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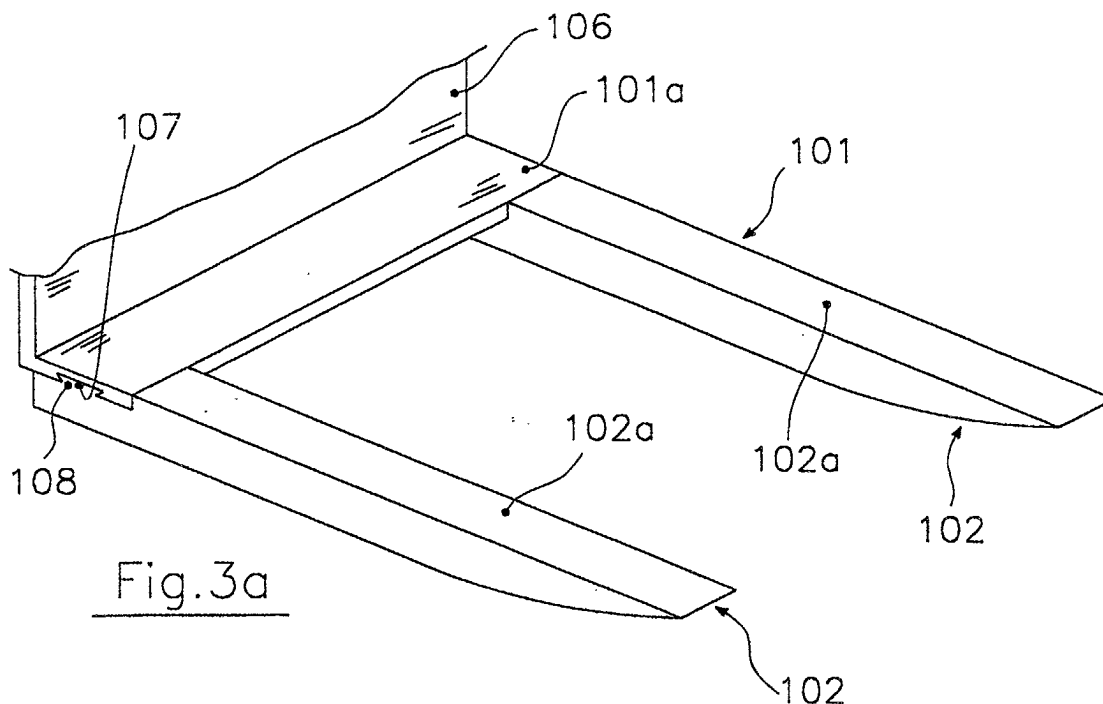
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(54) Improved equipment for dividing stacks of palletized goods

(57) An equipment for dividing a stack of palletised goods comprises a base (101) that defines a horizontal bearing surface for the goods. A fixed vertical plate (106) rises from a rearward edge of the base (101) and can be attached to the operating head of a lift truck. On the base (101) a pusher (8) moves between a rearward and a forward position in order to engage with the division sheet of the stack, and drag an upper portion of the stack onto the upper surface of the base or to push the portion

forwards. According to the invention, the base (101) comprises two arms (102) that extend forward from the vertical plate (106) and comprise respective upper faces (102a) capable of supporting the movement of the pusher means (8). The arms (102) are slidingly connected to the plate (106) in such a way as to enable them to move sideways towards and away from each other, for carrying out the operations of picking up and moving a pallet when the pusher (8) is in its rearward position.



EP 1 312 578 A1

Description

[0001] The present invention concerns the field of equipment for loading, unloading and, more generally, handling goods. In particular, it concerns an improved equipment for dividing stacks of palletized goods and suitable for being fitted to forklift trucks.

