Office de la Propriété Intellectuelle du Canada
Un organisme d'Industrie Canada

Canadian Intellectual Property Office
An agency of Industry Canada

CA 2382982 C 2009/06/02

(11)(21) 2 382 982

(12) BREVET CANADIEN
CANADIAN PATENT

(13) C

(22) Date de dépôt/Filing Date: 2002/04/23

(41) Mise à la disp. pub./Open to Public Insp.: 2002/10/26

(45) Date de délivrance/Issue Date: 2009/06/02

(30) Priorité/Priority: 2001/04/26 (CH764/01)

(51) Cl.Int./Int.Cl. *B65G 57/11* (2006.01),
B65H 39/06 (2006.01)

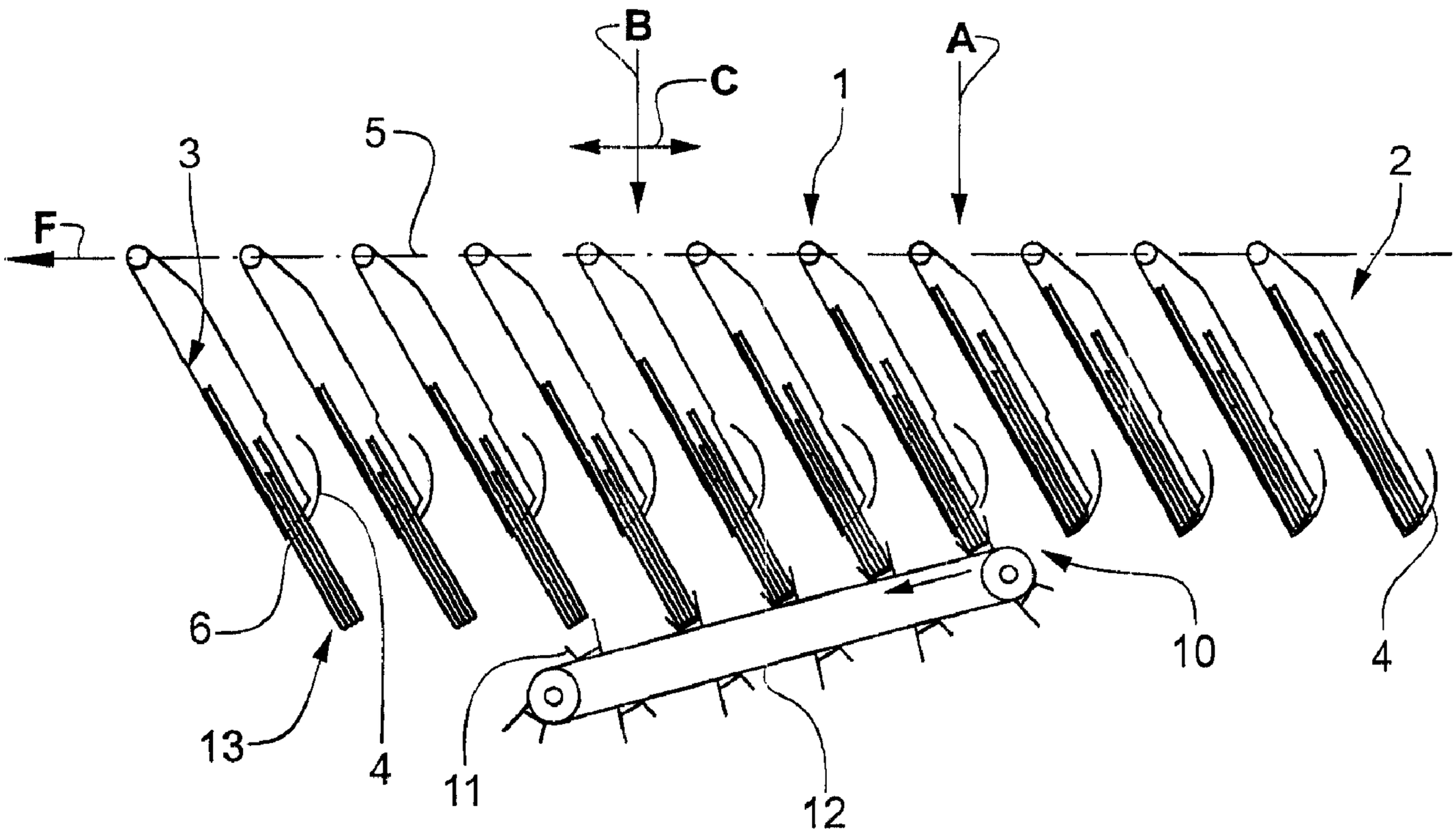
(72) Inventeur/Inventor:
HONEGGER, WERNER, CH

(73) Propriétaire/Owner:
FERAG AG, CH

(74) Agent: FREEDMAN & ASSOCIATES

(54) Titre : DISPOSITIF D'EMPILAGE D'ARTICLES PLATS ET DE TRANSFORMATION ULTERIEURE DES PILES

(54) Title: DEVICE FOR GATHERING FLAT ARTICLES INTO STACKS AND FOR FURTHER PROCESSING THE STACKS



(57) Abrégé/Abstract:
Flat articles are gathered on stack supports (2) being conveyed past feed points substantially continuously and one after the other. After the gathering operation, bottom edge zones (13) of the gathered articles are exposed for a further processing operation. The corresponding device comprises continuously conveyed stack supports (2) each with an inclined supporting surface (3) and a foot element (4) located in the bottom area of the supporting surface (3). The foot elements are actively connected with the supporting surfaces in such a manner, that they are capable of being pressed against the supporting surface and of being distanced from the

CA 2382982 C 2009/06/02

(11)(21) 2 382 982

(13) C

(57) Abrégé(suite)/Abstract(continued):
supporting surface. In an exposure zone downstream of the gathering zone (1), stack support means (10) being conveyed in synchronism with the stack supports (2) and substantially in the same direction and control means are provided. The stack support means are arranged in such a manner, that at the entrance to the exposure zone (1) they are positioned immediately underneath the stack supports and that further downstream they move away from the stack supports (2) in a downwards direction. The control means act on the foot elements (4) of stack supports (2) conveyed through the exposure zone in such a manner, that these are distanced from the supporting surfaces (3) at the entrance to the exposure zone for letting the stacks slide down onto the stack support means, and that the stacks having slid down onto the stack support means (10) are clamped between the foot element and the supporting surface. The exposed edge zones (13) of the gathered articles can then be processed in a simple way and/or can be taken hold of by further conveying means. The device is simple and is capable of being adjusted to suit various applications.

ABSTRACT

Flat articles are gathered on stack supports (2) being conveyed past feed points substantially continuously and one after the other. After the gathering operation, bottom edge zones (13) of the gathered articles are exposed for a further processing operation. The corresponding device comprises continuously conveyed stack supports (2) each with an inclined supporting surface (3) and a foot element (4) located in the bottom area of the supporting surface (3). The foot elements are actively connected with the supporting surfaces in such a manner, that they are capable of being pressed against the supporting surface and of being distanced from the supporting surface. In an exposure zone downstream of the gathering zone (1), stack support means (10) being conveyed in synchronism with the stack supports (2) and substantially in the same direction and control means are provided. The stack support means are arranged in such a manner, that at the entrance to the exposure zone (1) they are positioned immediately underneath the stack supports and that further downstream they move away from the stack supports (2) in a downwards direction. The control means act on the foot elements (4) of stack supports (2) conveyed through the exposure zone in such a manner, that these are distanced from the supporting surfaces (3) at the entrance to the exposure zone for letting the stacks slide down onto the stack support means, and that the stacks having slid down onto the stack support means (10) are clamped between the foot element and the supporting surface. The exposed edge zones (13) of the gathered articles can then be processed in a simple way and/or can be taken hold of by further conveying means. The device is simple and is capable of being adjusted to suit various applications.

Doc. No. 35-66 CA

Patent

Device for Gathering Flat Articles into Stacks and for Further Processing the Stacks

[001] The invention is related to the field of materials handling technology and concerns a device according to the generic term of the first claim. The device serves for continuously gathering flat articles in a serial production of article stacks and for further processing the produced stacks.

[002] In particular from the printing and book-binding industry it is known to produce stacks of sheets, of folded sheets, of signatures or of other printed products by providing a row of feed points, by conveying stacks being produced along the row of feed points one after the other in a substantially continuous manner and by adding one printed product to each stack at every feed point. The device for conveying the stacks being produced comprises e.g. a plurality of essentially V-shaped pockets arranged one behind the other. These pockets have openings directed upwards and extending substantially transverse to the conveying direction and the printed products are introduced into the pockets with one edge leading. A stack already present in the pocket is leaning against one of the walls of the pocket and if so required is pressed against this wall with suitable means, so that the product to be added can introduced securely and precisely. For the same purpose, it is also possible to provide L-shaped stack supports arranged one behind the other, each respectively with a supporting surface and a foot element, wherein the supporting surfaces extend transverse to the conveying direction and advantageously are inclined relative to the vertical. The supplied printed products are advantageously laid onto these supporting surfaces being guided at their leading edge, as is described. for example, in the Swiss patent application No. 2525/00 (P1814) of the same applicant.

[003] It is also known to remove the stacks of flat articles gathered in the manner briefly outlined above from the V-shaped pockets by opening the bottom of the pockets and by letting the stacks fall out of the pockets driven by gravity.

[004] In the publication EP-0908408 it is proposed to open such gathering pockets after completion of the stacks during continuous conveyance at their bottom, so that gravity relocates

the stacks into lower pockets arranged to adjoin the gathering pockets. The walls of the lower pockets are movable in such a manner, that the dropped stack is capable of being clamped between these walls, so that when opening this pocket, the bottom side of the stack or all bottom edges of the flat articles gathered in the stack respectively become freely accessible while the stack is being gripped in the lower pocket. For being bound, the such exposed side of the stacks are then e.g. roughened, trimmed and/or treated with adhesive. Following this treatment, the stack is released by the pocket walls and is dropped in a controlled manner.

