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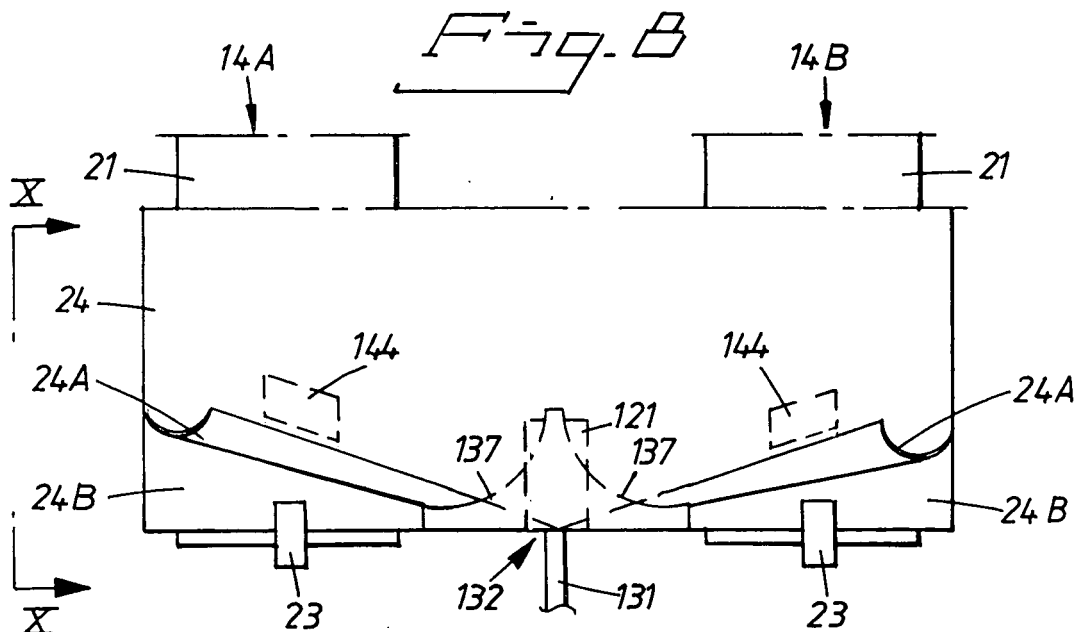
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(54) **A device for opening folded sheets during transportation**

(57) A device for opening folders (24) during transportation comprises an opener (91) arranged to run together along and next to the transversally central area of the folder tail. The opener is provided with a wedge (132) that is driven into the folder tail. The wedge has two support edges (137) that diverge from the wedge tip (138) in a direction opposite the drive-in direction of the wedge in the folder, away from each other in the plane

of the folder, as well as away from the extension plane of the folder so that an outer folder part (24A) deflected upon the driving-in of the wedge (132) will be supported by the wedge support edges (137) at separated positions along the folder tail, whereby a subjacent inner folder part (24B) is exposed so that a gripper (23) on a leading wall (21) in a folder conveyor can fix the subjacent inner folder part (24B) against the leading wall (21).



Description

[0001] The invention relates to a device for opening folders of the kind that is seen in the preamble of claim 1.

[0002] SE-C-464757 shows a device by means of which folders can be opened during controlled transportation piece by piece, for feeding one or more supplements into an opened folder. In that connection, there is utilized an endless conveyor carrying generally V-shaped pockets, each one of which receives a folder, the back of the folder being placed in the bottom of the pocket. At the outer free border part thereof, at least one wall of the pocket has one or more controllable clips for gripping of one tail part of the opened folder.

[0003] According to technique known from practice, said folders are formed so that one half thereof is somewhat longer than the other half as counted from the back. The clips can only grip the outermost end of the longer half of the folder, and in this way, the shorter half of the folder can be turned away from the longer half of the folder, for instance, by the fact that the pocket is turned so that the shorter half of the folder, under the action of the gravity, will rest against the adjacent wall of the pocket. Possibly, the shorter half of the folder may also be gripped by means of appurtenant controllable grippers on the adjacent other pocket wall. One or more supplements can now be fed into the accordingly opened folder.

[0004] Possibly, there may be a gripper clip at the bottom of the pocket to retain the folder in the pocket, when the pocket has such an orientation (for instance, facing downward) that there is a risk that the folder otherwise could fall out of the pocket.

[0005] A folder conveyor having such clips or controllable grippers may run synchronously with the pocket conveyor.

[0006] The opening of each folder is a critical part of the process. In practice, said folders may consist of newspapers that come from a newspaper press with a flow of 10-15 newspapers per second, and then it may be desirable to carry out 10-15 folder opening operations per second to be able to supply each newspaper in the flow from the press with one or more supplements. Even if the insertion process is carried out on a flow of newspapers off-line, it is desirable to be able to carry out the folder opening at a correspondingly high pace.

[0007] Therefore, an object of the invention is to provide a technique that allows opening folders at a folder-tail edge at a high pace, while said folders are transported piece by piece by a conveyor at a high flow, also when the folder sheets are entirely overlapping at the folder tail.

[0008] DE-A-1436585 reveals an insertion technique in which folders, during separate transportation in the respective pockets, are opened for insertion by clamping the folder against a pocket wall and by sticking a wedge into the side edge of the folder at a preselected distance from the supporting pocket wall. In this way, the folder can be opened at a well-determined position, even if the sheets of the folder are mutually equal and entirely over-

lap each other. A drawback is that the wedge only can have a small width, and that the gap between the folder pages, in the area where the wedge is stuck in, only slowly propagates along the free folder edges, since the wedge should have a small wedge angle and therefore has to be introduced far into the folder to cause a propagation of the gap. When the gap eventually has become opened also at the tail of the folder, a thread of a screw is introduced between the opened folder portions in order to further separate the same and hold them apart during the following transportation of the folders to a station where a supplement is introduced into the opened folder. The technique according to DE-A-1436585 is slow by nature and can therefore not be used for the purpose according to the invention.