[0002] In the road transport of many types of goods/products, toilet paper being a case in point, there has recently affirmed itself the tendency of loading the vehicle in accordance with the so-called "ready for sale" system. In practice, this consists of arranging the goods on conventional wooden pallets and in stacks that do not exceed about 180 cm in height. In this way, once the goods have reached the point of sale, all that has to be done is to unload the products stacked on their pallets and remove the cover of plastic material, after which they are directly and easily accessible and can be picked up by the customer. This, of course, thanks to the low height of the stacks.

[0003] However, this system is associated with the drawback of increasing the transport costs, because the volume available for the load is only partially occupied. Indeed, the load containers of the motor vehicles normally have a useful height in the range of 280 - 300 cm, so that use of the described system means that the vehicle will travel with a load that does not reach two thirds of the maximum load it could carry.

[0004] With a view to avoiding this problem and fully exploiting the available space, there has been proposed a method that makes it possible to divide the stacks of palletized products, at the desired height and in a relatively simple manner after they have been unloaded. In this way the loading space can be filled with stacks of the maximum possible height, subsequently obtaining stacks of the "ready for sale" height after the division. This in practice by depriving the original stacks of their respective upper portions and then using these portions to form further stacks of the appropriate height.

[0005] This method envisages the insertion in the stack of a sheet of material of adequate tensile strength, typically high-strength cardboard, at the level at which it is desired to divide the stack (and therefore at about 180 cm from the base). This sheet has a flap that projects from one side of the stack. The flap in question can be gripped by appropriate equipment carried on the forks of the fork-lift truck.

[0006] The general principle of known equipment of this type is illustrated by figures 1, 2a and 2b, to which reference will henceforth be made. The equipment comprises a substantially quadrilateral base plate 1, from the lower face of which there extend two tubular ribs 2 that are integral with it and parallel to each other. The ribs 2, which have an open end at the rear edge of the base plate 1, permit the insertion of the forks of a traditional fork-lift truck 5, thanks to which the base plate 1 will become supported in a horizontal plane.

[0007] From the upper face of the plate and along said

rear edge there rises a fixed vertical plate 6 that on its front face carries an articulated parallelogramme mechanism 7. Said mechanism 7, which is provided with oleo-pneumatic actuating means that are not shown on the drawing, serves to move a pusher 8 that likewise lies in a vertical plane and can thus be moved between the front and the rear edge of the base plate 1, always maintaining its vertical alignment.

[0008] More precisely, the pusher 8 has a box-like structure, consisting of a parallelepiped of which the front face constitutes the flat pusher 8a in the proper sense of the term. The structure is supported by two wheels 9 that roll on the upper face of the base plate 1, one such wheel being arranged at each lateral edge of the plate. However, the front face 8a of the pusher 8 does not reach right down to the base plate 1, thus forming a front opening 10 into which there can be inserted the projecting flap of the aforementioned separation sheet included in the stack of goods, this sheet being indicated by F in figures 2a and 2b.

[0009] To facilitate this insertion, the bottom 8b of the pusher 8 is bent forward and gradually diminishes in thickness, terminating in a front edge 8c which, eventually, contacts the base plate 1. In practice, therefore, this front edge constitutes the bottom side of the opening 10.

[0010] As can be seen in figure 2b, the rear face 8d of the pusher 8 is provided with a horizontal slot 13 in a position corresponding to the front opening 10, and the sheet F, as will be explained in greater detail further on, can be inserted in this slot. Lastly, housed within the pusher 8 there is a shutter 11 that, controlled by actuators 12, can be moved vertically downwards to grip the sheet F in the manner of pincers by pressing it against the bottom 8b. Both the forward and backward movement of the pusher 8 and the up and down movement of the shutter 11 are controlled by the driver of the fork-lift truck.

[0011] With the equipment that has just been schematically described, the unloading operations will be carried out in the following manner. The stack of palletized goods that is to be divided (and which will therefore have a height of about 270 cm) is first deprived of its protective covering, thus rendering the projecting flap F accessible. The equipment, with the pusher 8 in its extreme forward position as in figure 1, and the base plate 1 substantially at the level of the dividing sheet F, is then brought close to the stack in such a manner that the flap F will penetrate into the front opening 10 of the pusher.