[005] Gathering of printed products in pockets being substantially continuously conveyed, is described also in the publication EP-0712736. Each finished stack is then clamped and gripped by the walls of the pocket in such a manner, that the pocket is able to be opened at the bottom and the position of the stack remains unchanged relative to the pocket walls. The pocket comprises a U-shaped base part, which, for opening the pocket, is moved away downwards. The article edges on the bottom side of the stack being exposed in this manner are further treated for binding the stack, for which purpose the stack together with the clamping pocket walls is inserted into clamping tongues.

[006] The object of the present invention is to create a device for continuously gathering flat articles into stacks and for further processing the stacks, with which device specific edges of the stacked, flat articles are aligned to one another during stacking and are made accessible for further processing on the finished stack and with which device the stacks with the exposed edge zones are conveyed to a processing operation. The device according to the invention is to differ from known devices with the same purpose, particularly by being more universally utilisable and simpler and by being significantly more easily adaptable to different requirements with respect to the exposure of the edge zones of the stacked, flat articles.

[007] This object is achieved by the device as described in the claims.

[008] The device in accordance with the invention comprises in a per se known manner a plurality of stack supports which are substantially continuously conveyed one after the other in a conveying direction. These stack supports are essentially continuously conveyed, first, for

producing the stacks by gathering articles, along a row of feed points, then through an exposure zone and from there to further processing.

[009] The stack supports comprise supporting surfaces substantially aligned transverse to the conveying direction and foot elements arranged at the bottom end of each supporting surface. The foot element is actively connected to the supporting surface in such a manner, that it is capable of being pressed against the supporting surface with a pressing force and that by the action of suitable control means or by stopping the pressing force it can be distanced from the supporting surface and from this distanced position is able to be released again into the pressing position.

[0010] During the gathering operation, the flat articles are laid against the advantageously inclined supporting surfaces and their bottom edges are aligned to one another by the foot element, which in this phase is pressed against the supporting surface. Supporting surface and foot element together carry the stack in a defined position during production and after completion.

[0011] Downstream of the last feed point there is an exposure zone, through which the stack supports are conveyed in substantially the same manner as along the row of feed points. Also conveyed through the exposure zone are stack support means and this in synchronism with the stack supports and aligned to them, wherein the conveying path of the stack supports and the conveying path of the stack support means are designed in such a manner, that at the entrance to the exposure zone the stack support means are arranged immediately underneath the stack supports and that during conveyance through the exposure zone they move more and more away downwards from the stack supports.

[0012] Furthermore, means for controlling the foot elements are provided in the exposure zone. A first such control means distances the foot elements from the supporting surfaces in the point, in which the stack support means are moving immediately underneath the stack supports, i.e. at the entrance of the exposure zone, such that the stacks lying against the supporting surfaces are released downwards and, still lying against the supporting surfaces, slide down onto the stack support means. The stacks are further conveyed lying against the supporting surfaces

and supported by the stack support means, until as a result of the divergence of the conveying paths of stack supports and stack support means they have slid off the stack supporting surface to such an extent, that the bottom edges of the stacked flat articles protrude from the bottom edges of the supporting surfaces by a predefined value. At this point, a second control means releases the foot elements from their position distanced from the supporting surface to their pressing position. Through their sliding the stacks are now positioned between the supporting surface and the foot element, i.e. the foot element when released into the pressing position is not anymore pressed directly against the supporting surface but against the stack, so that the latter is pressed between foot element and supporting surface and therefore, is fixed in its position relative to the supporting surface. Further sliding of the stack is not possible anymore.

[0013] With the stack clamped between the supporting surface and the foot element, the stack supports are conveyed onwards, wherein their spatial orientation can now be changed, for example, by swivelling the stack supports relative to the conveying path or by changing the direction of the conveying path. Through such changes of the spatial orientation of the stack supports and the stacks of flat articles clamped in them, the aligned edge zones protruding beyond the supporting surfaces which were originally oriented downwards can be oriented to suit a following processing operation.

[0014] For releasing stacked, flat articles possibly processed in the area of the exposed edge zones, from their clamped position in the stack supports, the part of the stack protruding between the supporting surface and the foot element can simply be taken hold of with suitable means and then the foot element can be brought back into its position distanced from the supporting surface.

[0015] Instead of L-shaped stack supports as described above, the device according to the invention may also comprise V-shaped gathering pockets extending substantially transverse to the conveying direction and comprising two pocket walls located opposite one another in the direction of conveyance. One of the pocket walls represents the supporting surface and the foot element closes off the distance between the pocket walls at the pocket bottom.

[0016] It goes without saying that using the device in accordance with the invention, it is not only possible to produce and further process stacks comprising a plurality of flat articles but it is

also possible to clamp and further process individual articles, i.e. "stacks" comprising only one flat article.

[0017] Exemplary embodiments of the device according to the invention are described in more detail in the context of the following Figs., wherein:

[0018] **Figs. 1 and 2** show in two operational modes, the exposure zone of a first embodiment of the device in accordance with the invention;

[0019] **Figs. 3 to 5** illustrate in detail the operation of the foot element on the embodiment according to Figs. 1 and 2;

[0020] **Figs. 6 and 7** show the exposure zones of two further, exemplary embodiments of the device according to the invention;

[0021] **Figs. 8 to 12** show the embodiment of the device in accordance with the invention as shown in Figs. 1 and 2 in processing zones in which the stacks are held clamped between the supporting surface and the foot element.

[0022] Fig. 1 illustrates a first embodiment of the device according to the invention in the exposure zone 1, through which the stack supports 2 move substantially continuously (conveying direction F) and with essentially the same spatial orientation, in which they are conveyed along the row of feed points. Of the stack supports 2 each one comprises a supporting surface 3 and a foot element 4. The stack supports 2 are as illustrated e.g. coupled to a conveying organ (dot-dash line 5) at equal distances between one another. They may also, however, be movable in the conveying direction F substantially independent of one another. The supporting surfaces 3 of the stack supports 2 extend substantially transverse to the conveying direction F (perpendicular to the paper plane of Fig. 1) and are arranged inclined in the conveying direction, for example, in such a manner, that their bottom edges trail the upper edges.

[0023] Each one of the stack supports 2 being conveyed into the exposure zone 2 carries a stack 6, wherein the flat articles of the stack 6 were deposited in an as such known manner on the

stack supports 2 during conveyance along a row of feed points arranged upstream of the exposure zone 1 illustrated in Fig. 1.

[0024] Stack support means 10 are arranged to move through the exposure zone underneath the stack supports 2, in synchronism with the stack supports 2 and aligned to these such that at the entrance to the exposure zone 1 they are positioned immediately underneath the bottom edges of the supporting surfaces 3 and that during their conveyance through the exposure zone 1 they move away from the stack supports at an acute angle. The stack support means 10, for example, comprises individual stack support bases 11 coupled to a conveying organ 12 with a closed-in-itself circulation track.

[0025] At the point designated with A and approximately corresponding to the point, in which the stack base supports 11 are situated closest to the supporting surfaces 3, a first control means (not illustrated) is effective, through the action of which the foot elements 4 of stack supports 2 being conveyed past are brought into their position distanced from the supporting surface 3. As a result, the stack 6 lying against the supporting surface 3 slides down onto the stack support base 11.

[0026] During onward conveyance and due to the divergence of the conveying paths of stack support 2 and stack support base 11, the stack 6 slides down further and more and more protrudes beyond the supporting surface 3.

[0027] At the point designated with B and situated downstream of point A, a second control means is arranged (not illustrated), through the action of which the foot elements 4 of stack supports 2 conveyed past are released into their pressing position from their position distanced from the supporting surface 3, in order to press the slid down stack 6 against the supporting surface 3 and to thus fix it in its position protruding beyond the supporting surface 3.

[0028] In a zone downstream of point B, the stack support bases 11 are moved away from the stack supports 2, as a result of which the bottom edge zones 13 of the stacked, flat articles, which protrude beyond the supporting surface 3 and the foot element 4 become freely accessible for further processing of the stacks.

[0029] From Fig. 1 it is clearly evident, that the stack supports 2 are very simple device components, which are capable of being conveyed along the conveying path following one another very closely. It is also evident, that the stack supports 2, when holding a stack 6 clamped between supporting surface 3 and foot element 4 can be brought into various spatial orientations, e.g. by being swivelled parallel to the conveying path F and/or by changing the direction of the conveying path. In such a way, the exposed, originally bottom edge zones 13 of the stacked, flat articles can e.g. be made optimally accessible for a processing operation or for transfer to a further conveying device.

[0030] From Fig. 1 it is also evident that the device according to the invention is very easily adaptable for different handling operations of different stacks. Within the broadest limits it is of no importance how large (also how differently large) and how numerous the stacked, flat articles are. As long as they each have a substantially straight edge zone and as long as this edge zone of all articles to be stacked are to be aligned to one another, the device can be used without any modifications. For adjusting the length, by which the bottom edge zones 13 in their exposed condition are to protrude beyond the supporting surface 3, advantageously the point B or the second control means respectively is moved along the conveying path F (arrows C). On the other hand, it is also possible to adjust the angle between the conveying path F of the stack supports 2 and the conveying path of the stack support bases 11.

[0031] The stack support bases 11 illustrated in Fig. 1 extend, parallel to the supporting surfaces 3 and the foot elements 4, substantially transverse to the conveying direction F and comprise a floor surface, which advantageously is aligned perpendicular to the supporting surfaces 6. With stack supports 11 of this kind, the stacks 6 obtain a rectangular shape. In cases, in which such rectangularity is not relevant, it is also possible for a very simple conveyor belt to take over the function of the individual stack support bases illustrated in Fig. 1.

[0032] Fig. 2 illustrates essentially the same device as Fig. 1. While the device in accordance with Fig. 1 is operated in a mode, in which the foot elements 4 of all stack supports 2 being conveyed past point A are actuated, according to Fig. 2 this is only the case for selected ones of the stack supports 2, for example only for stack supports, which contain an error-free stack 6.

Not selected stack supports 2 are conveyed through the exposure zone 1 in an unchanged condition.

[0033] For controlling the operating mode according to Fig. 1, the control means are e.g. stationary cams co-operating with guide rollers arranged on the foot elements 4 of the stack supports 2. For controlling the operating mode according to Fig. 2, active control means have to be provided, which selectively actuate control elements acting on the foot elements 4 of the selected stack supports.