[0009] The object is attained by the invention.

[0010] The invention is defined in the appended independent claims.

[0011] Thus, in one embodiment, the invention relates to a device for opening folders during transportation, a folder conveyor comprising an endless chain having folder pockets that are arranged mutually equidistantly and have a wall each running ahead in the direction of transportation and, at a free edge, having at least one gripper for clamping a tail portion of an adjacent folder part against said leading wall, an opener being arranged to run together with the leading folder wall along at least a part of the path of motion thereof, and the opener comprising a clamping jaw arranged to clamp the folder against the support, and a wedge that has a tip and that is displaceable for introducing the tip into an edge of the folder at a selected distance from the support. In that connection, the device is characterized in that the opener is arranged to run along the transversal centre of the folder tail, that the wedge has two support edges that diverge in a direction opposite the drive-in direction of the wedge, away from each other in the plane of the folder, as well as away from the support carried by the opener in the vicinity of the free edge of the leading pocket wall so that an outer folder part deflected upon the driving-in of the wedge is supported by the two wedge support edges separated along the folder tail, whereby the gripper on the leading pocket wall can fix the non-deflected folder part against said pocket wall. The clamping jaw of the opener is preferably arranged to be biased against the support in order to hold together the folder tail in the transversally central area thereof where the wedge tip is driven-in. The wedge is driven-in so that the two support edges thereof support the deflected folder part in separated positions along the folder tail, and at a distance from the folder edge (within the extension area of the folder), while the clamping jaw holds the folder compressed at the folder-tail edge. In this way, the deflected folder part will, along the folder tail, form two triangular parts, the tips of which are situated at the transversally central edge of the folder tail and at the clamping jaw. In order to further support a controlled turning-up of the triangular edge portions of the deflected folder part, the

opener may also comprise additional clamping jaws that are pressed against the folder (and offer a clamping of the folder against the leading pocket wall) at a position above the deflection line of the triangular folder part that, in that connection, is established in the maximally introduced state of the wedge. Thus, said additional clamping jaws are separated from the transversal centre of the folder, on both sides thereof. In the areas below the bent-up upper triangular folder parts, the gripper of the leading pocket wall may be reliably pressed against the folder part situated closest to the pocket wall. The continued opening of the folder may, for instance, be effected such as has been disclosed in connection with the device according to SE-C-464757. The insertion into, and the transportation away of the folder including input supplements can also be effected according to prior art, for instance, such as it is seen in SE-C-464757.

[0012] An embodiment of the invention will now be described by way of examples, reference being made to the appended drawing.

- Fig. 1 schematically shows a side view of an insertion apparatus.
- Fig. 2 schematically shows a section taken along the line A-A in Fig. 1.
- Fig. 3 shows a gripper of a gripper conveyor by means of which folders can be transported through an insertion apparatus according to the invention.
- Fig. 4 schematically shows a pocket included in the insertion apparatus.
- Fig. 5 shows a variant of an insertion apparatus, having another transportation of the folders that are provided with supplements.
- Fig. 6 shows a schematic side view of a folder opener that engages with a folder tail.
- Fig. 7 shows a schematic section view taken along the line VII-VII in Fig. 6.
- Fig. 8 shows a view corresponding to Fig. 7 when the wedge of the opener has been driven into the folder tail.
- Fig. 9 illustrates a schematic section taken along the line IX-IX in Fig. 7.
- Fig. 10 illustrates a schematic view taken along the line X-X in Fig. 8.
- Fig. 11 shows a planar view of the wedge and arms of the opener.

Fig. 12 shows a view taken along the line XII-XII in Fig. 11.

Fig. 13 shows a side view taken along XIII-XIII in Fig. 11.

[0013] The device according to Figs. 1-4 corresponds substantially to the one according to Figs. 1-4 in SE-C-464757, but has in Figs. 1 and 2 been supplemented with an additional conveyor 90 that carries openers according to the invention for folders transported in the insertion apparatus. A conveyor 90 is also shown in connection with the apparatus illustrated in Fig. 5.

[0014] Fig. 1 schematically illustrates an endless conveyor 10 comprising a chain 11 that runs over two chain wheels 12, 13, at least one of which is driven for rotation in the direction indicated. The conveyor 10 contains two equal parts displaced in the axial direction of the wheels 12, 13, each one of which parts is a series of pockets 14 that mouth outward away from the chain 11 and extend transverse to the longitudinal direction of the chain 11. Each pocket 14 consists of a leading wall 21 and a trailing wall 22, and a clip 23 at the outer end of the front wall 21. An endless conveyor 40 has controllable grippers 45 at a mutual distance, corresponding to the distance between adjacent pockets 14 of the chain 10. The transportation chain 40 is guided by a shown guide, so that the grippers 45 run along and close by the path of the chain 11 along a part of the running path thereof such as is shown. Each gripper 45 carries the back of a folder 20 and converges toward the chain 11 so that each folder is lifted into an appurtenant pocket. Correspondingly, the conveyor 40 and the grippers 45 may leave the pockets by the fact that the conveyor chain 40 diverges from the conveyor 10. While the pockets are turned substantially over the horizontal plane, the grippers 45 can be opened. A supplement 61 can be fed out from a storage 60 and be introduced into an opened folder in a pocket that is facing upward so that the gripper 45 in question can be open, whereby the supplement 61 can be introduced up to the back of the folder and thereby reliably be retained in the folder during further transportation by means of a gripper 45. The conveyor 45 may be a conveyor that picks up the folders (newspapers) from a printing press or the corresponding production area.

