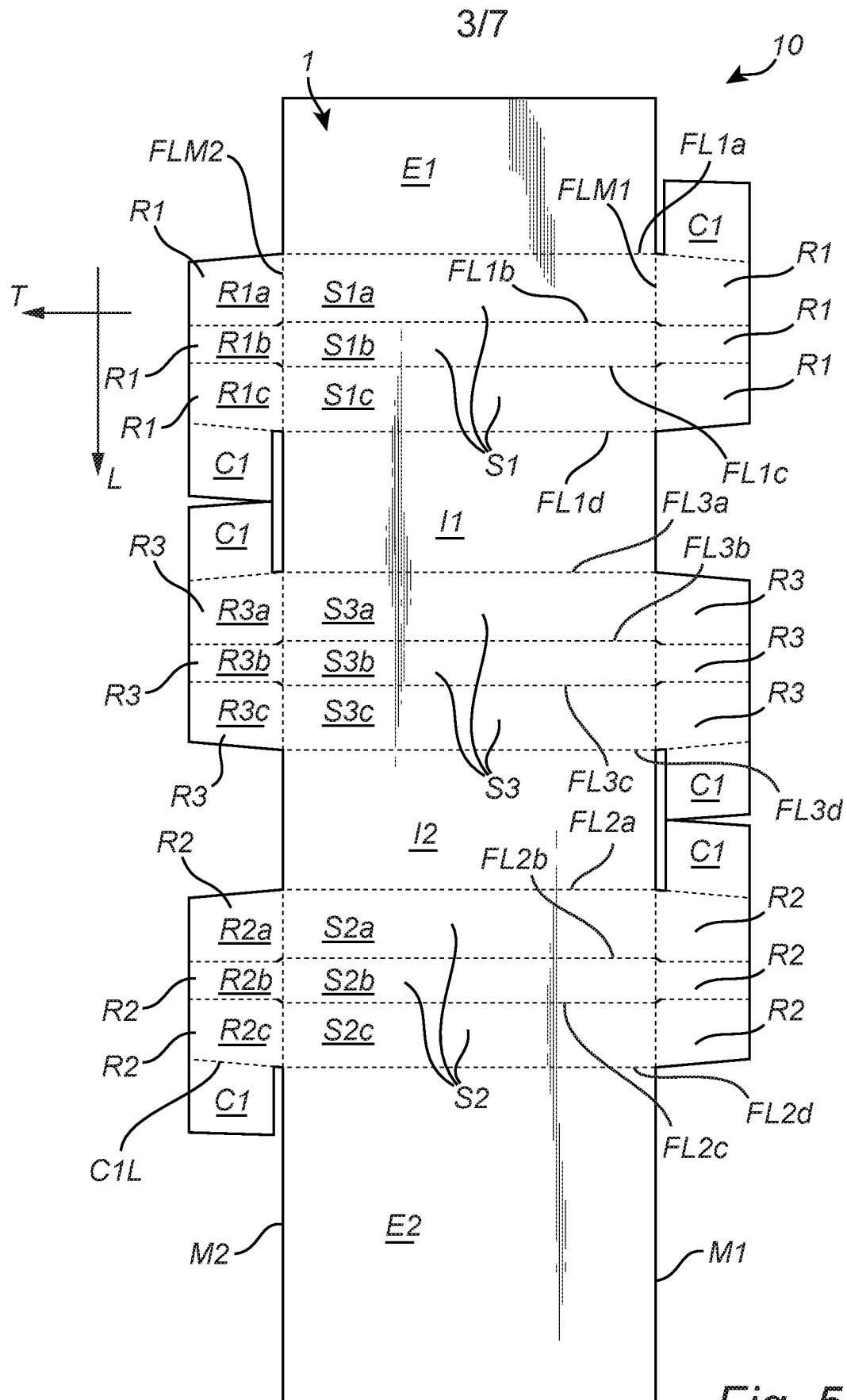


Fig. 5

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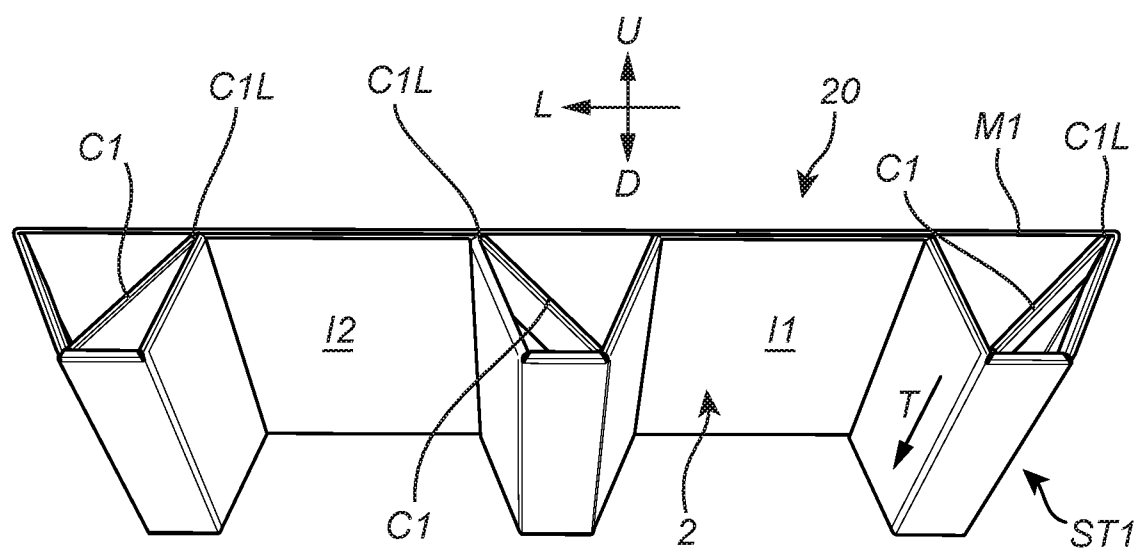