[0034] Figs. 3 to 5 show in more detail the operation mode of an exemplary embodiment of a stack support 2 in a device as illustrated more schematically in Figs. 1 and 2. Illustrated are the bottom zones of a stack support 2 in a configuration suitable for the gathering operation (Fig. 3), suitable for the exposure of the bottom edge zones 13 of the stacked, flat articles or for releasing a stack (Fig. 4) and suitable for further processing the stack 6 or the exposed edge zones 13 of the stack respectively (Fig. 5).

[0035] In each of the Figs. the bottom part of the supporting surface 3 being limited on both sides by side pieces 20 (one of them visible), and of a stack 6 lying against the supporting surface 3 are shown. The foot element 4 is fixed to the side pieces 20 being capable to swivel and being driven against the supporting surface 3 by a tension spring 21 pre-tensioned between the side piece 20 and the foot element 4. The foot element 4 further comprises a guide roller 22, which when rolling on a corresponding cam surface 23 brings the foot element 4, against the tensile force of the tension spring 21, into a position more or less distanced from the supporting surface 3 and holds it in such a position. The cam surface 23 is necessary in zones of the conveying path (Fig. 4), in which the foot elements 4 have to be held in a position distanced from the supporting surface 3. The cam surface 23 can be absent in such zones of the conveying path (Figs. 3 and 5), in which the foot element 4 is to be pressed against the supporting surface 3 or against a stack 6 lying against the supporting surface 3 with the full force of the tension spring.

[0036] Fig. 3 depicts the foot element 4 in the gathering configuration, into which it is driven by the force of the tension spring 21, when no stack 6 is positioned between the supporting surface 3 and foot element 4. In this position, the foot element is tightly joined with the

supporting surface 3 in such a manner, that it is capable of supporting flat articles lying against the supporting surface 3.

[0037] Fig. 4 illustrates the stack support 2 in the exposure or release configuration, in which it is conveyed through the exposure zone, i.e. through the zone between points A and B depicted in Figs. 1 and 2, and through a release zone, in which a stack is released from its position clamped between supporting surface 3 and foot element 4. The foot element 4 is at a distance from the supporting surface 3 in such a manner, that the bottom end of the supporting surface 3 is free and flat articles lying against the supporting surface 3 can slide down along it or are able to be removed from between the supporting surface 3 and the foot element 4. During conveyance, the foot element 4 is held in this position by the cam surface 23 and the guide roller is pressed against the cam surface by the spring force of tension spring 21.

[0038] Fig. 5 illustrates the stack support 2 in the processing configuration, into which it is brought, when stacks 6 lying against the supporting surface 3 and being supported by the stack support means (not depicted) have slid beyond the supporting surface 3 by a predetermined amount (point B in Figs. 1 and 2). The foot element 4 is pressed by the tension spring 21 against the stack 6 and is holding it firm.

[0039] Instead of the tension spring 21, it is possible to use other means to press the foot element 4 against the supporting surface. This function, for example, may also be taken over by the guide rollers 22 and a corresponding cam surface. For the operating mode illustrated in Fig. 2, cam surfaces are not suitable control means. In this case, active control means selectively unlatching the tension spring 21 have to be provided.

[0040] Figs. 6 and 7 illustrate two further, exemplary embodiments of the device according to the invention.

[0041] The stack supports 2 according to Fig. 6 comprise each an extension 30 on the supporting surface 3 and a foot element 4 running substantially parallel to one another in a downwards direction and forming a sort of flat pliers for holding the stack 6 even better than is possible with the embodiment according to Figs. 1 and 2.

[0042] Fig. 7 very schematically illustrates a further, exemplary embodiment of the device according to the invention, in which the supporting surfaces 3 and foot elements 4 form components of substantially V-shaped gathering pockets 2'. The foot elements 4 are each connected in an articulated manner to a pocket wall 31 situated opposite the supporting surface 3 and are driven into a "closed" position by not illustrated pressing means and into an "open" position by suitable control means.

[0043] Figs. 8 to 12 illustrate the embodiment of the device according to the invention as depicted in Figs. 1 to 5 in a conveying zone downstream of the exposure zone. In this zone, the stacks 6 are further processed by action on the edge zones 13 of the flat articles. This further processing has to be understood in a very broad meaning of the term. It shall not only include steps modifying these edge zones (for example by binding of a stack of printed products), but may also be a pure handling operation (for example a transfer to a further conveying device) or may be both.

[0044] Fig. 8 illustrates a stack handling operation substantially consisting of reversing the exposure of the bottom edge zones 13 possibly after processing these edge zones 13. The stack supports 2 hold stacks 6 pressed between the supporting surfaces 3 and foot elements 4 when conveyed into this zone, in which further stack support means 10' with stack support bases 11' conveyed parallel to the stack supports 2 are provided. These stack support bases 11' are adjustable in their height relative to a conveying organ 12' in such a manner and to such an extent, that they are capable of pushing back stacks 6 along the supporting surface 3. In analogy to the exposure zone, for driving the foot elements 4 at a point A a first control means and at a point B a second control means are provided, wherein these control means, as already described in connection with Fig. 1, act on the foot elements 4 of all stack support 2 conveyed past or only on the foot elements 4 of selected ones of the stack supports 2 (as illustrated in Fig. 8).

[0045] For a processing operation as illustrated in Fig. 8 it is a prerequisite, that the stack support bases 11' and the foot elements 4 are designed in such a manner, that they are able to mesh with one another. The stack support bases 11' therefore, for example, comprise gaps along their extent transverse to the conveying direction or else are narrower than the stacked articles.

and the foot elements 4 consist of at least two foot element components, which are aligned to the named gaps or else are arranged lateral to the stack support bases 11'.

[0046] Figs. 9 to 11 illustrate transfer zones, in which stacks held clamped between supporting surfaces 3 and foot elements 4 are transferred to a further conveying means 40. To achieve this, at a point A of the conveying path F once again a first control means is provided for bringing the foot elements 4 of stack supports 2 conveyed past into the position at a distance from the stack supporting surface 3.

[0047] In accordance with Fig. 9, the taking over conveying means 40 comprises grippers 41 for gripping the exposed edge zone 13 before the stack supports 2 are conveyed past point A. According to Fig. 10, the taking over conveying means 40 comprises pockets 42, in which covering sheets 43 may already be positioned. The exposed edge zones 13 are inserted into these pockets as far as possible before the stack supports 2 pass point A, where the stacks 6 are released by actuation of the foot elements 4 and are left to fall into the pockets. For this case it is particularly advantageous, if the stacks 6 protrude beyond the supporting surfaces 3 as far as possible, such that free fall is as short as possible.

[0048] According to Fig. 11, the exposure zone 1 and the transfer zone substantially coincide. Already during the exposure of the bottom edge zones 13 in the exposure zone 1 while sliding along the supporting surfaces 3, the stacks 6 are inserted into clamping means 50 of a further conveying means 40 and downstream of the exposure zone they are gripped by these and then released by the foot elements 4.

[0049] Fig. 12 illustrates further processing of stacks 6 held clamped in stack supports 2, the processing regarding the area of the exposed edge zones 13. The stacks 6, which at least in the exposure zone are directed downwards, are brought into a vertical position, in which the exposed edge zones 13 are oriented upwards by a change 60 of the conveying direction F of the stack supports 2 and a corresponding swivelling of the stack supports 2 relative to this conveying path. With the new stack orientation, the stack supports 2 are conveyed through a processing zone for further processing of the stacks 6 and then through a release zone. In the processing zone, folded covering sheets 43 are opened and laid over the exposed edge zones. In the release zone, the

exposed edge zones 13 with covering sheets 43 laid over them are gripped by suitable grippers and are released by the foot elements 4 (point A).

[0050] Prior to the placement of the covering sheets 43, the exposed edge zones if so required may be roughened or trimmed and treated with adhesive. After placement of the covering sheets 43 they may be correspondingly pressed. It is also conceivable to apply more than one covering sheet 43 and, prior to releasing the stacks 6, to tack the multitude of covering sheets together.

CLAIMS

1. Device for gathering flat articles into stacks and for further processing the stacks, which device comprises a plurality of stack supports and means for continuously conveying the stack supports one behind the other along a conveying path, wherein the conveying path, for gathering the articles in a gathering zone leads past a row of feed points and for further processing leads through a processing zone and wherein, for carrying a stack of the articles, each one of the stack supports comprises a supporting surface extending substantially transverse to the conveying path and a foot element arranged in the bottom zone of the supporting surface, characterized in that the foot elements are designed and actively connected to the supporting surfaces to be capable of being pressed against the supporting surfaces and of being distanced from the supporting surfaces, that in an exposure zone between the gathering zone and the processing zone, stack support means being capable of moving in synchronism and substantially in the same direction with the stack supports are provided, wherein, at the entrance to the exposure zone, the stack support means are positioned immediately underneath the stack supports and further downstream move away from the stack supports in a downwards direction, and that in the exposure zone, control means are provided for bringing the foot elements of stack supports being conveyed past the entrance of the exposure zone from their position pressed against the supporting surface into their position at distanced from the supporting surface and, further downstream, back into their position pressed against the supporting surface.

2. Device in accordance with claim 1, characterized in that the foot elements are mounted on the supporting surfaces in a swivelling manner.

3. Device according to one of claims 1 or 2, characterized in that a tension spring is arranged between the foot element and the supporting surface.

4. Device in accordance with claim 1, characterized in that the stack supports are components of substantially V-shaped gathering pockets, wherein the supporting surface forms one of two pocket walls situated opposite one another and the foot element closes off the distance between the pocket walls towards the bottom.

5. Device according to one of claims 1 to 4, characterized in that the stack support means comprise individual stack support bases, which are coupled to a circulating conveying organ.

6. Device in accordance with claim 5, characterized in that the stack support bases comprise supporting surfaces oriented vertically to the supporting surfaces.

7. Device according to one of claims 1 to 6, characterized in that the control means for driving the foot elements comprise cam surfaces co-operating with guide rollers arranged on the foot elements.

8. Device in accordance with one of claims 1 to 6, characterized in that the control means comprise active components for activating selected ones of the foot elements of stack supports.