[0015] Fig. 5 shows an embodiment where the grippers 45' are fixedly attached on the conveyor 10 at the bottom area of the pockets. In this case, folders 20 are fed down into passing pockets by means of a feeding-in device 200. Furthermore, two feeding-in devices 60, 61 are shown for supplements, and in addition, a device 70 is illustrated that after the opening of the clip 23 closes the folder including supplements and puts the folder in a pre-determined position, for instance, so that it abuts against the trailing wall of the pocket. In this way, an unloading conveyor 80 having grippers 83 can work synchronously with the conveyor 11 and grip the closed folders including the supplements in the tail for transportation away.

[0016] In Figs. 1 and 5, it can be assumed, as an example, that the pockets, as facing downward, have, for instance, the front walls 21 thereof situated approximately in the vertical plane, so that the unopened folder tends to lie next to this wall 21. It can be seen that an endless conveyor 90 carries openers 91, which have a mutual distance corresponding to the pitch between the pockets 14, the conveyor 90 being synchronized with the conveyor 11 so that an opener 91 is placed close by the outer end of the front wall 21 of each pocket 14 and synchronously accompanies the same a chosen distance. Figs. 2-4 illustrate that the conveyor 11 may contain two mutually equal conveyor parts 14a and 14b, wherein the grippers 45 may run between said parts 14a, 14b. In Fig. 3, it can be seen that the gripper comprises a support chute 46, 47, the bottom line 49 of which corresponds to the bottom line of the pockets 14. The clips 45 further comprise a movable clamping jaw 48, which co-operates with a stationary clamping jaw 47 that is shown to be a wall in the support pocket. Possibly, the walls of the pockets may be mounted around spindles 49 at the bottom of the pocket, and furthermore, the walls of the pockets may be provided with drivers 25, 26 that co-operate with control members that control the turning motion of the walls 20, 21 during transportation, if desired.

[0017] The opener conveyor may be assumed to be located between the conveyor parts 10a, 10b, such as is illustrated. Fig. 6 schematically illustrates an opener 91 of the conveyor 90. In Fig. 6, the tail end 24 of a folder 20 can be seen. The folder 20 abuts against the front pocket wall 21, which lies in the plane 26 indicated. The opener 91 comprises a body 92, which is fitted into the transportation chain 90. Via a pivot mounting 109, the body 92 carries an arm 110, which at one end is provided with a support plate 111 and which has a tracer 112, for instance, a tracer roller that is guided by a guiding path, so that the support plate 111 can be put under in order to allow the folder tail 24 to come into and out of the position shown without being blocked by the plate 111. Furthermore, the plate 111 should assume an exact end position, which is shown in Fig. 6 and which preferably lies in the vicinity of the plane 26. In addition, the body 92 carries via a pivot mounting 119 an arm 120, which is turnable into and out of the shown position. The arm 120 is shown to carry a clamping jaw 121, which is connected to the arm 120 via a pivot mounting 122. A spring 123 resting against the arm 120 biases the clamping jaw 121 into an outer end position. The pivot mounting 122 and the spring 123 allow the clamping jaw 121 to assume end positions at different distances from the support plate 111 when the arms 110, 120 have assumed the end positions thereof shown.

[0018] The arm 120 may be turned around the mounting 119 into a folded-away position to allow the folder tail 24 to be easier introducible into the shown position in relation to the body 92.

[0019] The arm 120 is shown to have a tracer 124, for instance, in the form of a roller, which is guided by an

appurtenant guiding path, not shown in more detail, which is formed to bring about the different turning positions of the arm 120 during transportation.

[0020] The arm 120 of the opener and possibly also the arm 110 can be turned away to allow the opener to diverge away from the path of motion of the pockets, without mutual interference. The free folder part 20b comes into abutment against the tailing folder wall 22 and turns up toward the horizontal plane, i.e., at the left end of the conveyor according to, for instance, Fig. 5. A clip at the outer edge of the rear pocket wall 22 can then clamp the tail end of the folder part 20b in a known manner per se, if it is desirable to hold both end edges of the folder parts 20a, 20b retained at the pocket walls during an insertion operation.

[0021] In, for instance, Fig. 5, it can be seen that the conveyor 90 comprises an endless chain 92 that runs around two chain wheels 93, at least one of which is driven. One run of the chain extends along the path of motion of the free edges of downwardly turned pockets, and the pitch between the openers 91 corresponds to the pitch between the pockets 14.

[0022] Furthermore, the body 92 is shown to have a guide 130 for a bar 131, which thereby is movable in a direction parallel to the support surface of the support plate 111 and thereby parallel to the main surface of the folder. The bar 131 is, at one end thereof, provided with a wedge 132, having a leading lip 134. The lip 134 is preferably parallel to the support surface of the support plate 111 and essentially perpendicular to the linear direction of motion of the bar 131. The front surface of the wedge that is facing the support plate 111 is preferably parallel to the support surface of the support plate. The bar 131 is shown to have a tracer 139, in the form of a roller that is guided by a guiding path (not shown) along the path of motion of the opener and the pocket, whereby the bar 131 is imparted a chosen reciprocating motion by which the wedge 132 is driven into the folder tail 24. In this way, the wedge 132 initiates an opening of the folder tail. By adjusting the distance along the chain of the conveyor 90 between the support plate 111 and the wedge 132, it is possible to exactly select the position for the penetration of the wedge into the folder tail, i.e., between which pages the folder should be split. The wedge 132 penetrates into the folder tail between the support plate 111 and the spring-loaded clamping plate 121. In Fig. 9, it can be seen that the clamping jaw 121 holds together the folder tail also when the wedge 132 with the shank thereof connecting thereto is driven into the folder tail.

