

DescriptionDevice and method for stacking or transporting a
plurality of flat substrates**Field of application and prior art**

5 **[0001]** The invention relates to a device for stacking
and/or for transporting a plurality of flat substrates
such as, in particular, silicon wafers for solar cell
production in accordance with the preamble of Claim 1.
The invention also relates to a method for introducing
10 a total amount of a large number of flat substrates
into such a device.

[0002] After being removed from a substrate and sawed
from a silicon block, silicon wafers for solar cell
production are usually held in a bath with water or
15 process solution. They are then taken out by hand, for
example in subsets of approximately 50 to 100 units,
and inserted into a machine carrier. They are
introduced in a horizontal position in this process.
The machine carrier is then let down vertically in
20 upright fashion into a water bath, and with the aid of
an automatic removal means such as, for example, a band
conveyor, individual substrates are then removed from
the machine carrier and fed to further processing, in
particular final cleaning. In addition, the substrates
25 are separated as completely as possible in this case.
It is to be considered here as a problem that the
wafers are gripped and inserted into the machine
carrier by hand. The result is that there is a risk of
damaging the very sensitive wafers.

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Object and how it is achieved

[0003] It is the object of the invention to provide a
device, mentioned at the beginning, and a corresponding

method which are able to avoid disadvantages of the prior art and, in particular, enable the substrates to be introduced into the machine carrier safely and in a fashion fit for use that saves material.

5 **[0004]** This object is achieved by a device having the features of Claim 1, and by a method having the features of Claim 13. Advantageous and preferred refinements of the invention are subject matter of the further claims and will be explained in more detail
10 below. Some of the features known below are enumerated only for the method or only for the device. However, irrespective thereof the aim is that they be valid both for the device and for the method. The wording of the claims is incorporated in the description by express
15 reference.

[0005] It is provided that the device has an upright machine carrier for holding a plurality of the flat substrates as total amount. There can be up to 1000 such substrates, for example. The substrates are then
20 located in a horizontal position in the machine carrier.

[0006] According to the invention, the device has at least one loading cassette or, advantageously two loading cassettes, in particular of similar type or
25 identical, into which a fraction of the total amount of the substrates can be introduced. This can be around a quarter or a third of the total amount, by way of example. The machine carrier has holding devices for the loading cassette in order to fasten them, together
30 with the substrates therein, in the machine carrier. A loading cassette is designed such that it has a lower support device on which the substrates can be put or on which they can be stacked. It also has a rear side running substantially perpendicular thereto and which
35 holds the substrates in this direction as a type of

vertical stack. The loading cassette is designed such that the side opposite the rear side, and the top side are freely accessible, that is to say, in particular, have no walls, supports or the like.

5 **[0007]** The inventive device can thus be used to introduce a relatively small number of substrates, for example the 100 units mentioned, into the loading cassette, it being possible, for example, to insert three times 100 units into the loading cassette. For
10 this purpose, the loading cassette can even, in some circumstances, be dipped into the bath in which the substrates are located such that their mechanical loading and handling are particularly advantageous. After the loading cassette has been filled with the
15 appropriate amount, it is introduced into the machine carrier such that ultimately the substrates are located in the machine carrier in a precisely prescribed alignment and/or position. This can advantageously take place in such a way that the loading cassettes are
20 firstly introduced from the bottom upwards. There is thus no need for an entire machine carrier to be manipulated by hand or to be introduced with the substrates therein into a bath.

[0008] In one refinement of the invention, the base
25 surface of the loading cassette or of the support device onto which the substrates are put can be not much larger than the surface of the substrates themselves. Consequently, the machine carrier need be designed to be only insubstantially or even not at all
30 larger than to date. This relates chiefly to the width. Thus, not only can the loading cassettes be used with slightly modified, already available machine carriers, but their effect on the machine carrier is a not excessively high outlay, apart from the holding
35 devices.

