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(54) Sampling apparatus for flat products carried by conveyor

Einrichtung zur Probeentnahme von flachen Produkten, die von einer Förderanlage getragen werden

Appareil de prélèvement d'échantillons de produits plats entraînés par un convoyeur

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DE-A- 2 346 898 **DE-A- 3 732 589**
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Description

The present invention relates to an apparatus for sampling part of flat products carried by a conveyor according to the preamble of claim 1. The apparatus may be used for sampling one or a plurality of pieces of signatures continuously carried from a printing machine or the like by a conveyor.

In the printing line, printed products continuously carried must be subjected to sampling for inspection. Conventionally, the sampling work has been manually performed by operators. It is desirable to mechanize the manual operation and to achieve the automatic sampling.

An apparatus as defined in the preamble of claim 1 is disclosed in EP-A-0 326 532 and refers to drive means for opening and closing a clamp which may be of any design. A continuous chain is used which runs around three stationary deflection rolls. This chain is provided with a mechanical clamp and is disposed above the conveyor which conveys the flat products placed thereon in such a manner that this chain is adjacent and parallel to the conveyor.

EP-A-0 116 015 shows and describes in general an apparatus for sampling part of flat products having the following features: detecting a side end of flat products with a side end detecting means; descending a knife; inserting the knife under the flat products; clamping the flat products piled on the knife; and moving the knife at a velocity higher than the conveyor velocity. A gripper used therein remains stationary, when the springs are inserted under the sample copy and when the sample copy is clamped with the spring. When a member is disengaged the spring abruptly and rapidly descends onto the sample copy. Thus the spring contacts the sample copy abruptly and the sample copy may be damaged caused by this abrupt contact. Furtheron the rapid closing of the spring tends to cause damages to the flat product to be sampled, too.

An object underlying the present invention is to overcome the above problems and to provide an apparatus for automatically sampling one or a plurality of pieces of flat products placed on a carrying conveyor and continuously carried.

According to the present invention there is provided an apparatus of the kind referred to above as set out in claim 1.

In the apparatus of the present invention the first unit is expandable and thus the inserting means can be moved in parallel with the conveyor by rotating the first arm unit around the arm shaft. Caused by this rotation of the first arm unit around the arm shaft the apparatus of the present invention is of simplified structure in comparison to the state of art discussed above. Additionally the expandability of the second arm unit facilitates the preferred soft touch of the inserting means on the upper surface of the flat products. Furtheron the moving means rotates around the arm shaft, so that the upper surface of the conveyor is not obstructed by any convey-

ing means, so that the transfer of the flat products is facilitated and also any maintenance of the conveyor will be simplified. Furtheron one of the edges of the flat products carried on the carrying conveyor is detected with high sensitivity, the knife as inserting means being certainly inserted between the flat products with accurate timing, and the flat products are clamped, which enables the automatic sampling.

Preferred embodiments of the apparatus of the present invention are subject matters of claims 2 to 12.

- Fig. 1 is a schematic side view showing the construction of an essential portion of an apparatus of the present invention;
- Fig. 2 is a front view of a sampling arm assembly;
- Fig. 3 is a side view of a first arm unit taken along the line A-A of Fig. 2;
- Fig. 4 is a side view of a second arm unit taken along the line B-B of Fig. 2;
- Fig. 5 is a view for explaining the starting state in the discarding-sampling by use of the apparatus of the present invention;
- Fig. 6 is a view for explaining the returning state of the discarding-sampling;
- Fig. 7 is a view for explaining the signatures carried in a manner of tiles of a roof by a conveyor;
- Fig. 8 is a view for explaining a stepped roller; and
- Fig. 9 is a view for explaining the signatures carried in another manner by a conveyor.

Hereinafter, embodiments of the present invention will be described with reference to the drawings.

Fig. 1 shows the construction of an essential portion of a sampling device according to the present invention. In Fig. 1, a main frame of the device is omitted, and the shape of each portion is simplified.

The sampling device of the present invention includes a means 3 for detecting one of edges 5 of flat products 4 carried by a conveyor 1; a knife 9 inserted between upper and lower flat products 4 and 4 from the edge 5 detected by the edge detecting means 3; a means 53 for clamping the flat products 4 on the upper surface side of the inserted knife 9; and a knife moving device 8 for moving the knife 9 on the downstream side of the carrying direction with a velocity higher than the carrying velocity of the conveyor 1, and sampling the flat products 4 clamped by the knife 9.

The carrying conveyor 1 has endless belts of a double row type in which the belts are disposed in parallel to each other, and which is continuously operated in the direction of the arrow W by a suitable drive source (not shown). As shown in Fig. 7, signatures 4 as one example of the flat products are carried in a manner to be overlapped on the conveyor 1, to be shifted in the carrying direction, and to be exposed at the edges 5 on the downstream side of the carrying direction. Namely, the signatures 4 are continuously carried while being overlapped to each other in a manner of the tiles of a roof.

The material of the belt of the carrying conveyor 1 is

not particularly limited; but is preferably constituted of a poly-belt, for example, with the nylon surface. The examples of the flat products 4 include the folded products such as printed products, or one sheet, and films other than paper sheets.