[0023] In Figs. 11, 12, 13, it can be understood that the wedge 132 has a tip 138 that is thin and has a lip that is parallel to the extension plane of the folder. The wedge has furthermore two arms 136 that extend toward opposite directions from the tip part, and away from the plane defined by the wall 21. The arms 136 have, on the upper sides thereof facing the folder tail, a guide edge 137 each. Said guide edges extend from the tip 138 and are sub-

stantially symmetrically diverging out of the plane of the wall 21 and away from the tip and the wedge-driving shank 131 that is shown to extend in the displacement direction of the wedge. The wedge 132 is shown to be carried by a shank 131 that lies in a symmetry plane to the wedge, and the guide edges 137 are accordingly mirror-symmetrical in relation to said plane. By the fact that the arms 136, in the portions thereof closest to the shank 131, extend substantially in the plane of the folder and not until at a relatively great distance from the shank 137 have portions that extend transverse to the plane of the folder, the upper folder tail part 24A will be carried at a relatively great distance from the tip 138. The guide edges 137 try to roll up the outer folder tail part when the guide edges reach a level above the folder tail as viewed in Fig. 7, and since the effective parts of the guide edges 137 are at a relatively great distance from each other, a stable bending-up of the outer folder part 24B can be attained, which allows the grippers 123 to be driven into engagement with the subjacent folder tail part 24B. By the fact that the clamping jaw 121 and the support 111 hold together the folder tail all the way to the lower edge thereof, also when the central part of the wedge 132 is introduced in the intermediate folder tail part, the bent-up outer folder tail parts 24A will assume the shape of triangular tongues, such as is shown in Fig. 8. In this way, the upturned outer folder tail parts 24A are further stabilized. Possibly one may, such as is schematically illustrated at 144 in Fig. 8, temporary press supporting shoulders against the free main surface of the folder in the area above the bent-out folder tail part 24A and so that the same experiences an additional stabilization during the period of time when the gripper 23 should be pressed. As soon as the grippers 23 have gripped the folder tail parts 24B, the wedge 132 can be retracted and the opener has fulfilled the work thereof. In Fig. 13, it can be seen that the wedge tip 138 has a small width and a sharp lip 134 extending parallel to the extension plane of the folder, the side of the wedge tip facing the wall 21 being parallel to the same while the corresponding surface 135 of the wedge tip converges in relation to the surface 133 toward the lip 134.

Claims

1. A device for opening folders during transportation, comprising a folder conveyor (11, 12, 13) that has an endless chain having folder pockets (14) that are arranged at a mutual distance and have a wall (21) each running ahead in the direction of transportation and, at a free edge situated at the folder tail, having at least one gripper (23) for clamping a tail portion (24) of an adjacent folder part (24B) against the pocket wall (21), an opener (91) being arranged to run together with the pocket along at least a part of the path of motion thereof and the opener comprising a clamping jaw (121) arranged to clamp the folder

against a support (111), and a wedge (132) that has a tip and that is displaceable for introducing the tip (138) into an edge of the folder at a selected distance from the support, **characterized in that** the opener (91) is arranged to run along the transversally central area of the folder tail, that the support (111) is carried by the opener, and that the wedge has two support edges (137) that diverge from the wedge tip (38) in a direction opposite the drive-in direction of the wedge in the folder, away from each other in the plane of the folder, as well as away from the support (111), so that an outer folder part (24A) deflected upon the driving-in of the wedge is supported by the two wedge support edges (137) separated along the folder tail and exposes a subjacent inner folder part (24B) so that the gripper (23) on the leading pocket wall can fix the non-deflected folder part against the pocket wall.

2. Device according to claim 1, **characterized in that** the clamping jaw (121) of the opener (91) is spring-loaded toward the support in order to hold together the folder tail in the transversally central area where the wedge tip (132) is driven-in, and where the wedge has a small thickness in the thickness direction of the folder.
3. Device according to claim 2, **characterized in that** the wedge (132) is arranged to be driven-in into such a depth in the folder that the two support edges thereof support the deflected outer folder part (24A) in separated positions along the folder tail and in the area over the folder main surface, at a distance from the folder edge, while the clamping jaw holds the folder compressed at the folder-tail edge, so that the deflected outer folder part (24A) forms two triangular areas, the tops of which meet at the folder-tail edge.
4. Device according to any one of claims 1-3, **characterized in that** the pocket wall carries two grippers (23) that are separated along the free edge of the pocket wall.
5. Device according to any one of claims 1-4, **characterized in that** the support (111) is turnably arranged on the body (92) into and out of the support position thereof.
6. Device according to any one of claims 1-5, **characterized in that** the clamping jaw (121) is pivotally mounted (122) and spring-supported on an arm (120), which is pivotally mounted (119) on the body (92) into and out of an end position in which the clamping jaw (121) can assume different spring-loaded turning positions in relation to the arm (120).
7. Device according to any one of claims 1-6, **characterized in that** the arm (110) carrying the support

plate (111), the wedge (132) and the arm (120) carrying the clamping jaw (121) each has a tracer (112, 137, 122) that co-operates with the appurtenant guiding path for guiding their motions in relation to the body (92) along a path of motion of the body (92). 5

8. Device according to any one of claims 1-7, **characterized in that** at least one opener (91) is carried by an endless conveyor (90), which brings the opener to run together with a running pocket (14) in order to, during the transportation of a folder therein, open the folder. 10