5 **[0009]** By way of example, a machine carrier can be designed to hold two or, advantageously, three loading cassettes one above another, possibly even four to six such loading cassettes. This also depends on the total amount of the substrates, or on their total weight. A subdivision should be carried out such that a loading cassette with the number of substrates provided for it can still effectively be moved by hand by an operator for the purpose of insertion into the machine carrier.

10 **[0010]** The loading cassettes in the machine carrier should occupy only so much space that removal means for separating and/or removing the uppermost substrates of the substrate stack can engage and/or move into the uppermost loading cassette. Such removal means are
15 advantageously designed as usual or as known, in particular as band conveyors for removing the substrates by suction.

20 **[0011]** The support device on the loading cassette can be designed such that in one refinement of the invention it forms a surface, in particular a substantially continuous surface. This surface can be profiled to improve stability. Alternatively, the support device can have two support surfaces extending on the left-hand and right-hand sides, with a
25 continuous cutout therebetween. The support surfaces are respectively provided on lateral supports which then effect the substantial stability of the support device or of the loading cassette in this region. Said cutout can have at least 35% of the width of the
30 loading cassette, preferably somewhat more, for example 50% to 70%. Furthermore, it can have a depth of at least the depth of a substrate, advantageously even somewhat more. The cutout has the advantage that later on, when individual substrates are being removed from
35 the machine carrier from above, said removal means can be stationary and, so to say, engage in the machine

carrier, and the latter is slowly moved upwards in order in each case to bring the substrates to the underside of the removal means. In this process, the removal means can then move through the loading
5 cassettes in the machine carrier by means of the cutouts such that said loading cassettes need not be removed when they are empty.

[0012] A named lateral support can be profiled in its longitudinal direction in order to increase its
10 stability. For this purpose, it can be singly or multiply angled as a single or multiple U-profile. By way of example, a said support profile can be formed on an intermediate limb which points upwards or lies at the top and which runs between two U-limbs and connects
15 the latter. In a simple refinement of the invention, it is regarded as sufficient when two such somewhat widened support surfaces are provided to left and right for the substrates such that the cutout can be located therebetween. Such a lateral support can be led outside
20 over the width of the loading cassette in a horizontal limb as a type of rail. This limb can then move into a corresponding, horizontal slot-type holding device in the machine carrier in order to secure the loading cassette.

25 **[0013]** In a further refinement of the invention, it is possible to provide on the loading cassette lateral supports which connect the rear side thereof to the outer sides of the support device. They can, for example, be designed as side walls which advantageously
30 have the total height of the rear side, but are not necessarily guided all the way to the front, that is to say are somewhat set back. Such lateral supports can improve the stability of the loading cassette and/or stabilize the angular arrangement between support
35 surface and rear side. Moreover, they can effect a laterally exact positioning of the substrates in the

loading cassette. It is likewise advantageous to provide in the direction of the rear side a stop which can, for example, be arranged directly at the rear side, in particular near the outer side. Such a side wall can be continuous, or else have cutouts.

[0014] In a further refinement of the invention, the rear side is bent away from the support device or the substrates stacked thereon, or cambered. This camber can be designed to be relatively strong and has, for example, a quarter to a third of the width of the loading cassette. As previously described, as a result of the camber rearwards it is possible, firstly, for the removal beyond the substrates to move into the loading cassette. Furthermore, when the region of this camber is downwardly open to the rear, it is possible for broken substrates to fall out downwards and be divided from the separated substrates.

[0015] It can advantageously be provided that the rear side has at least one opening, particularly advantageously a plurality of horizontal slot-like openings. These can advantageously extend substantially over their entire width, also possibly be divided once. A plurality of such slot-like openings can be provided substantially over the entire height of the rear side. These openings serve the purpose of removing broken substrates and/or the individual parts thereof rearwards out of the loading cassette, and thus to the machine carrier.

[0016] For the purpose of better manipulation, a loading cassette can have gripping devices on the rear of at least one side, preferably to the left and right near the outer sides. Said devices can, for example, be designed as vertically extending handlebars, this being particularly good for holding and/or manipulating heavy loading cassettes.