Fig. 6

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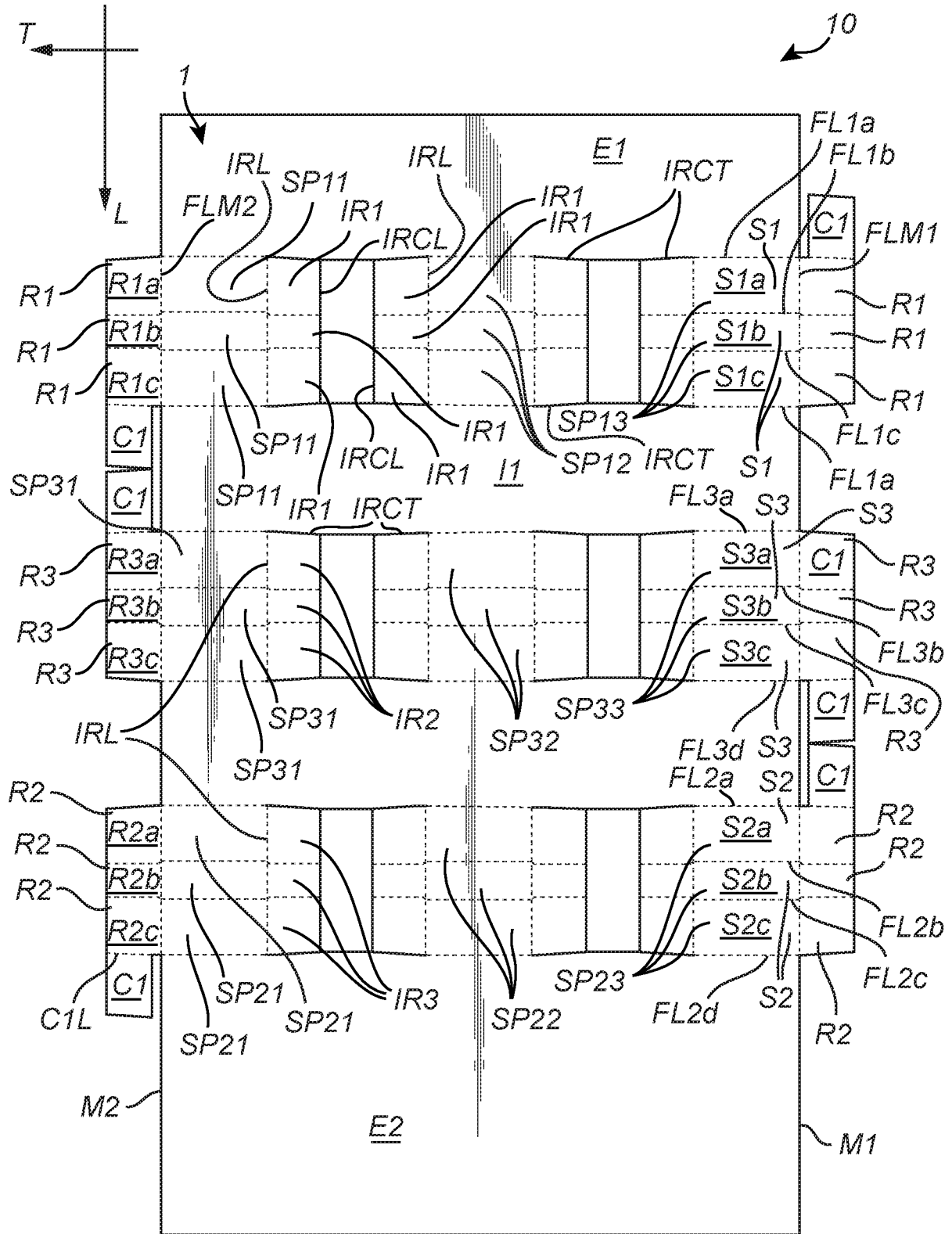
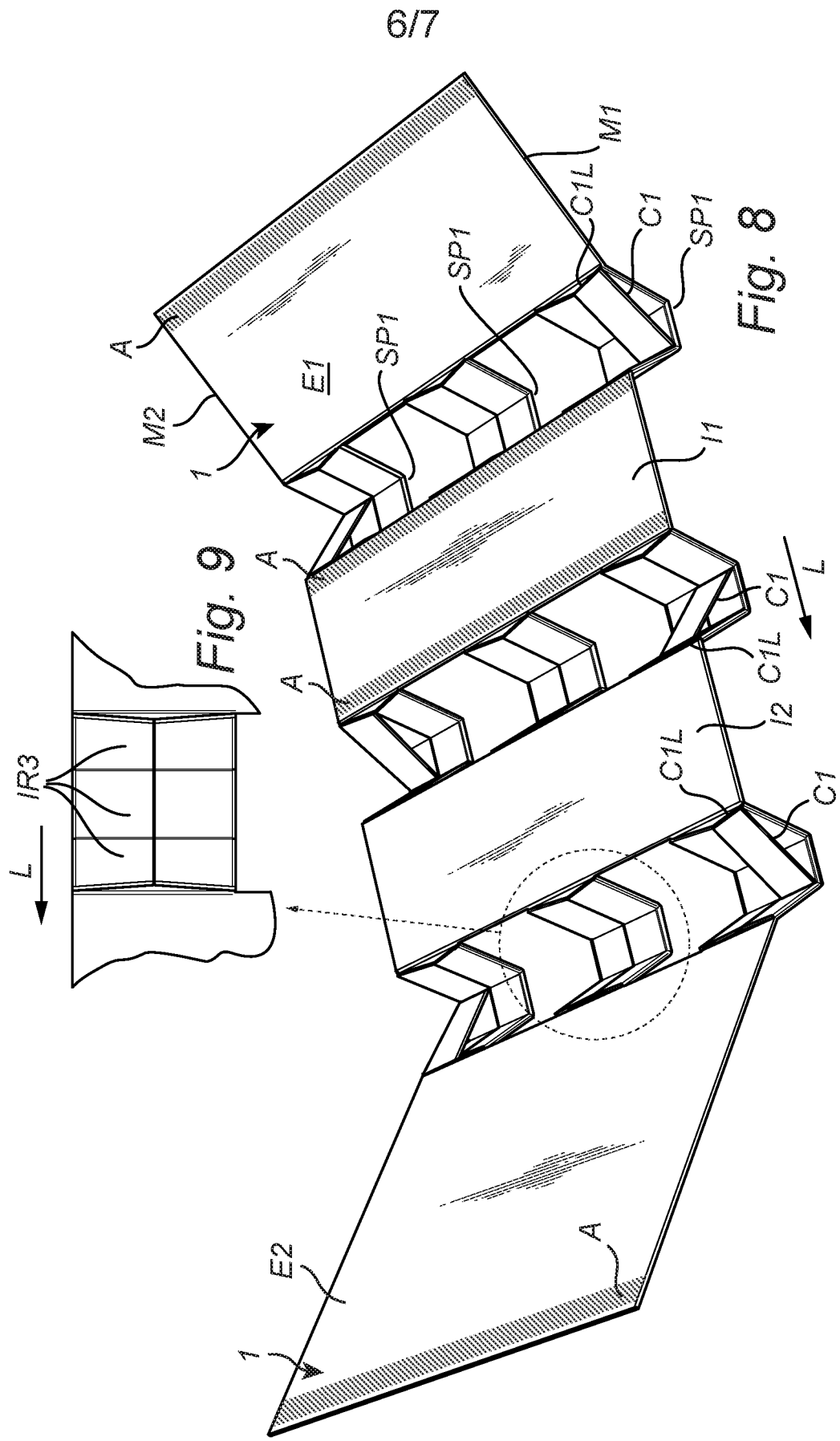