9. Device according to one of claims 1 to 8, characterized in that in the processing zone, further control means and further stack support means with stack support bases moving in the conveying direction and against the stack supports are provided for bringing the foot elements of stack supports conveyed past from their position pressed against the supporting surface to their position at a distance from the stack support and further downstream back into their position pressed against the supporting surface, and that the foot elements and the further stack support bases are designed in such a manner, that they are able to mesh with one another.

10. Device in accordance with one of claims 1 to 9, characterized in that downstream of the exposure zone means for changing the spatial orientation of the stack supports are provided.

11. Device according to claim 10, characterized in that the direction of the conveying path of the stack supports is changed downstream of the exposure zone.

12. Device in accordance with one of claims 10 or 11, characterized in that downstream of the exposure zone means for swivelling the stack supports relative to the conveying path are provided.

13. Device according to one of claims 10 to 12, characterized in that in the processing zone, a means for laying a covering sheet onto the exposed edge zones is provided.

14. Device in accordance with one of claims 1 to 13, characterized in that in the further processing zone a further conveying means with grippers is arranged in such a manner, that the grippers take hold of the exposed edge zones and thereupon are capable of being closed, and that for releasing the stacks, a further control means is provided for bringing the foot elements after the stacks have been taken hold of by the grippers from their position pressed against the supporting surface into their position at a distance from the supporting surface.

15. Device according to one of claims 1 to 13, characterized in that in the processing zone, a further conveying means with pockets is arranged in such a manner, that the exposed edge zones are capable of being inserted into the pockets, and that for the release of the stacks a further control means is provided for bringing the foot elements following insertion of the exposed edge zones into the pockets from their position pressed against the supporting surface into their position at a distance from the supporting surface.