[0017] In a development of the invention, locking devices can be provided in order to fasten or to lock a loading cassette after insertion into the machine carrier. Such locking devices are advantageously
5 designed such that they can be operated with one finger without a large outlay on force, in particular for the purpose of locking. To this end, they can, for example, be provided near an above-described gripping device, for example in the upper region thereof in the case of
10 vertical handlebars. Locking can thus be effected during the gripping of the gripping devices.

[0018] The holding devices on the machine carrier can advantageously be designed to be adjusted or height-adjusted. A machine carrier can therefore be adapted to
15 loading cassettes of different sizes and heights.

[0019] In a further refinement of the invention, it can be provided that at least one retaining element is provided on the side of the machine carrier which is situated opposite the side where the loading cassette
20 is inserted, that is to say on the open side. It advantageously runs vertically. When a loading cassette with substrates is being inserted, the retaining element serves the purpose of preventing it from falling out forwards, that is to say in the insertion
25 direction.

[0020] A machine carrier can advantageously be designed as is known, that is to say consist of a lower plate and an upper plate which are connected by side walls and lateral stay bars. The said insertion side
30 for introduction of the loading cassette into the machine carrier, and the opposite side, on which the substrates are removed, are advantageously substantially free.

[0021] A loading cassette can advantageously consist of fibre-reinforced plastic for the purpose of reducing weight. This also facilitates production in some circumstances. A multipartite loading cassette can be
5 produced by bonding or screwing of a plurality of parts.

[0022] Apart from following from the claims, these and other features also emerge from the description and the drawing, it being possible that the individual features
10 can respectively be implemented on their own or severally in the form of subcombinations in the case of an embodiment of the invention, and in other fields, and can constitute advantageous designs inherently worthy of protection and for which protection is
15 claimed here. The subdivision of the application into individual sections and subheadings do not restrict the general validity of the statements made thereunder.

Brief description of the drawings

[0023] Exemplary embodiments of the invention are
20 illustrated schematically in the drawings and will be explained in more detail below. In the drawings:

Figure 1 shows an oblique view of a loading cassette illustrated in a simplified fashion,

Figure 2 shows a side view of the insertion of a
25 plurality of loading cassettes into a machine carrier,

Figure 3 shows a view obliquely from above of a specially designed loading cassette,

Figure 4 shows a view obliquely from the rear and from
30 above of the loading cassette from Figure 3,

Figure 5 shows a view obliquely from the rear of an inventive device with a machine carrier into which three loading cassettes are inserted in a way similar to Figure 2,

- 5 Figure 6 shows the arrangement from Figure 5, obliquely from the front with in each case one substrate put down on the loading cassettes, and

10 Figure 7 shows a somewhat modified loading cassette in a loading device.

Detailed description of the exemplary embodiments

[0024] Illustrated in simplified form in Figure 1 is a loading cassette 11 which is substantially of angular design. It has a lower support surface 13 which, as
15 illustrated here, is designed in the simplest case just to be continuous. It is designed to be rectangular or square in accordance with the shape of the substrates to be held. The loading cassette 11 has a rectangular rear side 15 running perpendicular to said substrates
20 and is designed as a type of continuous wall. Also provided are two short side walls 16a and 16b which additionally on the one hand effect a better and more stable connection between support surface 13 and rear side 15. Furthermore, they serve as lateral stops for
25 substrates which are inserted into the loading cassette 11 and have substantially the area or at least the width of the support surface 13. The rear stop is formed by the rear side 15 itself.

[0025] The side walls 16a and 16b could be drawn yet
30 further forwards, in some circumstances up to the front side of the support surface 13. This would, on the one hand, improve the stabilizing action. Furthermore, the action of the lateral stops for the substrates would

also be improved thereby. It is also possible for such side walls to be designed to run obliquely.