[0012] At this point the shutter 11 is lowered to grip the flap of the sheet F and the pusher 8 starts its backward motion, sliding on the base plate 1. The sheet F and all the goods in the upper part of the stack will thus be dragged onto the base plate 1. The situation at this stage is as illustrated in figure 2a, where the goods itself has not been shown for the sake of clarity. When the pusher 8 reaches its rearward end-of-run and is therefore practically adjacent to the fixed vertical plate 6, the

goods will come to lie completely on the base plate 1.

[0013] The fork-lift truck 5 now moves to an empty pallet and manoeuvres until the separation equipment is directly above it. The forks 4 are lowered until the base plate 1 is just above the pallet. At this point the shutter 11 is raised, thus freeing the flap F, and the truck 5 then starts moving backwards. At the same time the pusher 8 is made to move forward with respect to the base plate 1 in such a manner that the resultant of the two motions, i.e. the backward motion of the truck and the forward motion of the pusher, will be null. The pusher 8 will thus remain substantially steady in the same position with respect to the pallet.

[0014] Consequently, while the base plate moves gradually backwards, the front face 8a of the pusher will keep the goods directly above the pallet, so that the latter will drop onto the pallet as soon as soon as it is no longer supported by the base plate. During this phase, as can be seen from figure 2b, the sheet F, inserted in the slot 13 in the rear face 8d of the pusher 8, will slip out from under the goods and remain lying on the base plate 1, from which it can then be removed for re-use. When the goods has been deposited on the pallet, the equipment is once again in its starting position.

[0015] The fork-lift truck then moves on to divide another stack, depositing the excess goods on top of the goods removed in the previous operation, in exactly the same manner as before. Repeating this operation on the whole of the incoming load, every two of the original stacks rising to a height of 270 cm, there will be thus yielded three "ready for sale" stacks of the reduced height of 180 cm.

[0016] It is evident that the aforementioned drawback of increased transport costs is overcome when the stacks are handled in this manner, because the sales point will now have stacks not exceeding the required maximum height without this involving an under-exploitation of the available loading space of the motor vehicle. Nevertheless, one has to bear in mind that the fork-lift truck 5 on the forks of which the equipment is mounted will obviously not be in a position to undertake the conventional operations of lifting and shifting pallets. Consequently, the need will arise for at least one extra fork-lift truck with free forks, and therefore capable of operating in the traditional manner, to shift the pallets with the goods they carry.

[0017] This fact has greatly penalized the affirmation of the stack-dividing equipment that has just been described, so that at present it is only very rarely used in actual practice. In fact, the use of two (or even more) fork-lift trucks not only renders the unloading operations considerably more complex, but also involves costs (purchase and maintenance of the trucks, labour) that in the greater part of cases cannot be sustained.

[0018] The present invention therefore sets out to overcome this situation and make it possible for stacks of palletized goods to be divided in accordance with the procedure described hereinabove, but without giving

rise to the logistical and cost problematics that have hitherto stood in the way of its widespread application.

[0019] This aim is achieved by the improved equipment for dividing stacks of palletized goods of which the essential characteristics are defined in the first of the appended claims.

[0020] The characteristics and advantages of the improved equipment for dividing stacks of palletised goods in accordance with the present invention will be more readily apparent from the description about to be given of a particular embodiment thereof, which is to be considered solely as an example and not limitative in any way, said description making reference to the attached drawings in which:

- figure 1 shows a schematic side elevation of equipment for dividing a stack of palletized goods in accordance with the prior art;
- figures 2a and 2b show schematic perspective views of the equipment of figure 1, partially broken, in two different operating positions;
- figures 3a and 3b schematically illustrate the equipment in accordance with the invention, again in two different operating positions, and - for the sake of clarity - limited to the lower part of the equipment and devoid of the pusher; and
- figure 4 shows a schematic view of the equipment in accordance with the invention as seen from behind and subject to the same limitations as figures 3a and 3b.