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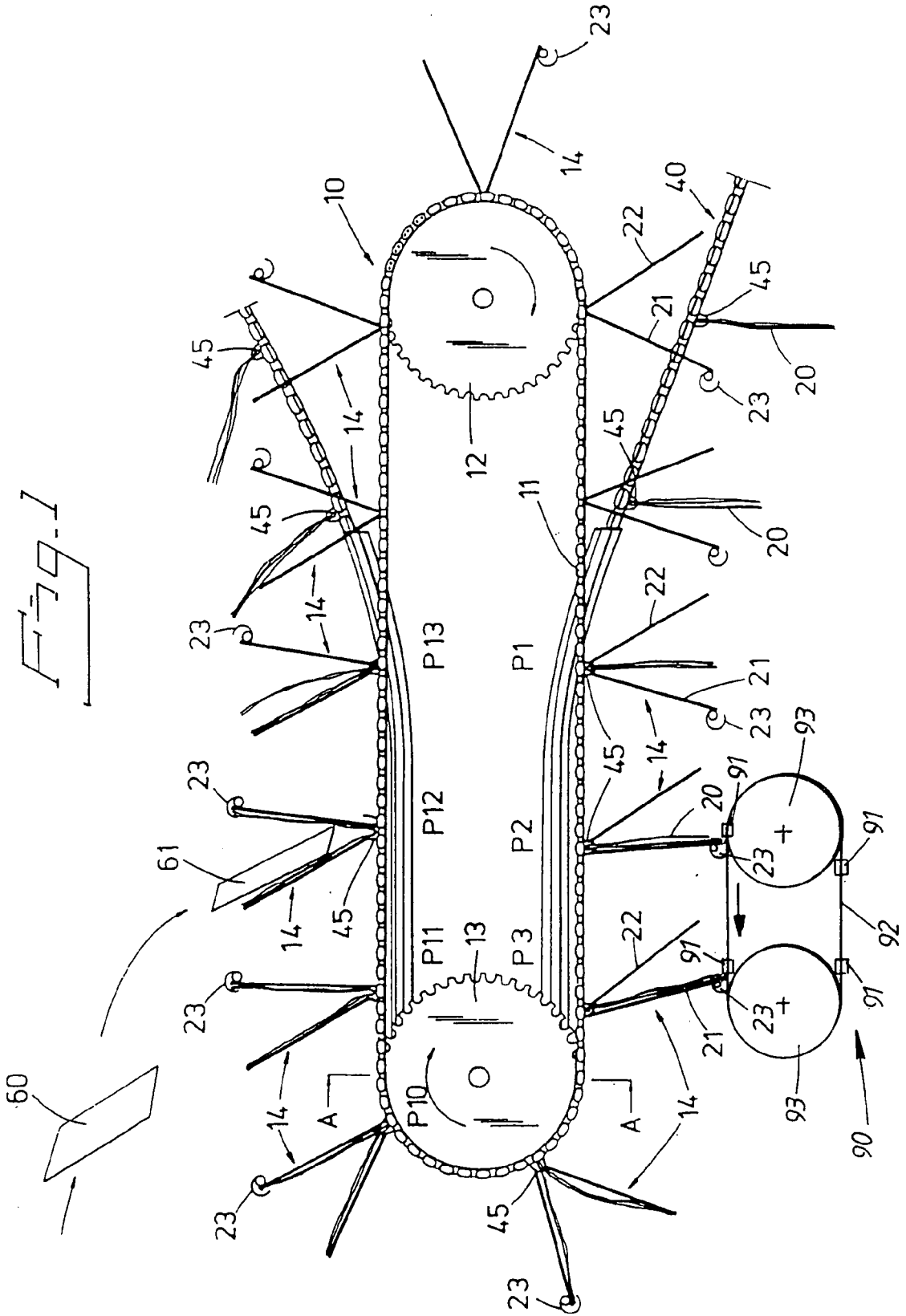


Fig. 2

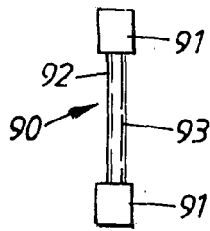