[0026] Figure 2 illustrates how a loading cassette 11 in accordance with Figure 1 is loaded with a plurality of flat substrates 20. In reality, the substrates 20 are directly on one another and are advantageously silicon wafers for the production of solar cells, for example having dimensions of 156 mm x 156 mm. An abovenamed subset of these substrates 20 is introduced into the loading cassette 11, or the substrates 20 are stacked on the support surface 13. It is to be seen that the stack of substrates 20 occupies approximately only half the height of the loading cassette 11, or that up to twice as many substrates 20 could be introduced. However, as has already been explained at the beginning, even for reasons of the total weight of loading cassette 11 and substrates 20 alone, such a complete filling should usually be omitted.

[0027] Figure 2 illustrates a machine carrier 22 such as is known per se in principle. A lower support plate 24a and an upper support plate 24b are connected by side parts 26a and 26b and form a type of frame that is completely open to the left and right in Figure 2.

[0028] Two loading cassettes 11 have already been introduced into the lower region of the machine carrier 22 and are held therein. By way of example, projecting lugs, guides, slide rails or the like can be provided on the inner sides of the side parts 26a and 26b for this purpose. The loading cassettes 11 are pushed in so far that they bear on the left with their side walls 16 against the rear lateral edge of the side parts 26. Both the support surfaces 13 and, above all, the substrates 20 project towards the right.

[0029] After being loaded with the loading cassettes 11 and thus with the substrates 20, the machine carrier 22 can be moved to a separating device which individually removes the substrates 20 and individually conveys them further for further processing. In a simple case, this can be a downward drop in a vertical direction, advantageously into a water bath. A removal means (here diagrammatically illustrated) in the form of a suction conveyor band 28 can then be brought into use. Said band is narrower than the spacing of the two side parts 26a and 26b in relation to one another, and therefore reaches into the machine carrier 22. It can be let down as far as the substrates 20, while it is possible as an alternative for the machine carrier 22 with the substrates to be moved correspondingly up to the suction conveyor band 28.

[0030] If all the substrates 20 of a loading cassette 11 are removed, it is then necessary either to remove the loading cassette 11 so that the support surface 13 enables the suction conveyor band 28 to be moved further as far as the next deeper stack of substrates 20. Alternatively, either the machine carrier 22 or the suction conveyor band 28 can be moved accordingly. In accordance with a yet further alternative refinement, it is possible to provide in the support surface 13 corresponding to Figure 1 a central cutout which is illustrated and described in the other exemplary embodiment in accordance with Figures 3 and 4.

[0031] The suction conveyor band 28 removes the substrates 20 individually and then puts them onto a separating band 29 running thereunder. However, this is known in principle from the prior art and therefore need not be further explained.

[0032] Figure 3 illustrates a modified loading cassette 111 in the way it can be designed in

particular, by way of example. A support surface is now subdivided into two divided support surfaces 113a and 113b with a far-reaching, central cutout 114 therebetween. The support surfaces 113a and 113b are, 5 so to say, only wide strips, but suffice for substrates to be sufficiently safely put on them in a way corresponding to Figure 2.

[0033] Above all, the support surfaces 113 are provided on lateral supports 117a and 117b which are 10 profiled or multiply corrugated in a longitudinal direction. Their stability can be substantially improved thereby. Outside laterally on the lateral supports 117, the latter are designed as longitudinal rails 118a and 118b which run in a single, horizontal 15 plane and project in lateral fashion substantially beyond side walls 116a and 116b. The longitudinal rails 118 serve the purpose of inserting the loading cassette 111 into corresponding grooves or onto previously described guide rails or the like in the machine 20 carrier, which will be explained in yet more detail below.

[0034] To the rear, the lateral supports 117a and 117b come together behind the rear end of the cutout 114 and are drawn upwards or merge into a rear side 115. As 25 becomes clear from Figure 4, in particular, this rear side 115 is not of flat design and closed as illustrated in Figure 1, but is cambered strongly rearwards. The effect of this is that it always runs behind the cutout 114 and thus permits a suction 30 conveyor band in accordance with Figure 2 to move through. Furthermore, its stability can thereby be improved yet further. Downwards, the rear side 115 merges precisely without the transition and in a rounded fashion into the lateral supports 117 or the 35 rear edge of the cutout 114.