[0021] With reference to figures 3a, 3b and 4, the overall characteristics of the equipment according to the invention are similar to those of the traditional equipment described in the introductory part hereinabove. In particular, the whole of the upper part - with the fixed vertical plate to be attached to the operating head of a fork-lift truck, the pusher and the operating mechanism associated with it - corresponds to the prior art and is therefore not shown in the figure, not least to render possible a clearer illustration of the lower part, in which the improvement of the invention resides.

[0022] According to the invention, in fact, from the lower side of the fixed vertical plate, of which a part can be seen in the figures and is there indicated by the reference number 106, there extends in a substantially horizontal direction a base 101 that comprises a shelf 101a that projects from the fixed vertical plate 106, to which it is integrally attached, so that it is likewise fixed. The forward overhang of the shelf 101a is smaller than its width, which is obviously equal to the width of the vertical plate 106a. Therefore, a strip-like surface is defined, on which the pusher can rest when it reaches its rearward end-of-run.

[0023] From the front edge of the shelf 101a there extend two tubular arms 102 that generate respective seatings 103 open at their rear ends to permit the stable insertion of respective forks of the lift truck. In practice,

the two arms 102 constitute a kind of sheath for the forks, reproducing their shape with only slightly greater dimensions, thus making it possible for the arms to be inserted in the pick-up channels of conventional pallets.

[0024] More precisely, the tubular arms 102 are connected to the lower face of the shelf 101a in such a way that the open rear ends of their seatings 103 will come to be situated substantially flush with the vertical plate 106. Besides, the connection is such that the arms 102 can be displaced sideways, and thus come to lie either closer or further apart, following the corresponding movement, commonly known as "setting", of the forks of the lift truck.

[0025] In the illustrated example this result is obtained thanks to a sliding fit, schematically represented in the figure by a guide groove 107 having an appropriate section to form a sliding dovetail joint with two correspondingly shaped upstands 108 that project from the arms 102 near their rear ends. It should also be noted that the height of the arms 102 increases beyond the shelf, and this in such a manner as to make their top surfaces 102a flush with the upper face of shelf 101a.

[0026] The procedure for dividing a stack of palletised goods with the equipment in accordance with the invention is substantially analogous to the one that has already been described for the prior art equipment in the introductory part hereof, and need not therefore be repeated. It is sufficient to underscore that during the steps that require the pusher to move forward from the fixed plate 106 (and therefore during the actual dividing operation) the tubular arms 102 will remain in the position in which they are furthest apart, as shown in figure 3a, so that their upper surfaces 102a will provide support for the wheels of the pusher, which can roll on them.

[0027] On the other hand, when the pusher is at its rearward end-of-run, i.e. when the wheels rest on the upper face of the shelf 101a, the arms 102 are free to move either towards or away from each other - as indicated in figure 4. In this way, they can perform the operations of picking up and moving the pallet.

[0028] In particular, before the start of the stack-dividing operations, the equipment can be used for unloading and moving the stacks that are to be divided. Subsequently, after the pusher has been withdrawn into the position adjacent to the fixed vertical plate 106, the lift truck can be used to pick up and move the "ready for sale" stacks that have been obtained. The whole, obviously, with just a single truck, thus overcoming the drawback associated with the prior art technique.

[0029] To avoid the pusher being moved forward when the arms 102 are not in their proper position, and also to avoid the arms being moved while the pusher is in its advanced position, the equipment can be advantageously provided with appropriate control means, the general configuration of which will be obvious to a person skilled in the art.

[0030] The shelf 101a need not be continuous and could therefore be devoid of some intermediate portion.