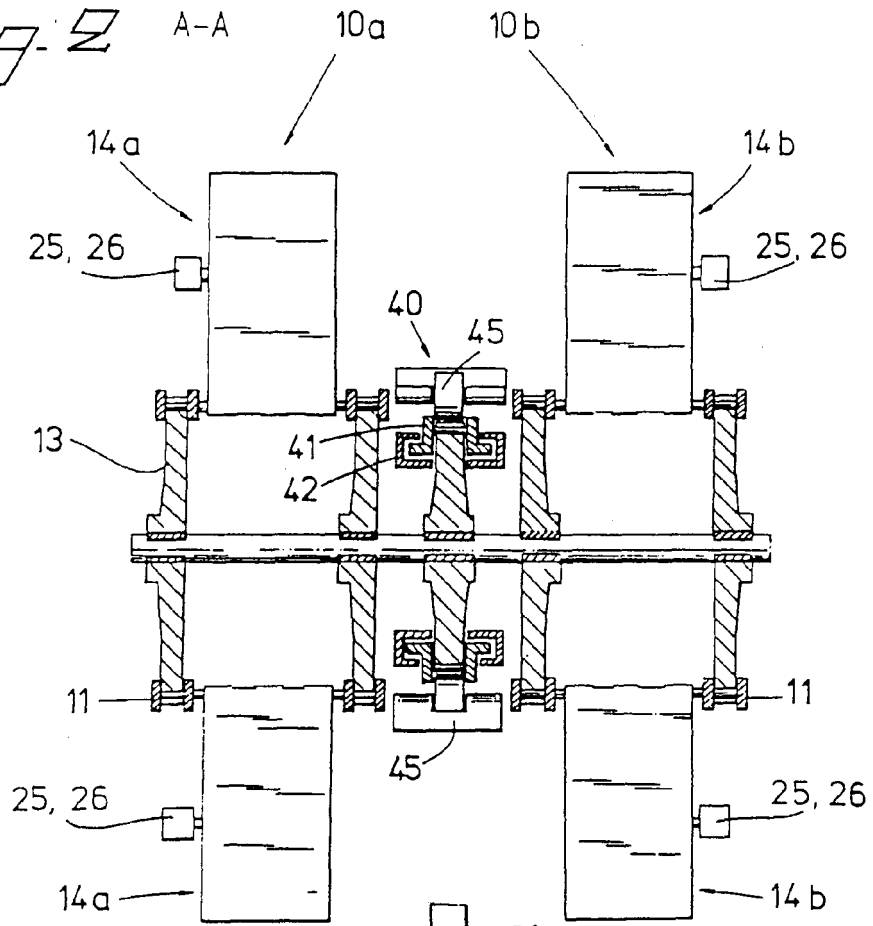
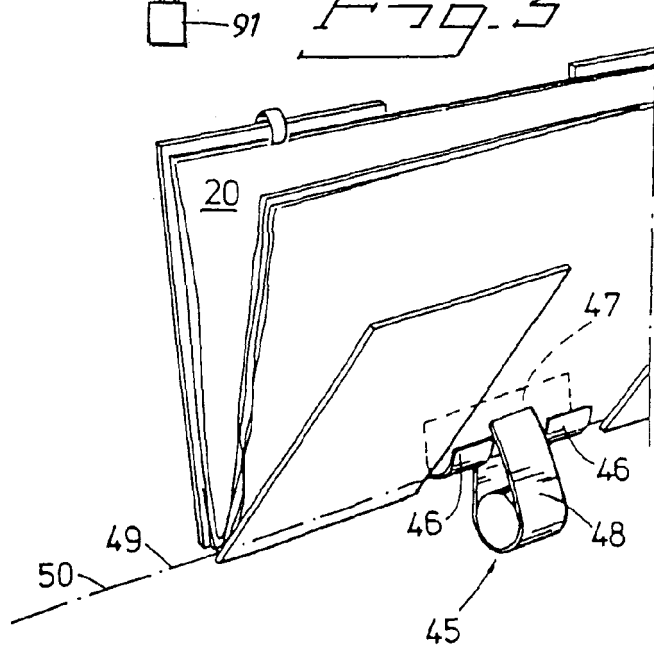
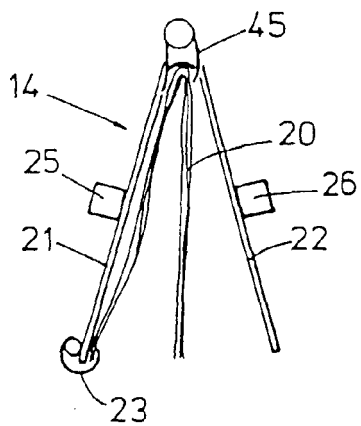