Fig. 7



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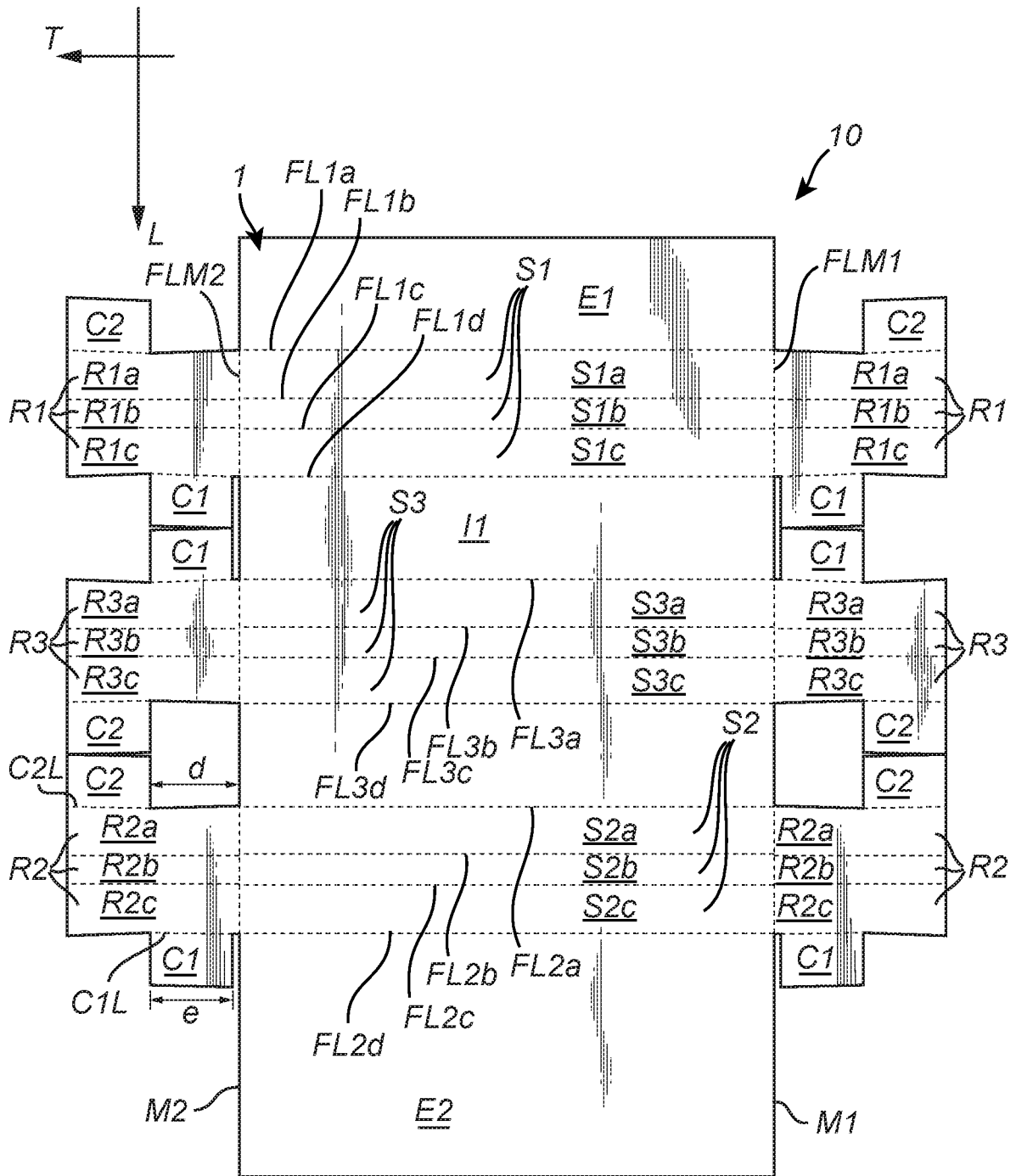


Fig. 10

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2019/050698

A. CLASSIFICATION OF SUBJECT MATTER

INV. B65D19/24
ADD. B65D19/34

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2006/016373 A1 (GORDON NORMAN H [US]) 26 January 2006 (2006-01-26) paragraph [0042] - paragraph [0062] figures 1-4	1-4,7-12
Y	----- EP 1 234 776 A2 (ROCKWOOL MINERALWOLLE [DE]) 28 August 2002 (2002-08-28) paragraph [0039] - paragraph [0046] figures 3,4	1-4,7-12
Y	----- DE 73 14 284 U (SPUMALIT-ANSTALT) 22 November 1973 (1973-11-22) page 4 - page 6; figures 1-3	1-4,7-12
Y	----- FR 2 751 304 A1 (TERLE MAURICE [FR]) 23 January 1998 (1998-01-23) page 12, line 9 - line 25 figures 15,16 ----- -/-	1-4,7-12

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Date of the actual completion of the international search

12 March 2019

Date of mailing of the international search report

19/03/2019

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INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2019/050698

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2019/050698

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