[0035] Above all, it is also to be seen from Figure 4 that slot-like openings 119 are provided on the rear side 115. Said openings are divided in the middle or do not extend over the entire width of the rear side 115, in order to increase the stability. Nevertheless, the openings 119 in the rear side 115 occupy approximately half the edge area. Alternatively, they are continuous.

[0036] It is to be seen from Figure 3 that vertically running stop strips 131 run in the transition between the rear side 115 and the side walls 116a and 116b. Said stop strips serve as stop for inserted substrates in the direction of the rear side 115. Like the support surfaces 113a and 113b, they can consist of another material than the loading cassette 111 itself, and/or be coated or surfaced, for example with materials that are more wear resistant or softer, in order to protect the substrates.

[0037] Provided on the outer sides of the rear side 115 are two grips with the aid of which the loading cassette 11 can be gripped and moved, particularly when it is loaded with substrates.

[0038] Locking devices 135a and 135b are provided on the top side of the rear side 115, which is drawn somewhat forwards and inwards and is also connected to a top edge of the side walls 116. Such a design is known in principle, and the locking devices 135 serve the purpose of securing the loading cassette 11 in a machine carrier after being inserted therein. If the locking devices 135 are pressed downwards, a loading cassette 111 can also be removed again. It is to be seen that the arrangement of the locking devices 135 near the grips 133 enables easy operation by thumb, that is to say while the loading cassette 111 is being securely held.

[0039] The openings 119 serve to enable broken substrates or their individual parts to fall out rearwards, that is to say approximately in a horizontal direction, as it were, and not to cause a disturbance.

5 It is true that continuous openings would be even better for this purpose, but they would excessively impair the stability of the loading cassette 111. A similar function is performed by the cutout 114 with the region that is drawn far to the rear and reaches up

10 to just in front of the rear side 115. Here, such fragments could fall directly downwards and thereby likewise be removed from the loading cassette 111.

[0040] Figures 5 and 6 illustrate how three loading cassettes 111 in accordance with Figures 3 and 4 are

15 introduced into a machine carrier 122. On the holding devices mentioned at the beginning, the machine carrier 122 has on the inner sides of the lateral parts 126a and 126b single horizontal, slot-type grooves 137 which extend over the entire width of the lateral parts 126.

20 Such grooves 137 can be provided at specific points, and this then enables the loading cassette 11 to be inserted precisely in this position. It is also possible to provide far more than the three grooves 137 illustrated, and this then in principle enables

25 insertion at different heights.

[0041] Also provided are locking stirrups 139, at least over the lowest and over the second lowest loading cassette 111. They are fastened laterally outside on the lateral parts 126a and 126b and the

30 course of their extent corresponds to that of the rear side 115 in the loading cassette 111 over the width thereof. The locking devices 135 of the loading cassettes 111 can engage and/or lock the locking stirrups or the underside thereof. For the sake of

35 clarity, no illustration of such a locking stirrup has been given above the uppermost loading cassette 111.

Such locking stirrups 139 can also be provided at appropriate bores or the like at a different height.

5 **[0042]** It is also illustrated how sliding layers 127a and 127b are provided on the inner sides of the lateral parts 126a and 126b. Said layers consist, for example, of thin, ceramic inserts which are bonded on the inner side of the lateral parts 126 and prevent the possibly sharp lateral edges of inserted substrates from damaging the material permanently.

10 **[0043]** Figure 6 illustrates how one substrate 120 in each case rests on each of the support surfaces 113 of the loading cassette 111. These substrates 120 bear in this case against the stop strips 131 with their rear edge. Also to be seen from this illustration is the
15 fact that fragments of such substrates can either be removed in a horizontal direction rearwards through the openings 119 in the rear sides 115 or, since the machine carrier 122 is then located in a water bath together with substrates 120, can be flushed out.
20 Alternatively, they can fall downwards through the rear regions, withdrawn to the rear, of the cutout 114 between the support surfaces 113a and 113b. It is true that in this case the fragments fall from the uppermost loading cassette 111 into the loading cassettes lying
25 therebelow. However, in practice they will simply likewise fall through the latter, and this then is likewise not a problem.