Fig. 3

Fig. 4



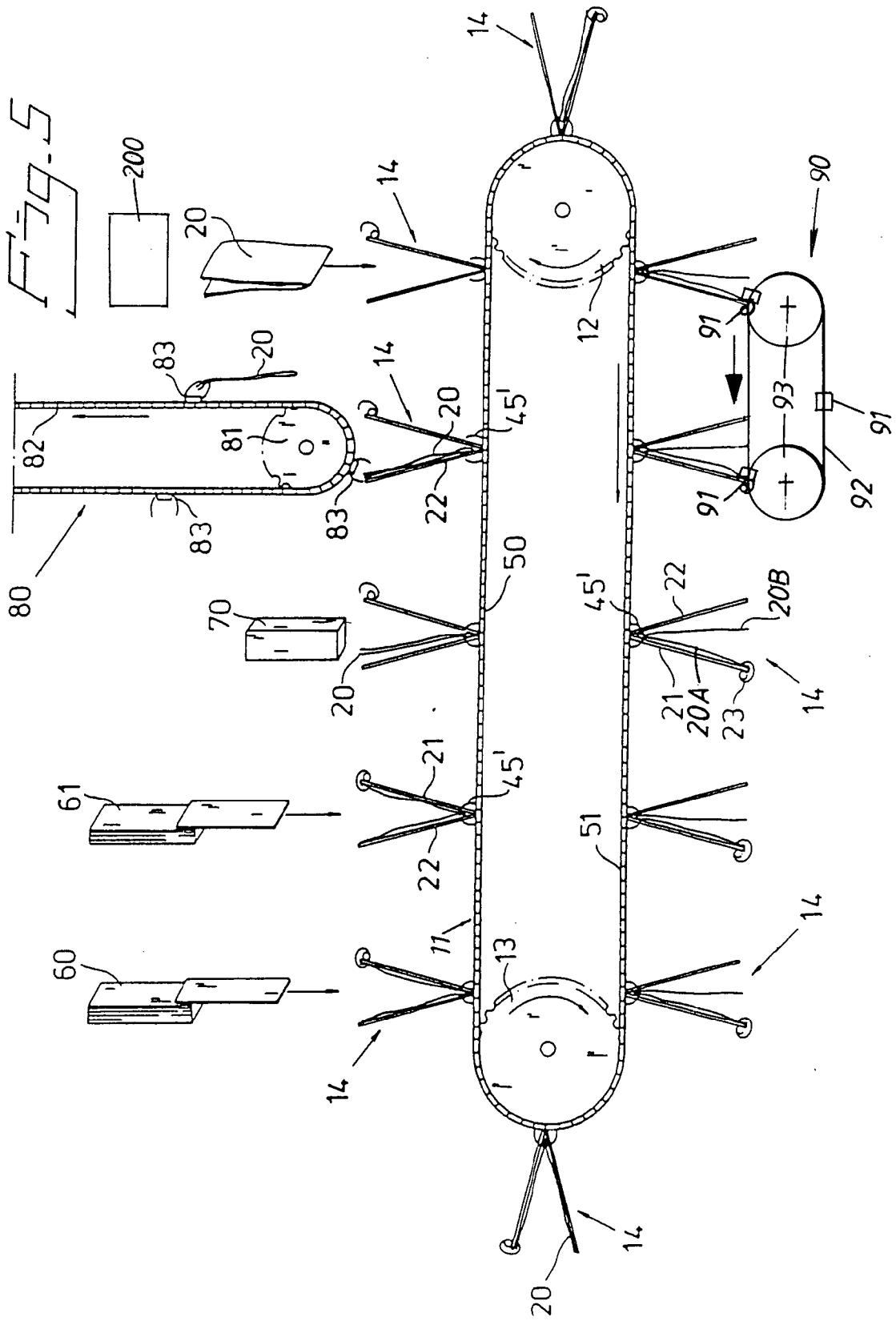


Fig. 6

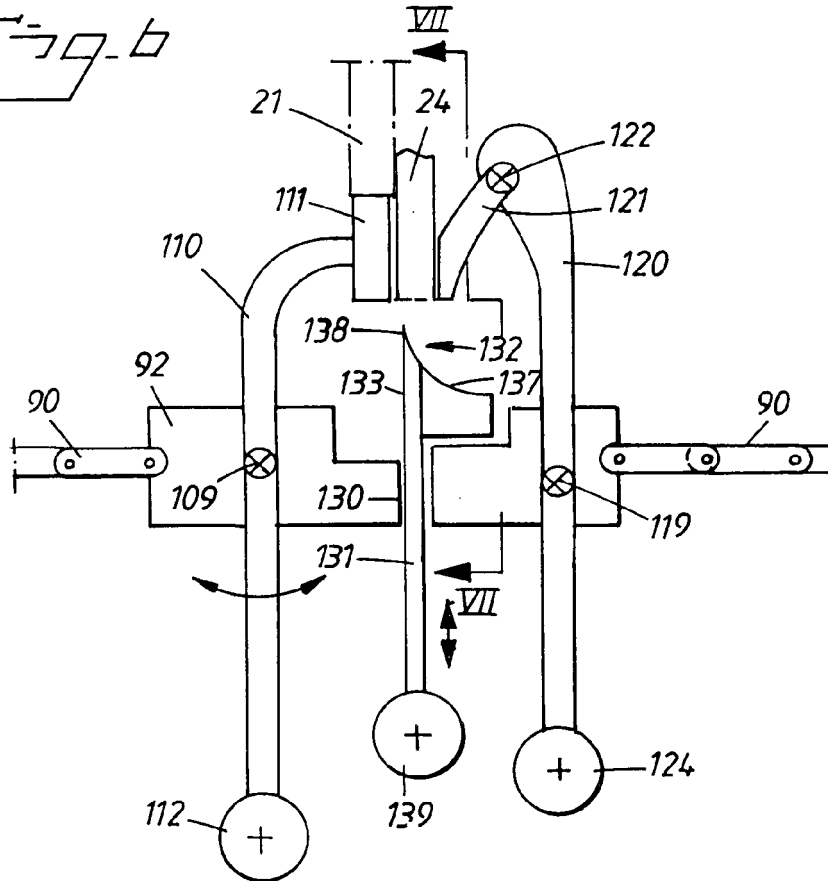
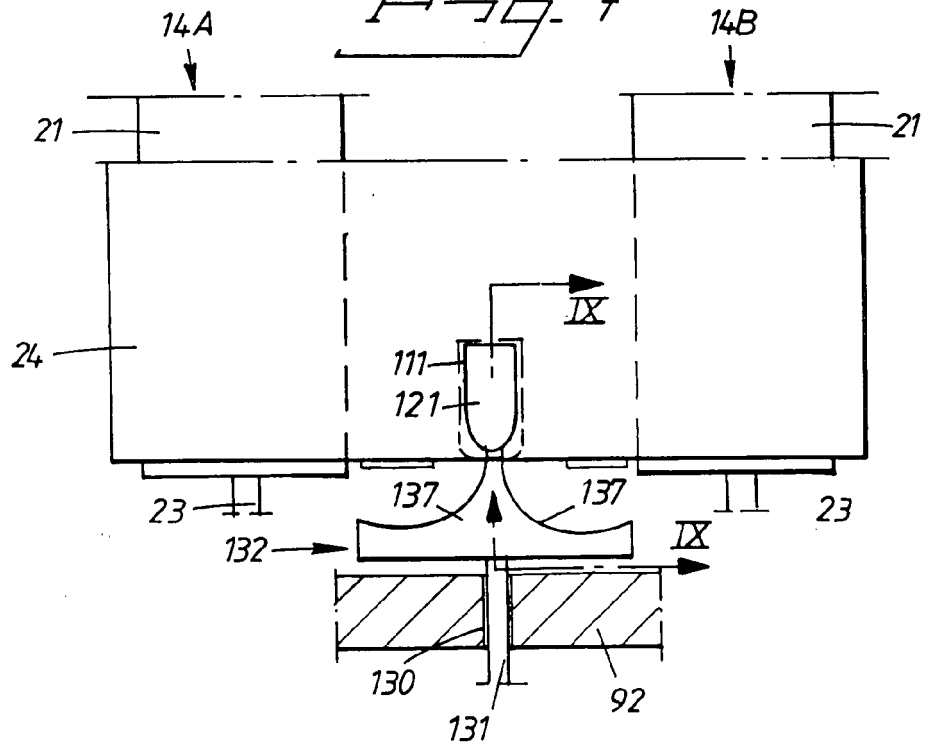