Fig.1

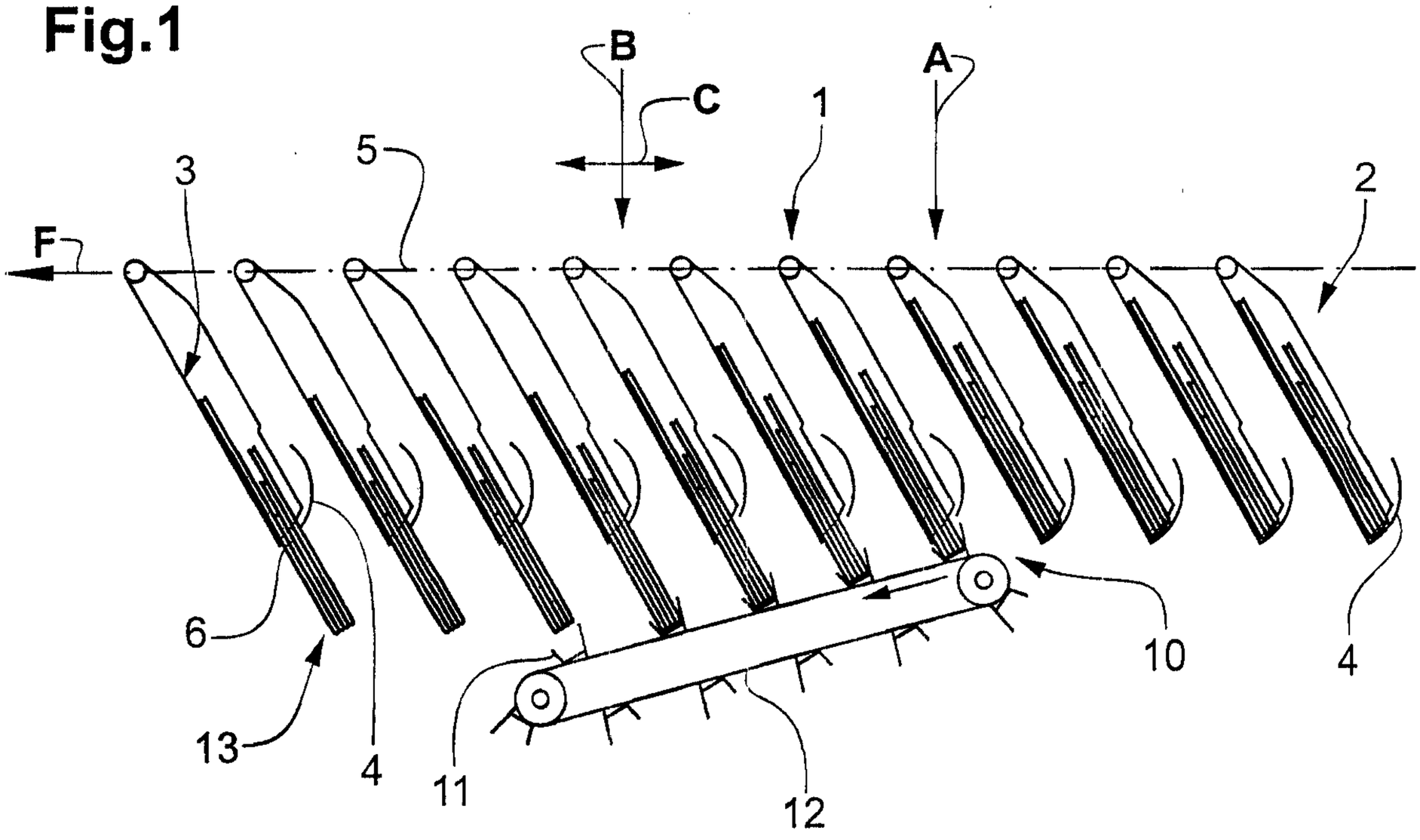


Fig.2

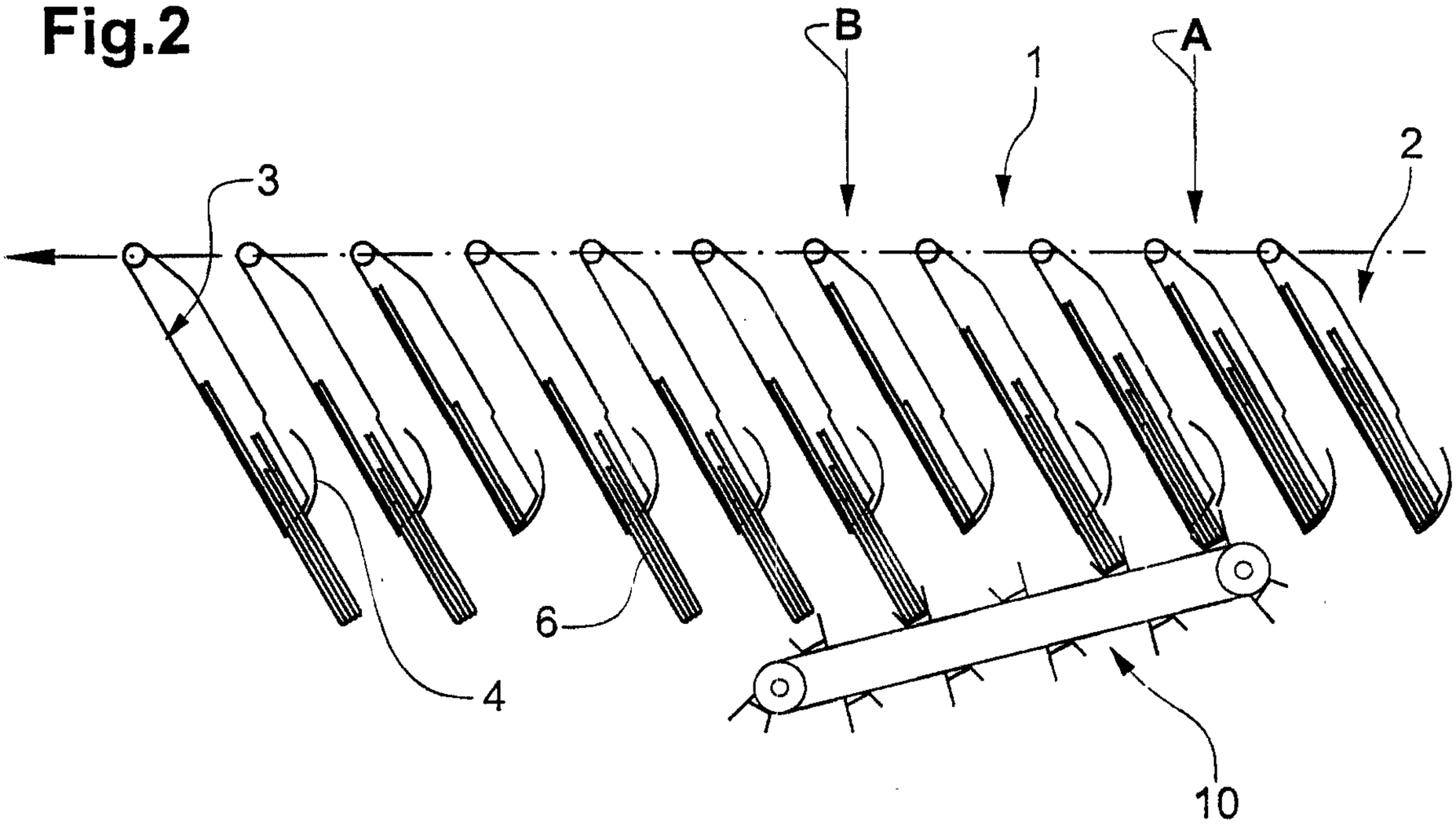


Fig.3

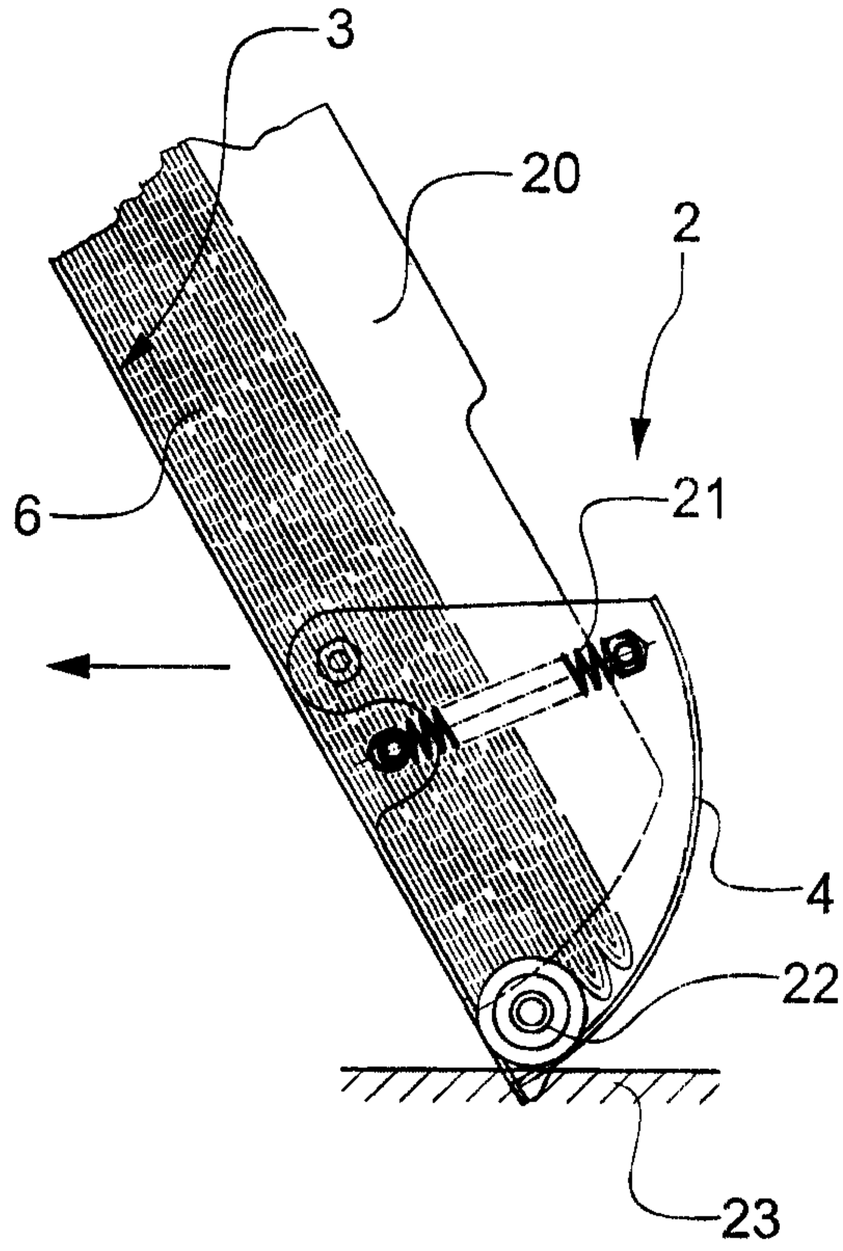


Fig.4