30 **[0044]** The figures do not illustrate the previously named retaining elements. By way of example, in the illustration of Figure 6 these can be provided in front of that side of the machine carrier 122 which is open from the plane of the drawing, for example as elongated bars which are fastened at the top and bottom on the support plates 124a and 124b. They can, for example,
35 run in accordance with the course of the stop strips

131, but such a retaining element is also possible here only on one side. It is then advantageously possible after completion of the insertion of the loading cassettes 111 into the machine carrier 122 for said
5 retaining element to be removed, specifically either completely removed or, for example, pivoted to the side. This enables the removal of the individual substrates 120 with the aid of a previously described suction conveyor band.

10 **[0045]** Figure 7 shows a loading cassette 211 of somewhat different design. Proceeding from the loading cassettes illustrated in Figures 3 and 4, said cassette differs to the extent that the side walls 216a and 216b are drawn out from the rear side 215 over the entire
15 height as far as the foremost end of the lateral supports 217a with support surfaces 213a. It is thereby possible to improve the lateral guidance of substrates which are to be inserted, which has been addressed previously. A cutout 214 is likewise provided between
20 the lateral supports 217. Provided on the rear side 215 are grips 233a and 233b and, thereabove, once more locking devices 235a and 235b.

[0046] As a further modification, the rear side 215 has two large openings 219 which are, in turn,
25 separated by a web for the purpose of better stability. Since the side walls 216 now adjoin the lateral supports 217 on the outside, the longitudinal rails 218a and 218b are in this case provided, for the sake of simplicity, as lengthened side walls on the upper
30 region thereof, specifically by bending the side walls up and outwards. In this case, holding devices and the grooves in the machine carrier in accordance with Figure 5 are provided at a correspondingly different site.

[0047] Illustrated in Figure 7 as a further particular feature is the fact that the loading cassette 211 is inserted into a loading device 240. As may be recognized, the loading device 240 is designed such that the loading cassette 211 can be inserted obliquely from above into a rail-like or U-like holder 241. It thereby continues to be effectively accessible from above, and inserted substrates slide under their own weight up to stop strips (not illustrated here) which are likewise provided as in Figure 3. It is thereby possible to substantially simplify the operation of loading the loading cassette 211 with substrates, both for an operator and for the substrates. In order to remove a filled loading cassette 211, it can either be withdrawn or lifted out in the direction of the lateral supports 217, or else simply withdrawn or lifted out vertically upwards.

[0048] A further advantage of the side walls 216, particularly when they are drawn far forwards in accordance with Figure 7, specifically, by way of example, to exactly the same length as the support surfaces or the lateral supports, resides in the fact that it is likewise possible in this region for the substrates to be held in a self-closed fashion, as it were. It is then even less likely that fragments of these substrates can come between loading cassette and machine carrier or lateral parts of the machine carriers, where they could impair the function.

[0049] The aim of providing at least one loading cassette in the machine carrier is to reduce mechanical stress exerted on the substrates or wafers, and also to reduce the risk of breakage. This is also achieved, inter alia, by virtue of the fact that the total amount of the substrates stacked one above another is reduced and that the height of the stack is reduced. For this purpose, in some circumstances even a plurality of

supporting devices is the manner of intermediate bases can be provided for each loading cassette. Again, loading which is possible in accordance with the invention is associated with a lower risk of breakage
5 when the substrates can be reloaded with as few manual steps as possible and, above all, need no longer be pressed together.