In that case one will have, in practice, two lateral shelves, each with a part of the guide channel 107, though - naturally - of a length sufficient to permit the desired sideways movement towards and away from each other of the two box-shaped arms 102. More generally speaking, the concept underlying the present invention, i.e. the base 101 comprising two mobile arms that can move towards and away from each other, could be realized in a plurality of equivalent constructions, of which the one here illustrated constitutes a possible embodiment that is advantageous on account of its structural and functional simplicity.

[0031] For example, the shelf 101a can be absent and the arms 102 slidably engage directly with the fixed vertical plate 106. In that case the pusher means, rather than having wheels, can be provided with rolls of a certain axial length, sufficient in any case to ensure that when the pusher is in its rearward end-of-run position, the moving of the arms 102 will not deprive the pusher of the necessary support. A similar result could also be obtained by means of an appropriate enlargement of the surface 102a in the rearmost area.

[0032] Furthermore, rather than sheathing the forks of the lift truck, the arms 102 could also replace the forks, being in any case controlled from aboard the truck with the help of appropriate activation means, for example, common liner oleo-pneumatic actuators. In that case the operating head of the truck will therefore be devoid of forks of its own, so that its function will be limited to lifting and lowering the equipment in accordance with the invention, by acting directly on the fixed vertical plate 106.

[0033] The improved equipment in accordance with the invention therefore constitutes an important step forward in the goods transport and handling field, because it confers real and effective applicability on the procedure for dividing stacks of palletised goods, and thus makes it possible to satisfy the ever more numerous requests for being supplied with the "ready for sale" system. This without increasing the transport costs due to the partial occupation of the loading space available on the vehicle.

[0034] Variations and/or modifications can be brought to the improved equipment for dividing stacks of palletised goods in accordance with the present invention without departing from the scope of the invention as defined by the claims hereinbelow.

Claims

1. An equipment for dividing a stack of palletised goods comprising: a base (101) defining a horizontal bearing surface for said goods; a fixed vertical plate (106) rising from a rearward edge (101) of said base and suitable for attachment to the operating head of a lift truck; pusher means (8) movable in a reciprocating manner with respect to said base (101), sliding thereon between a rearward end-of-

run position adjacent to said rearward edge and a position of maximum forward displacement, said pusher means (8) being fit for enagement with a dividing sheet inserted within said stack, in order to drag an upper portion of said stack onto said upper surface by pulling said sheet, and to push said portion forward to make it drop down frontally, said equipment being **characterized in that** said base (101) comprises two arms (102) projecting forward from said fixed vertical plate (106) and comprising respective upper faces (102a) capable of supporting the displacement of said pusher means (8), said arms (102) being slidably connected to said fixed vertical plate (106) in such a way as to enable them to move sideways towards and away from each other, due to the effect of activation means controlled from aboard the lift truck, for carrying out the operations of picking up and moving a pallet when said pusher means (8) are situated in their rearward end-of-run travel position.

2. The equipment according to claim 1, wherein said arms (102) have a tubular shape and define respective seatings (103) open at said rearward edge for the stable insertion of respective mobile forks of the lift truck, so that the displacement of said arms (102) responds to a corresponding operation of said forks. 25
3. The equipment according to claim 2, wherein a fixed shelf (101a) projects forward from said fixed vertical plate (106), said arms (102) being slidably connected to said shelf (101a), which has an upper face flush with the upper surface (102a) of said arms (102), thereby acting as a support of said pusher means (8) in their rearward end-of-run position. 30 35
4. The equipment according to claim 3, wherein said pusher means (8) move on said arms (102) via the support of a pair of lateral wheels (9), in a supporting arrangement of said pusher means (8) said arms (102) assuming a position in which they are furthest apart in order to support the running of said wheels (9). 40 45
5. The equipment according to claim 3 or claim 4, wherein said arms (102) are connected to the lower face of said shelf (101a) in such a way that the rearward ends of their respective seatings (103) are flush with said rearward edge, respective sliding fits being arranged between said arms and said lower face of the shelf. 50
6. The equipment according to claim 5, wherein said sliding fits are defined by a channel (107) arranged along said lower face of said shelf (101a) and having an appropriate cross section to form a sliding dovetail joint with two correspondingly shaped up-

stands (108) that project from the upper surface of said arms (102).