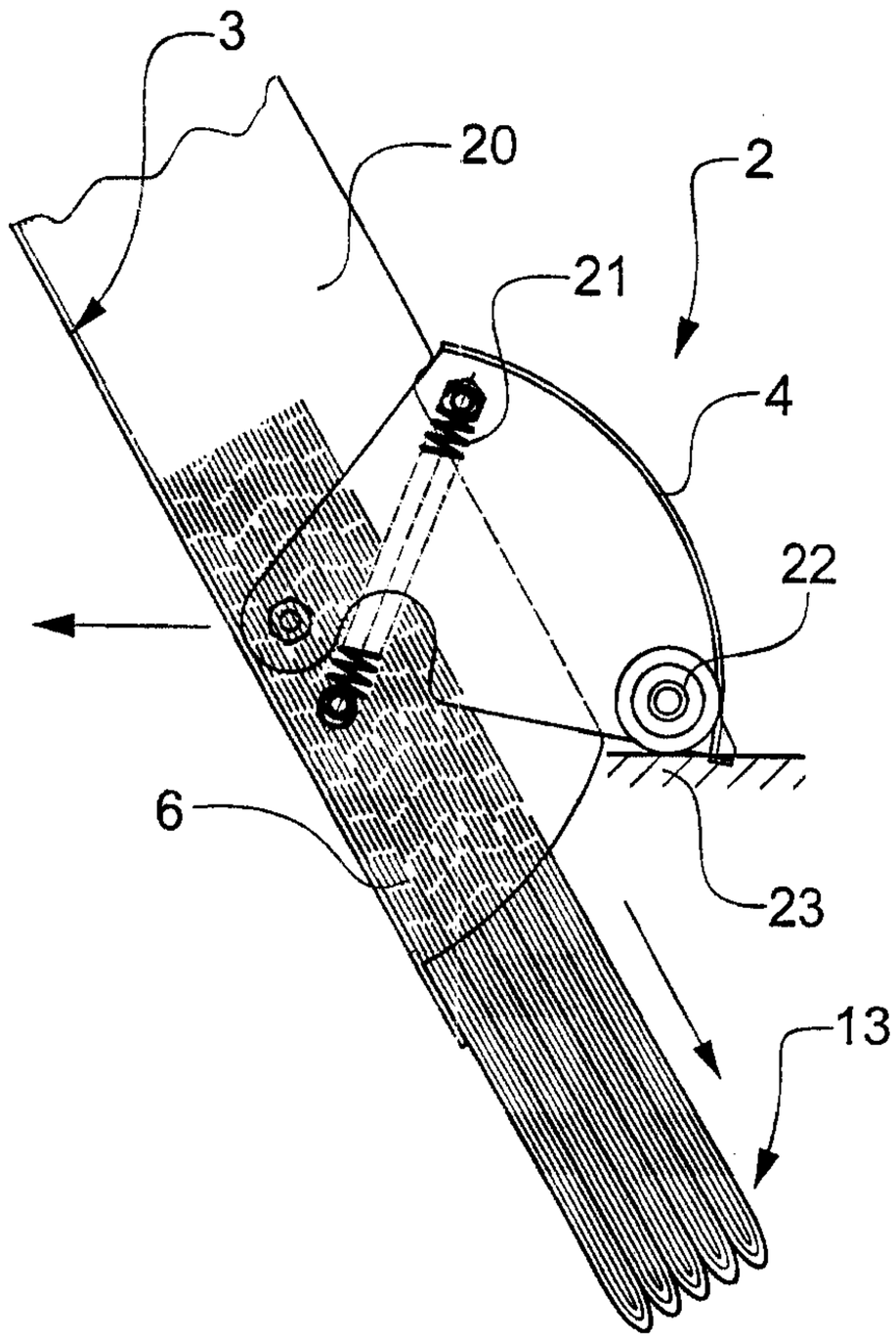


Fig.5

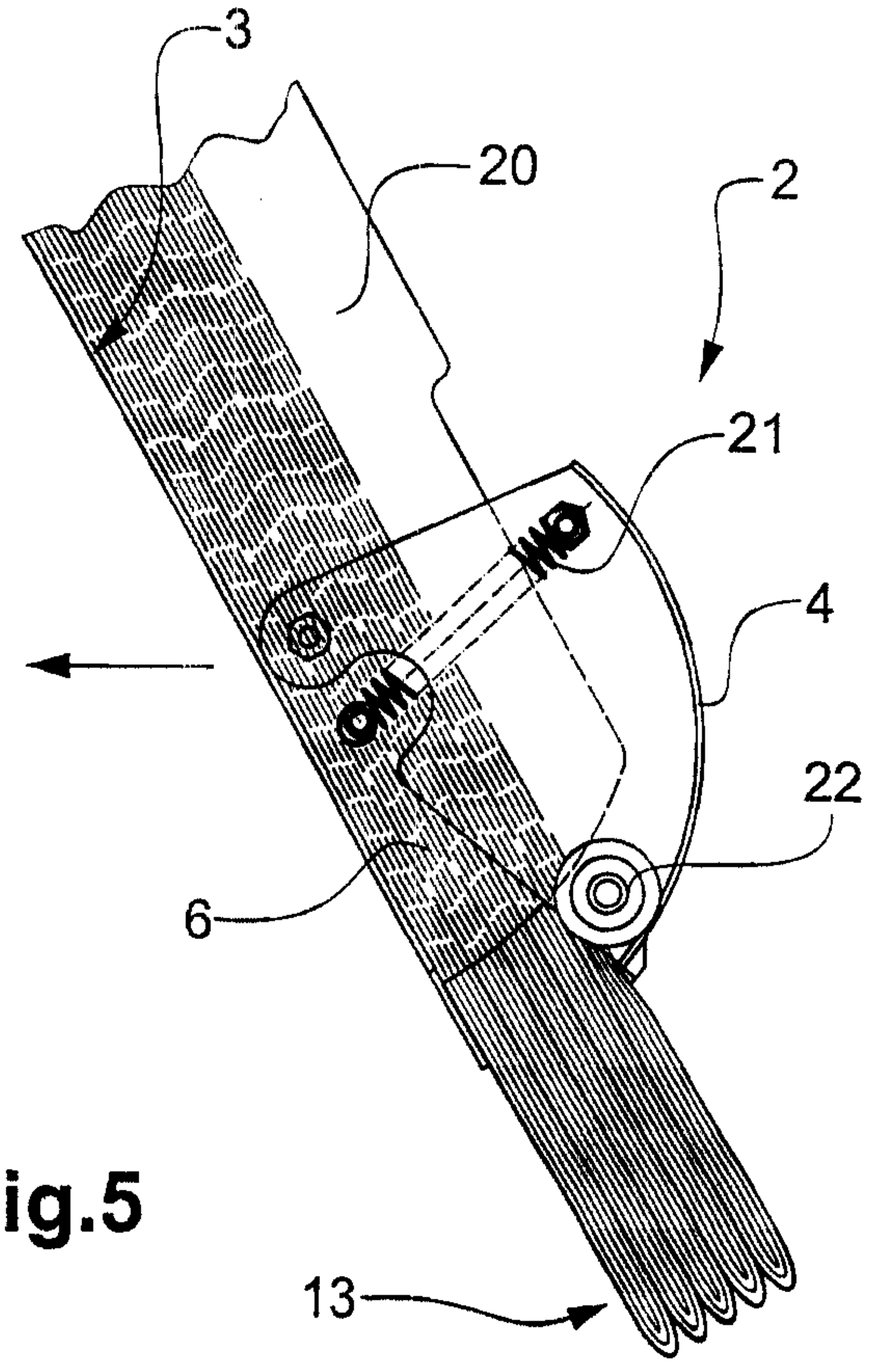


Fig.6

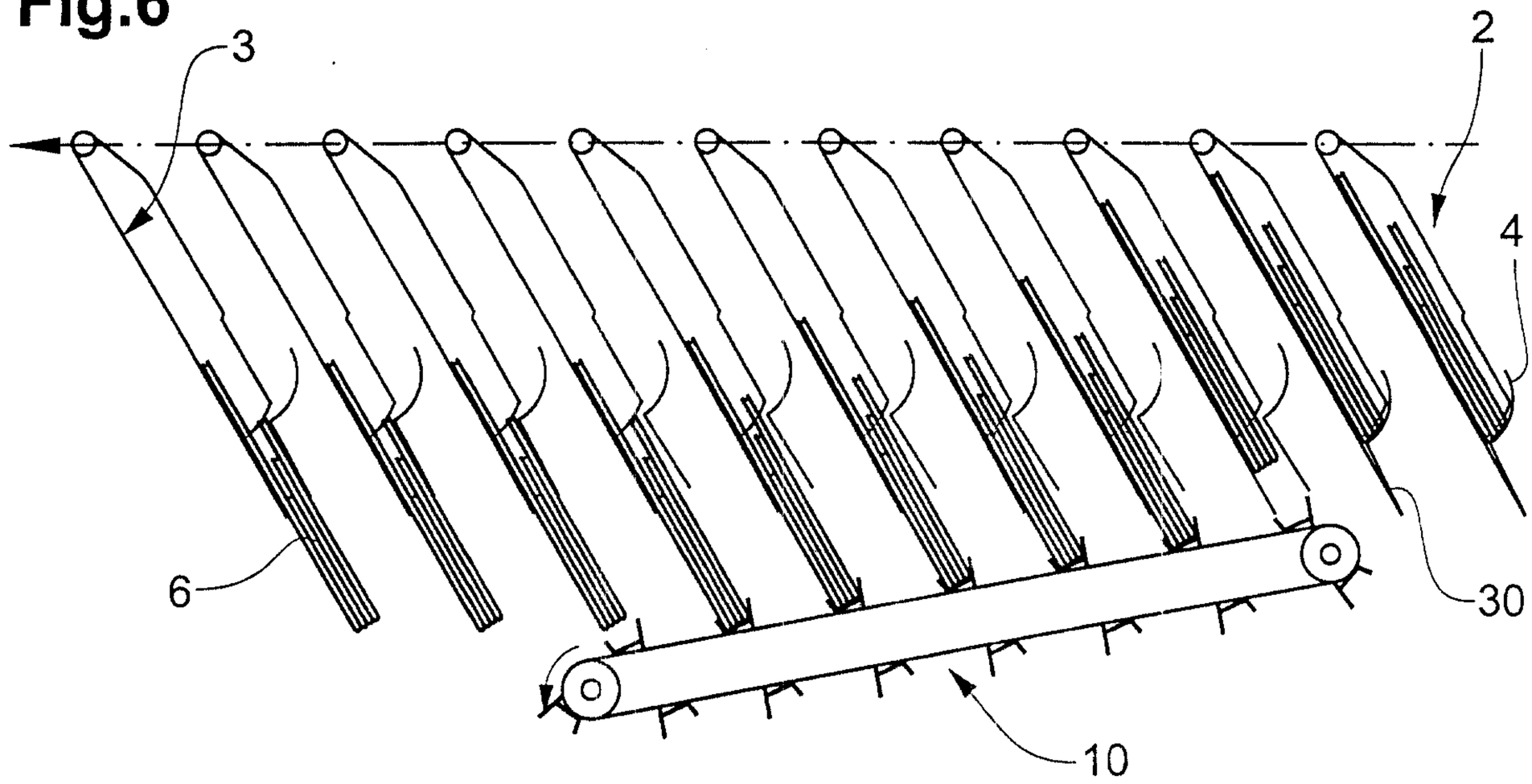


Fig.7