Patent Claims

1. Device for stacking and/or transporting a plurality of flat substrates such as silicon wafers for solar cell production, the device having an upright standing machine carrier for holding a plurality of flat substrates as total amount, the substrates being provided in a horizontal position in the machine carrier, characterized in that the device has at least one loading cassette for introducing a fraction of the total amount of the substrates therein, and the machine carrier having holding devices for the loading cassette, a loading cassette having a lower support device for putting substrates on in stack-like fashion, and a rear side running substantially perpendicular thereto, the loading cassette being designed in such a way that the side opposite the rear side, and the top side are freely accessible.
2. Device according to Claim 1, characterized in that the base surface of the loading cassette or of the support device is not much larger than the surface of a substrate to be introduced therein, in particular only insubstantially wider.
3. Device according to Claim 1 or 2, characterized in that the machine carrier is designed for holding two, advantageously three, loading cassettes one above another, and has holding devices therefor, the loading cassettes preferably having only a slight spacing from one another and there being sufficient space above the uppermost loading cassette for the intervention of a separating device for separating and/or removing the uppermost substrates of the substrate stack in the loading cassette.

4. Device according to one of the preceding claims, characterized in that the support device has two support surfaces which extend on the left-hand and right-hand sides and have a continuous cutout therebetween, the support surfaces preferably being provided in each case on lateral supports, and wherein the cutout therebetween has at least 35% of the width of the loading cassette, preferably approximately 50% to 70%.

5. Device according to Claim 4, characterized in that the cutout has a depth of at least the depth of a substrate, preferably at least 20% deeper.

6. Device according to one of Claims 4 or 5, characterized in that a lateral support is profiled in a longitudinal direction, preferably being singly or multiply angled as at least a single U-profile, the support surface preferably being formed on an upwardly pointing intermediate limb between two U-limbs.

7. Device according to one of the preceding claims, characterized in that lateral supports are provided on the loading cassette in a fashion directed from the rear side of the loading cassette to the outer sides of the support device, in particular as a substantially continuous side wall.

8. Device according to one of the preceding claims, characterized in that the rear side of the support device is bent away and/or cambered, preferably having one or more horizontal openings which extend over a large part of its width and are in particular provided over the entire height of the rear side.

9. Device according to one of the preceding claims, characterized in that on at least one side, preferably on both sides, the loading cassette has gripping

devices, particularly outside on the rear side, preferably with a substantially vertically running handlebar.

5 10. Device according to one of the preceding claims, characterized in that locking devices are provided for fastening or locking a loading cassette in the machine carrier after their insertion, these preferably being
10 one finger and are provided, in particular, on a gripping device according to Claim 9 or very near thereto.

11. Device according to one of the preceding claims,
15 characterized in that a holding device for the loading cassette on the machine carrier is designed such that it can be adjusted or height-adjusted.

12. Device according to one of the preceding claims,
20 characterized in that the machine carrier has at least a substantially vertically running retaining element on that side of the machine carrier which is situated opposite an insertion side of the loading cassette into the machine carrier in order to retain the substrates
25 during introduction of the loading cassette.

13. Method for introducing a total amount of a large number of flat substrates into a device in accordance with one of the preceding claims, characterized in that
30 a fraction of the substrates are introduced or inserted into the loading cassette and then the loading cassette is introduced into the machine carrier and preferably fastened therein, at least two such loading cassettes being loaded with substrates and introduced into the
35 machine carrier.

14. Method according to Claim 13, characterized in that the introduction of a plurality of loading

cassettes into the machine carrier takes place sequentially, the loading cassettes preferably being introduced from the bottom one after another.

5 15. Method according to Claim 13 or 14, characterized
in that the machine carrier is arranged above a water
bath and can be moved essentially in a vertical
direction, a loading cassette being moved as far as
possible downwards into the water bath after being
10 introduced into the machine carrier in order to dampen
the introduced loading cassette and/or the substrates
located therein, the insertion of the next higher
loading cassette taking place substantially outside the
water.

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16. Method according to one of Claims 13 to 15,
characterized in that substantially fixed removal
means, in particular a suction conveyor band, move into
the machine carrier in order to separate the substrates
20 from a stack above the uppermost loading cassette and
remove individual substrates from top to bottom, the
removal means preferably moving through the cutouts in
accordance with Claim 4 into the support devices during
movement of the machine carrier in a vertical
25 direction.