7. The equipment according to claim 1 or claim 2, wherein said pusher means (8) move on said arms (102) borne on a pair of lateral rollers having an axial length such that in said rearward end-of-run position said pusher means are still supported by said upper surfaces (102a) of said arms when said arms are displaced towards or away from each other. 5 10
8. The equipment according to any of the previous claims, comprising control means for preventing the displacement of said arms (102) when said pusher means (8) are not in said rearward end-of-run position. 15
9. The equipment according to any of the previous claims, comprising control means for preventing the forward motion of said pusher means (8) from said rearward end-of-run position when said arms (102) are not in a position suitable for supporting said pusher means. 20

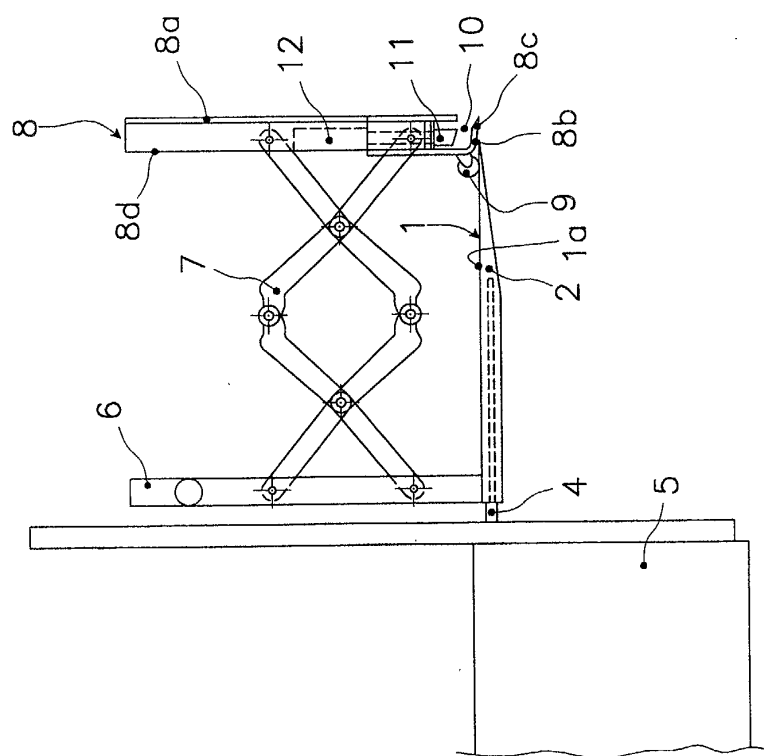


Fig. 1 (prior art)