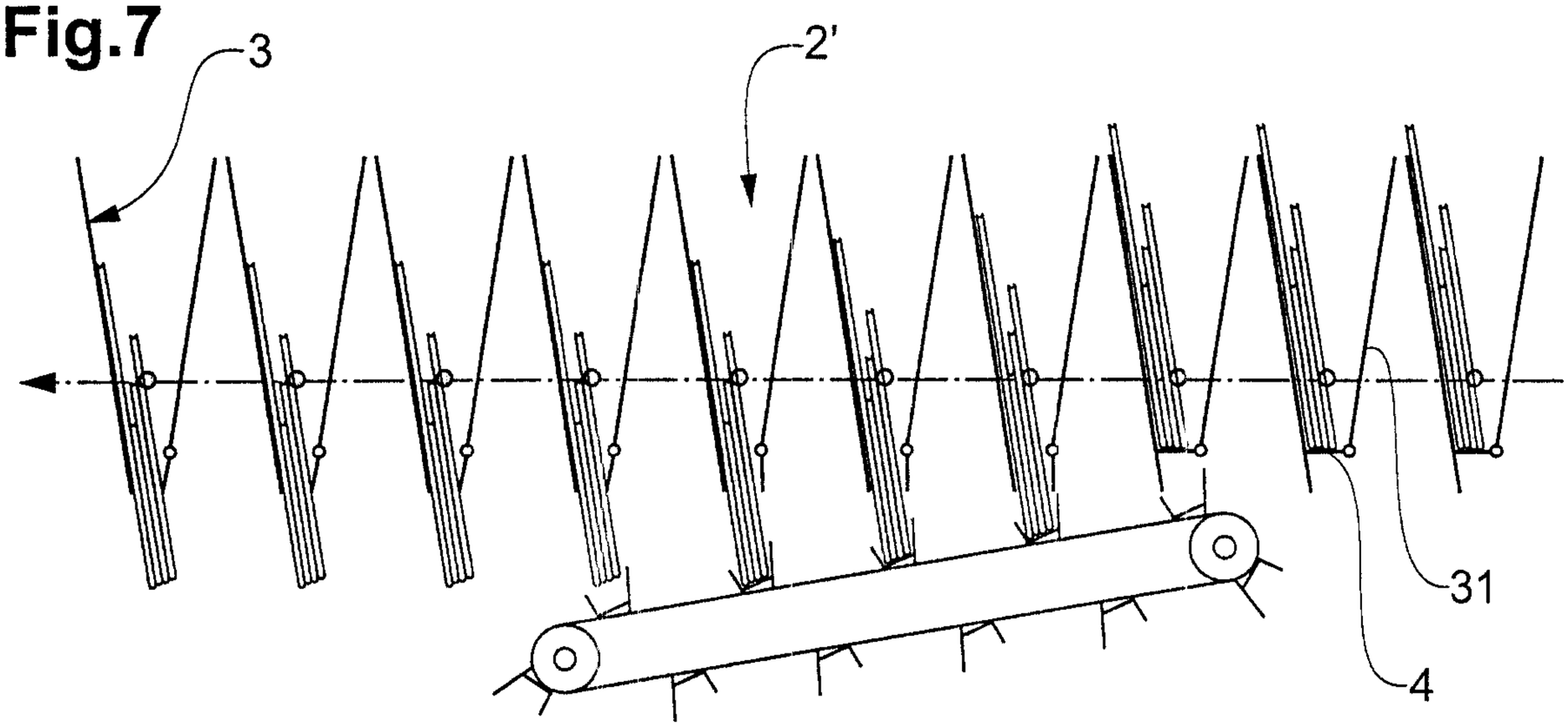


Fig.8

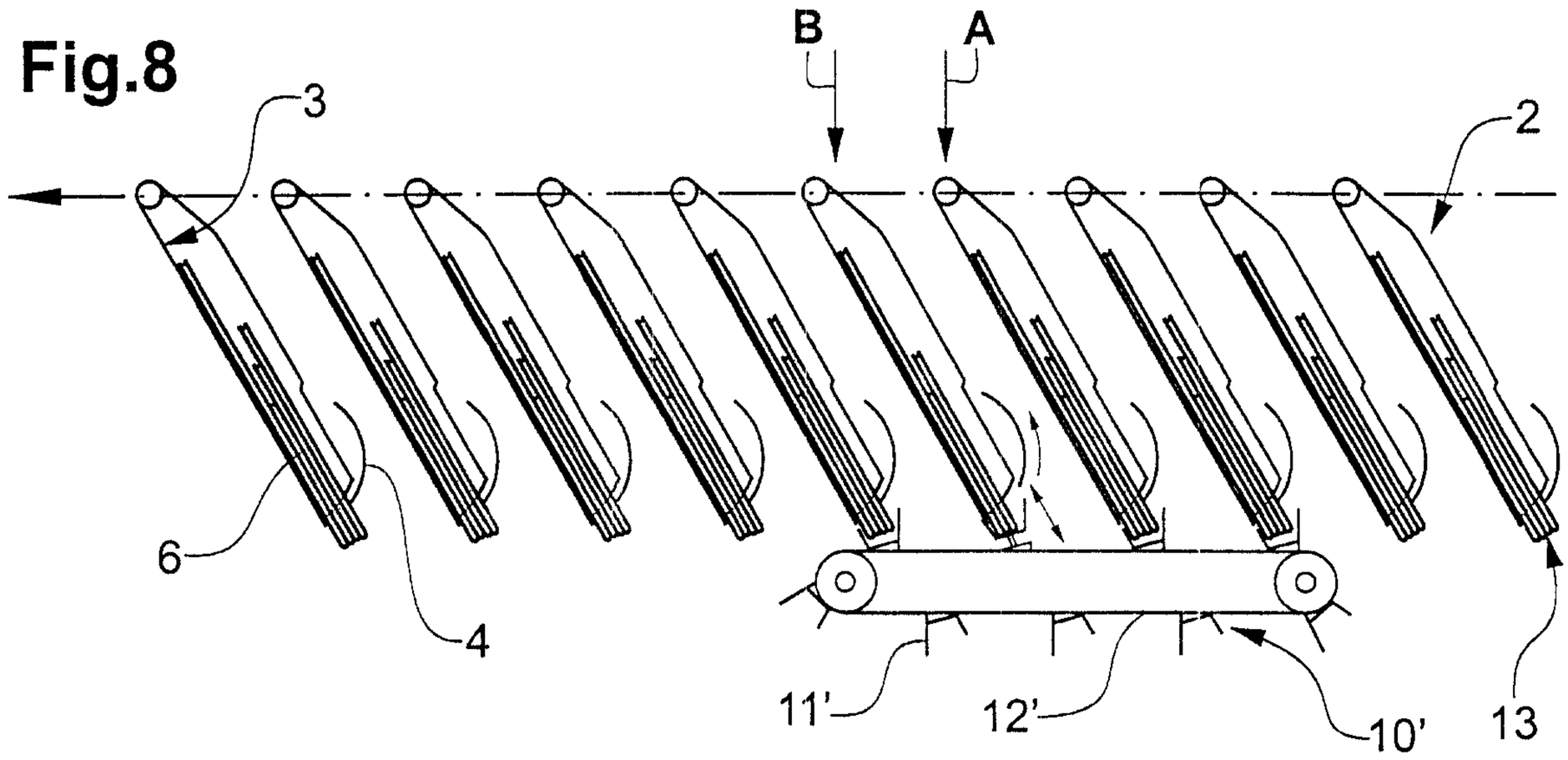


Fig.9

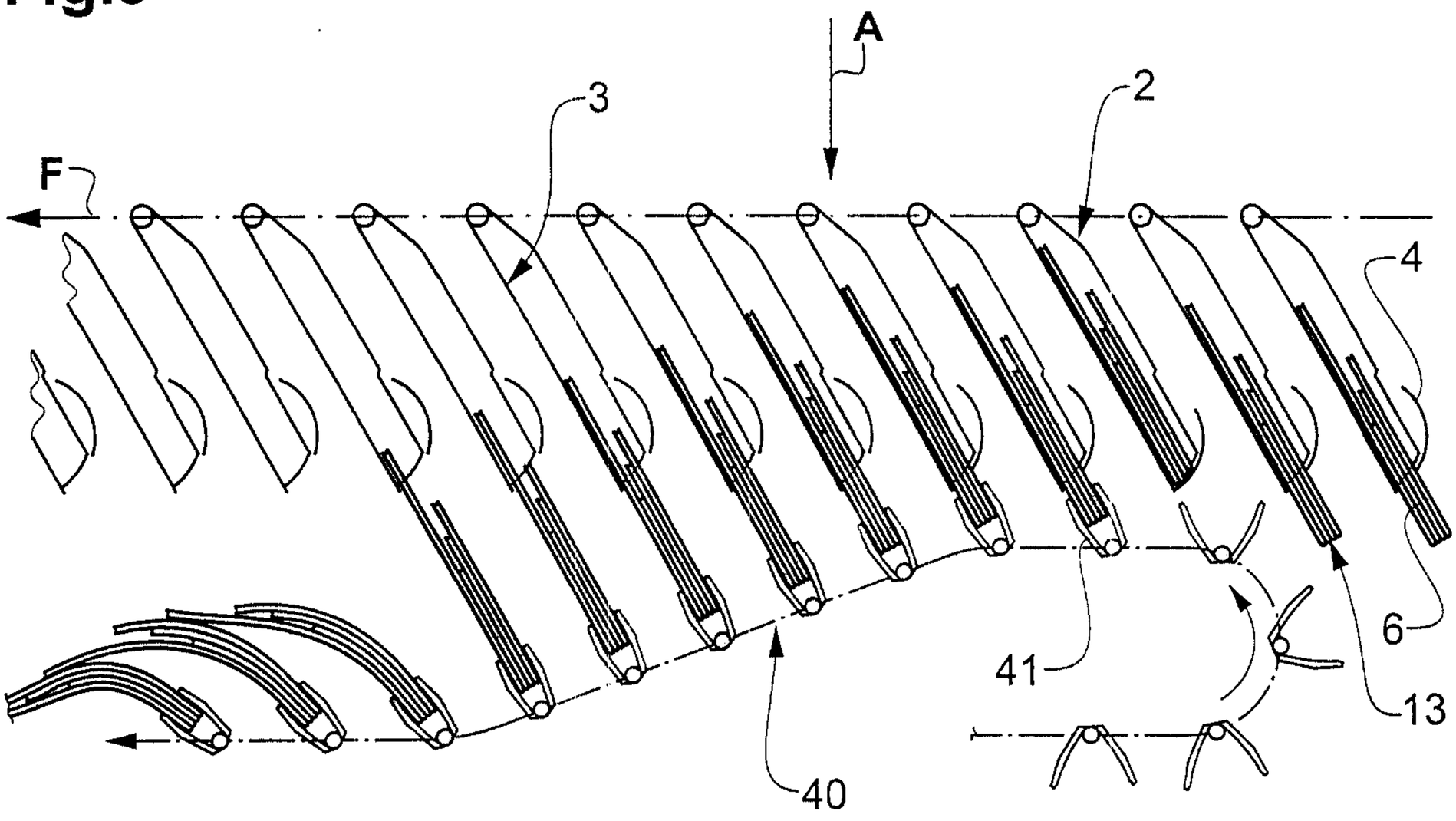
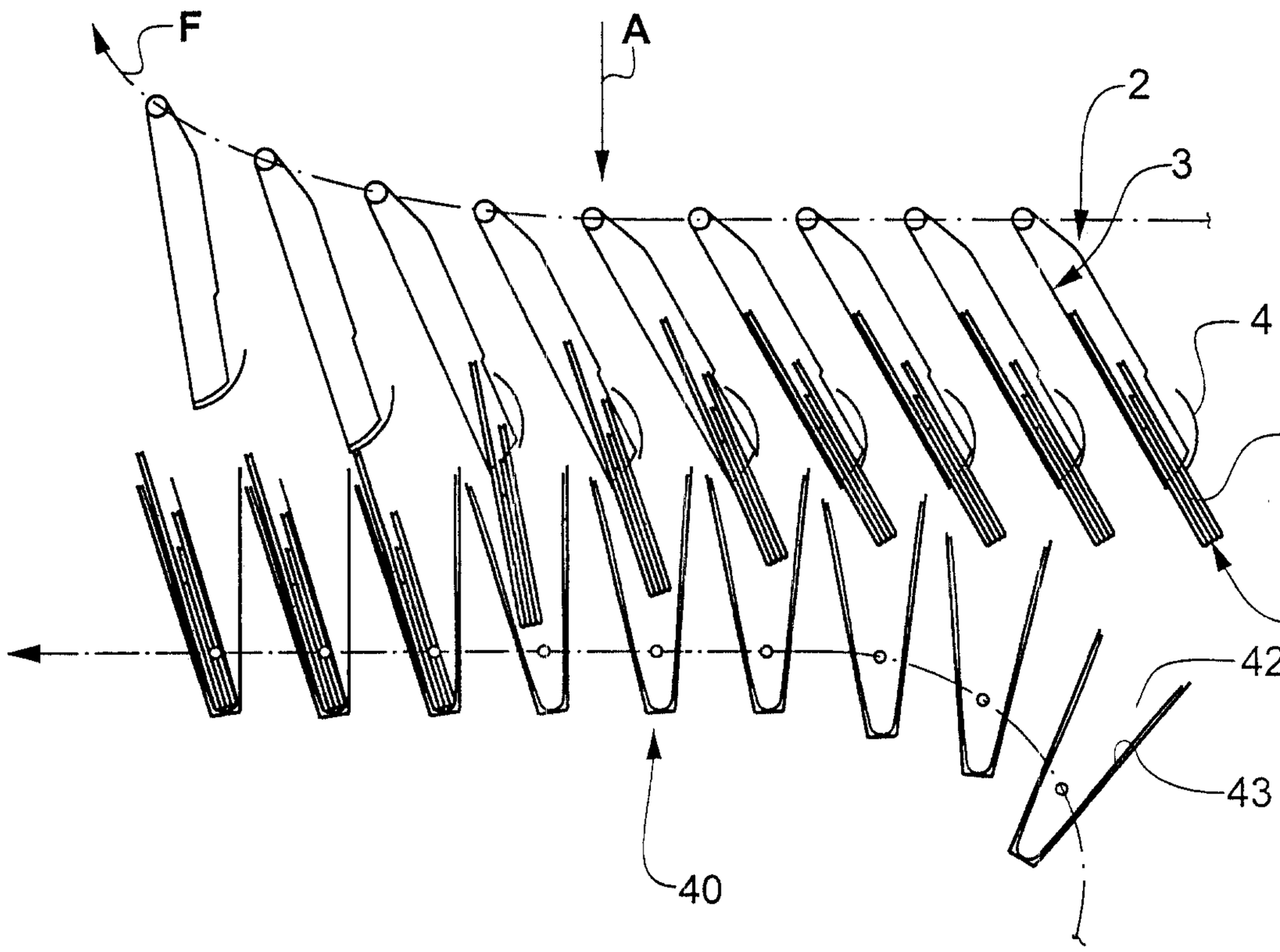