Fig. 7



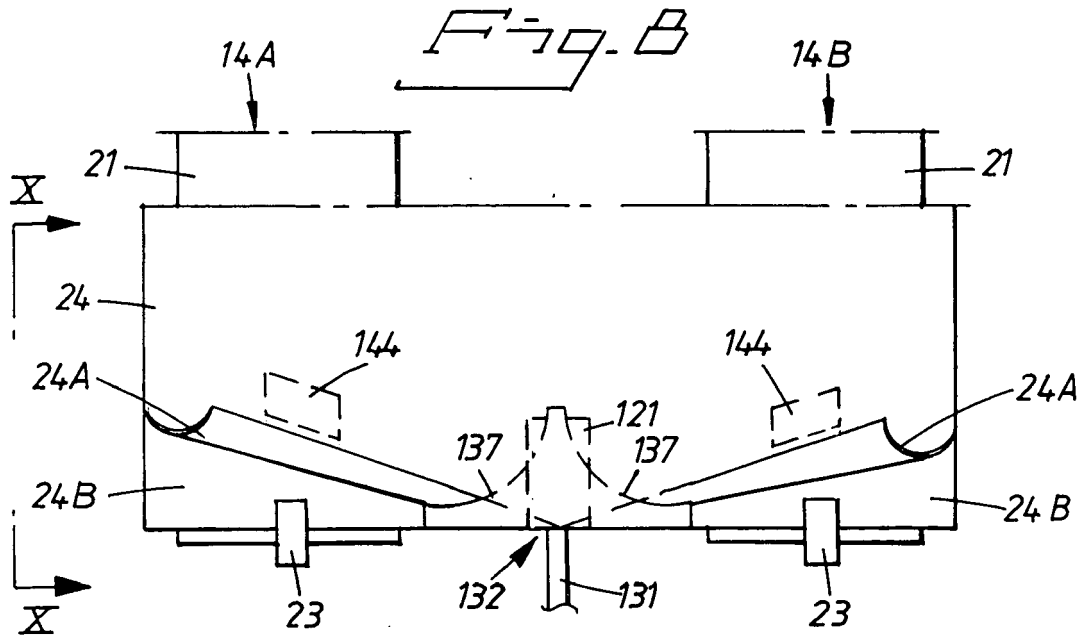


Fig. 9

Fig. 10

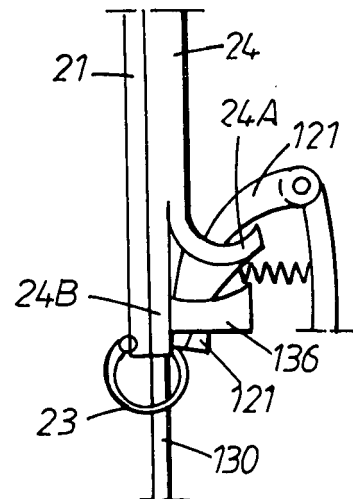
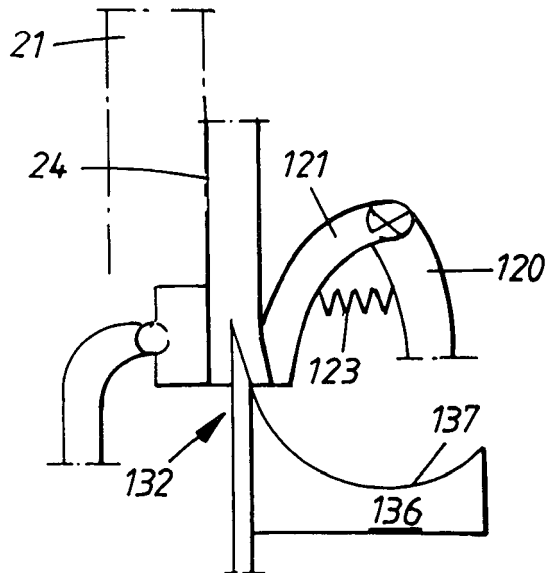


Fig. 11

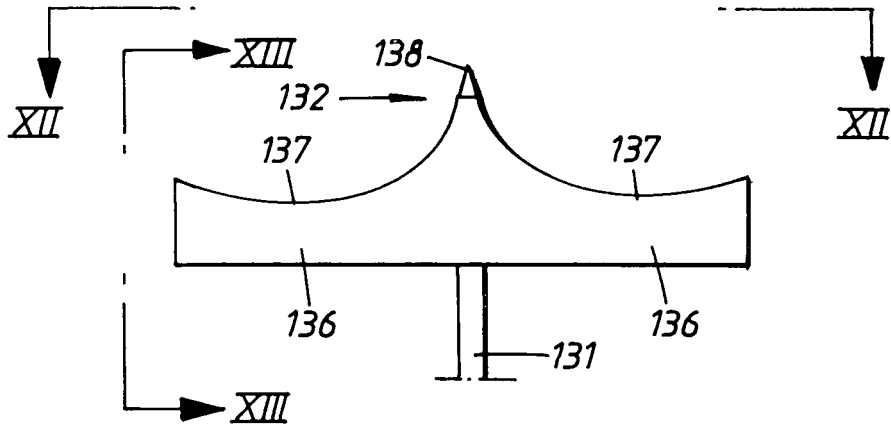


Fig. 12

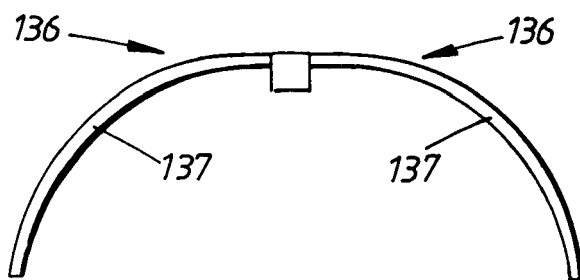
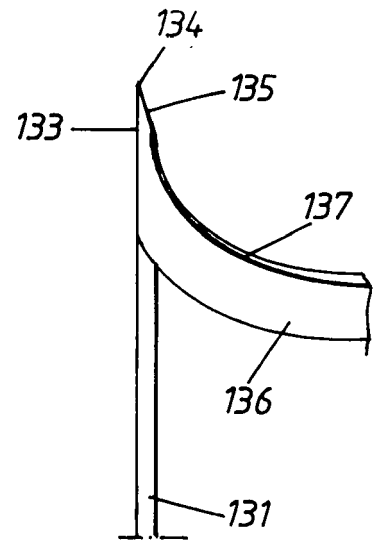


Fig. 13





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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		14 February 2008	Pollet, Didier
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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