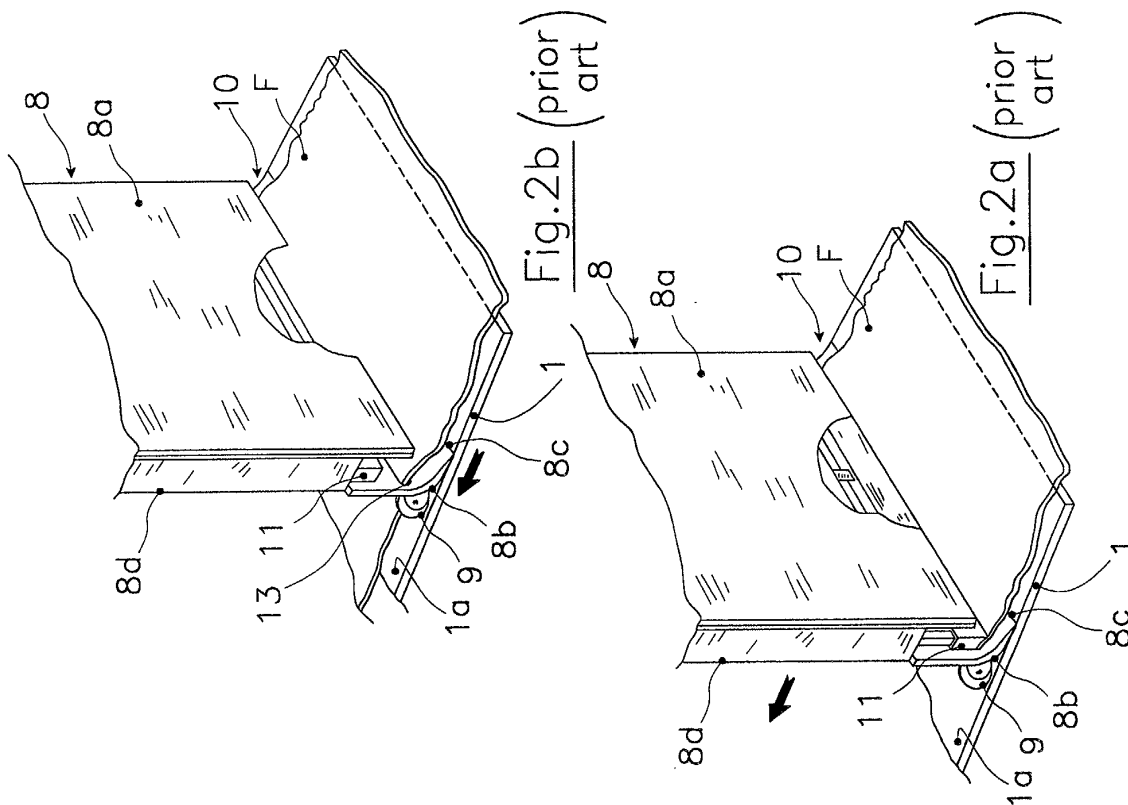
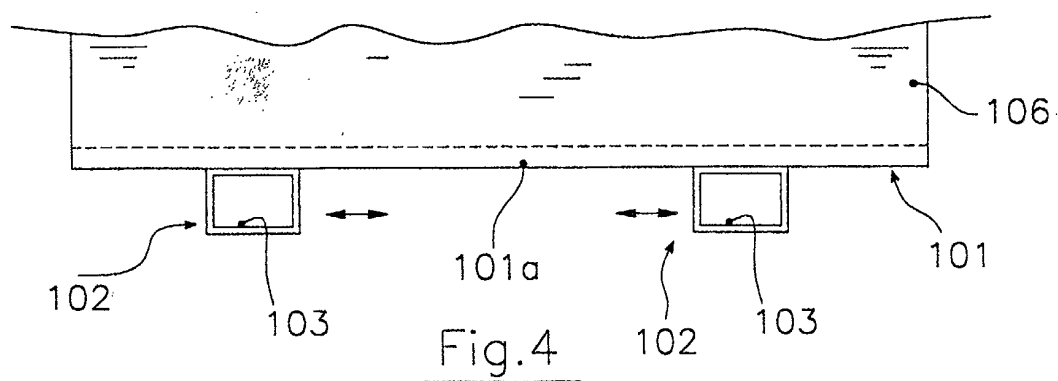
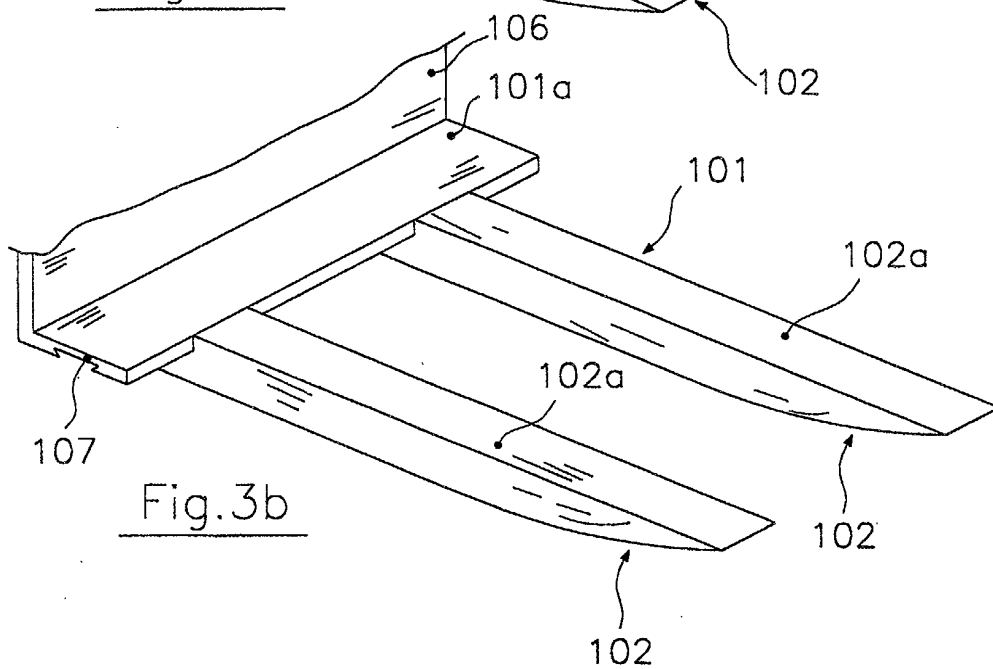
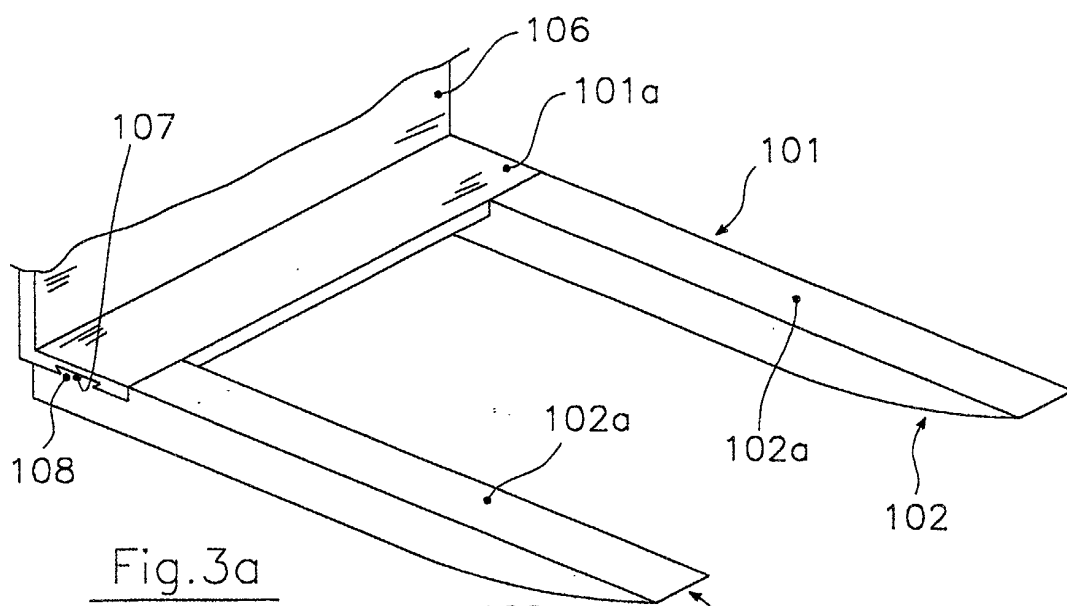


Fig. 2b (prior art)

Fig. 2a (prior art)





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EUROPEAN SEARCH REPORT

Application Number
EP 02 42 5694

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Place of search THE HAGUE		Date of completion of the search 14 February 2003	Examiner Sheppard, B
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EUROPEAN SEARCH REPORT

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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