Fig.10



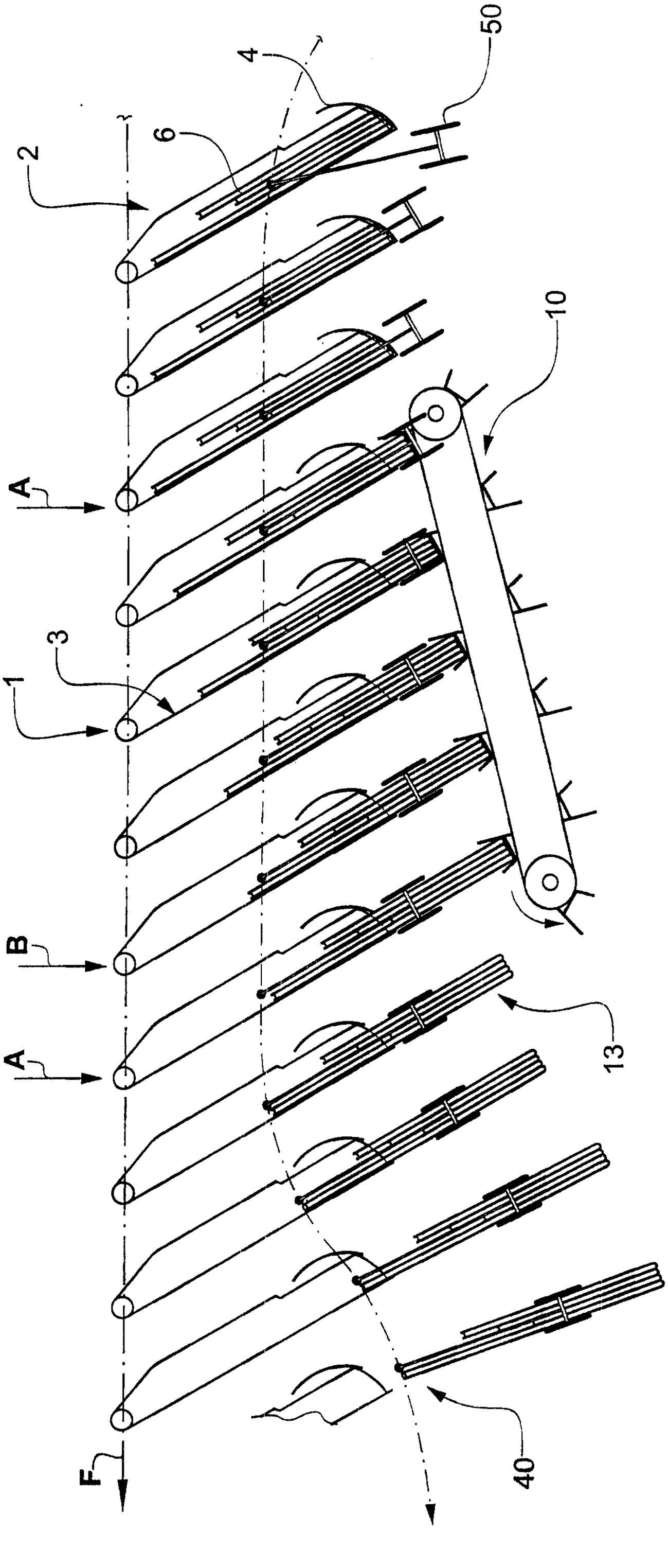


Fig.11

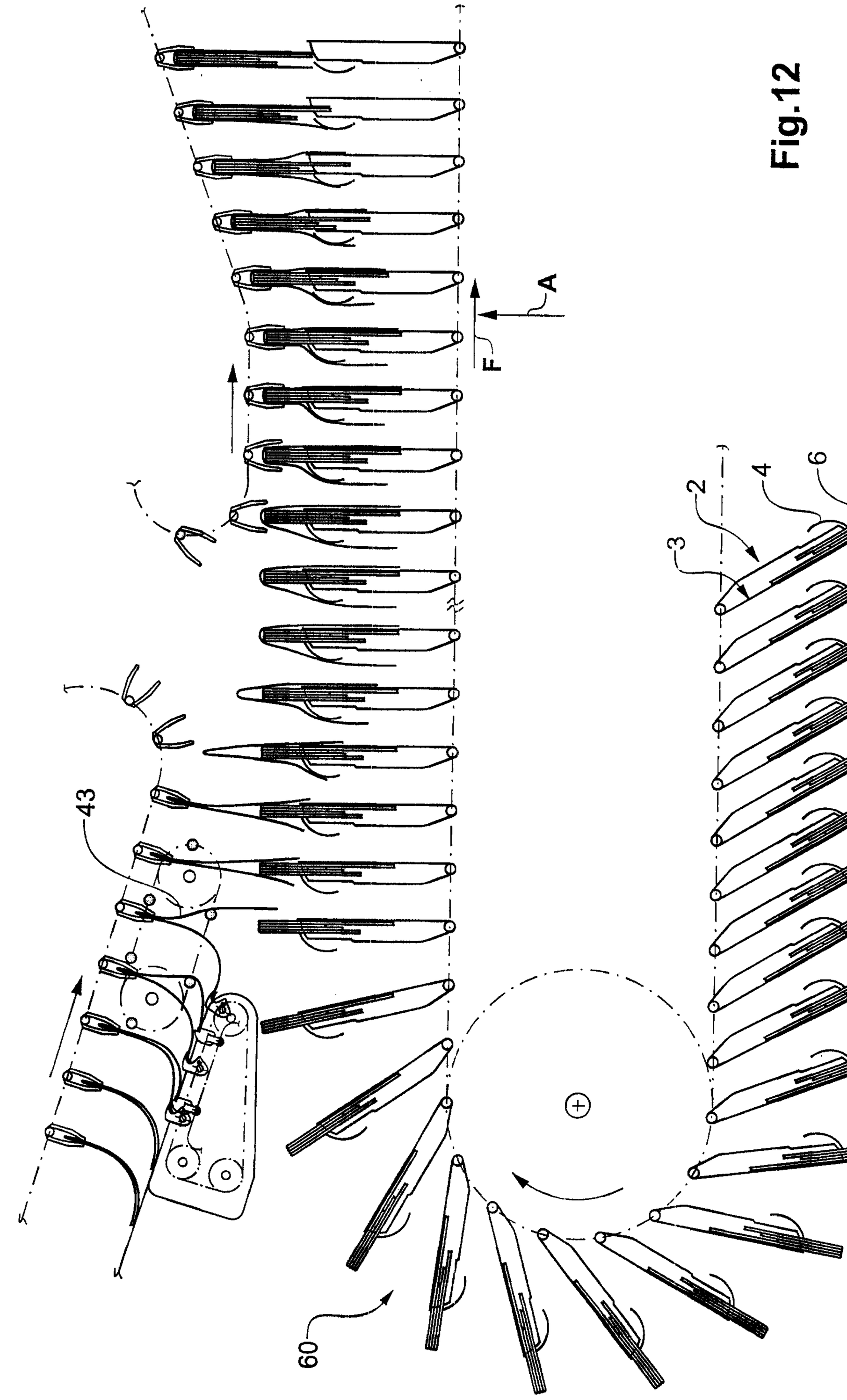
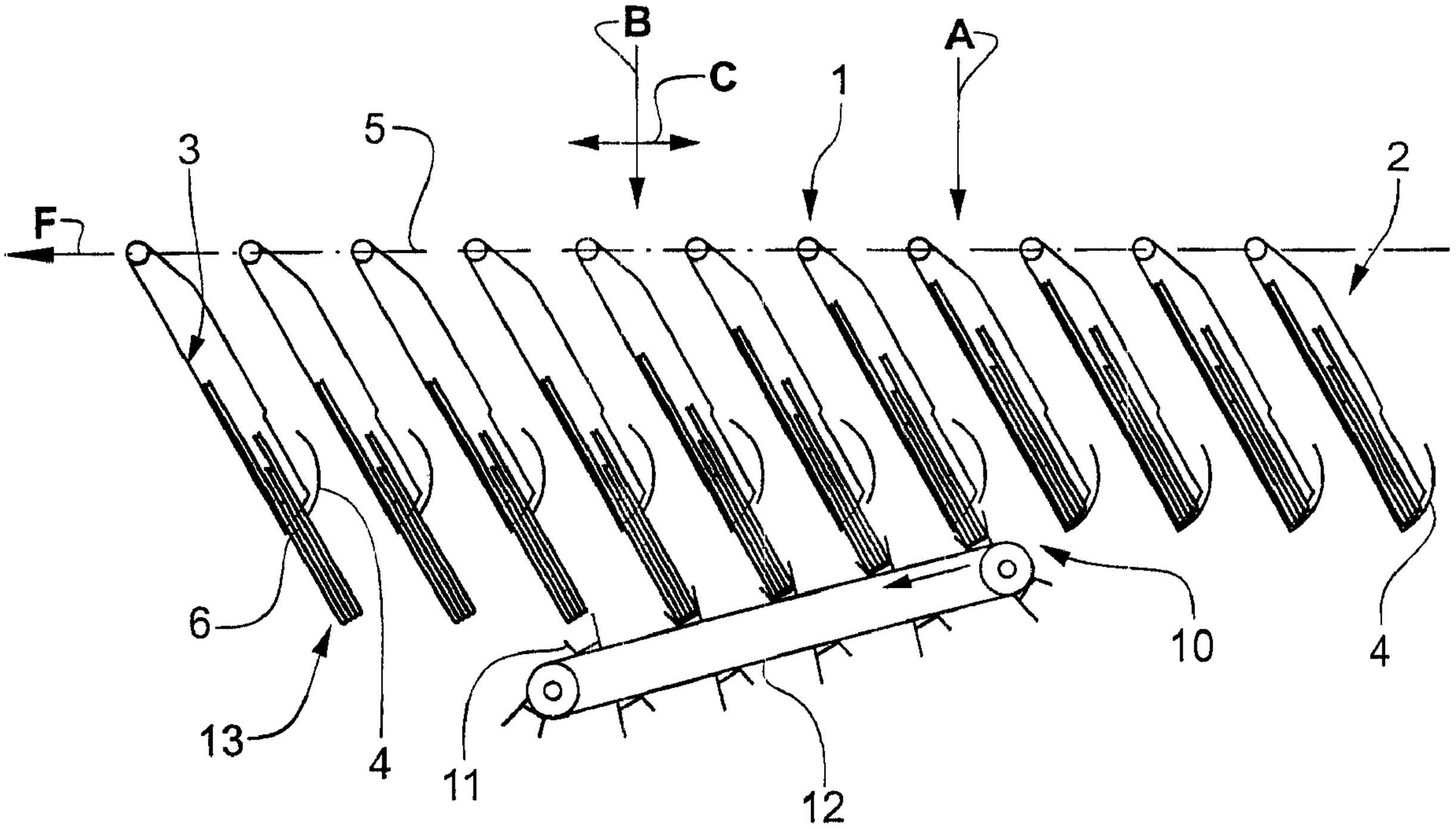


Fig.12


B
C
A
1
2
3
5
F
6
13
4
11
12
10
4