A means 2 for floating the edge 5 of one of the signatures 4 is provided on the conveyor 1. As shown in Fig. 8, the floating means 2 is constituted of a roller 2 provided between the endless belts. The peripheral surface of the roller 2 projects from the upper surface of the carrying conveyor 1 by a specified height. Namely, a stepped portion provided on the carrying surface of the conveyor 1 by use of the roller 2, to float the edge of the signature 4 from the surfaces of the lower signatures 4. The material of the roller 2 is suitably selected from metal, plastic and the like. In the case of the metal, the metal is preferably subjected to rust-preventive treatment such as plating. As for the drive of the roller 2, the peripheral velocity is preferably synchronized with the velocity of the carrying conveyor 1.

As shown in Fig. 1, the edge detecting means 3 is disposed at the position where the edge 5 of the signature 4 can be detected according to the position of the roller 2. The edge detecting means 3 is constituted of a non-contact distance sensor, which may be of a type capable of detecting the edge 5 of the signature 4, for example, a laser displacement meter, ultrasonic sensor or the like.

In addition, the roller 2 may be provided only in the case that the signature 4 is thinned and the edge 5 of the signature 4 is difficult to be detected by the detecting sensor 3. In the case that the signature 4 is thick, the roller 2 is not necessarily required to be provided.

The knife moving device 8 is constituted of an arm assembly 8, which is disposed upwardly from the conveyor 1 so as to be turnable around the horizontal axis perpendicular to the carrying direction of the conveyor 1.

As shown in Fig. 2, the arm assembly 8 is expandable in the turning-axial direction. Namely, the arm assembly 8 includes an arm shaft 6 having the horizontal axis perpendicular to the carrying direction of the conveyor 1, a first expandable arm unit provided on the arm shaft 6, a second expandable arm unit provided on the first arm unit, and a drive unit 7 constituted of a motor or the like for driving the arm shaft 6.

By turning of the arm shaft 6 by means of the motor 7 as the drive unit, the rocking speed, rocking angle, rocking direction and stopping position of the arm assembly 8 are freely controlled.

As shown in Fig. 3, the first arm unit includes a first block 11 fixed on the turnable arm shaft 6, first arms 14 slidably provided on the first block 11, and second blocks 21 and 30 pivotably supported at the lower ends of the first arms 14 so as to be turnable in the vertical direction.

Sliders 12 and 12 are provided on both sides of the first block 11 while holding the arm shaft 6. The first arms 14 and 14 are respectively inserted in the sliders

12 and 12 so as to be in parallel to each other and to be slidable in the direction perpendicular to the axis of the arm shaft 6. A pair of the first arms 14 and 14 are formed of rods.

The upper end portions of a pair of the first arms 14 and 14 are connected and fixed to each other by an upper plate 13a. The lower end portions of a pair of the first arms 14 and 14 are connected and fixed to each other by a lower plate 13b.

A spring seat 15 is provided on the lower surface of the first block 11. A spring seat 16 is provided on the upper surface of the lower plate 13b. A compression spring 17 is interposed between both the spring seats 15 and 16. Accordingly, a pair of the first arms 14 are usually extended as long as possible by the force of the spring 17. The maximum extension amount of the spring is set by the abutment of the stopper 18 provided on the upper plate 13a on the first block 11.

A downwardly projecting boss 19 is provided at the center portion on the lower surface of the lower plate 13b. A shaft 20 passes through the boss 19, and is thus turnable. The shaft 20 is disposed to be in parallel to the arm shaft 6. The second blocks 21 and 30 are fixed on the shaft 20.

Namely, the second blocks are divided into a triangular plate 21 fixed at one end portion of the shaft 20 and a block 30 fixed at the other end portion thereof.

A pair of front and rear rollers 24 and 24 are rotatably supported on the triangular plate 21. The rollers 24 and 24 are fitted in a rolling manner in a guide groove 23 formed between a pair of guide members 22 and 22 disposed in the vertical direction. The guide groove 23 is provided to extend in the carrying direction of the conveyor 1 for a specified length, and to extend in parallel to the carrying surface. The front and rear end portions of the guide groove 23 are opened, and the rollers 24 can be freely inserted in the guide groove 23 through these opening portions.

A rod 27 for a spring is fixed on the upper plate 13a. A metal fitting 26 is fixed on the triangular plate 21, and a pin 28 is fixed on the metal fitting 26. A stretching spring 25 is hung between the rod 27 for a spring and the pin 28. The triangular plate 21 is biased by the spring 25 in one direction.

Next, the second arm unit shown in Fig. 4 will be described.

Namely, a plate 31 is fixed on the block 30 constituting part of the second block. A pair of sliders 32 and 32 are provided on both the sides of the plate 31 through the shaft 20. Second arms 33 and 33 are slidably inserted in the sliders 32 and 32. The second arms 33 are formed of rods. The upper end portions of a pair of the second arms 33 and 33 are connected to each other by an upper plate 36, and the lower end portions of the second arms 33 and 33 are connected to each other by a third block 35. A boss 38 is projectingly provided on the lower surface of the third block 35. A shaft 39 is inserted in and fixed to the boss 38. The shaft 39 is provided to be in parallel to the arm shaft 6.

Blocks 40 and 40 are turnably inserted in the shaft 39, and the knife 9 is fixed on the lower surfaces of the blocks 40 and 40. The knife 9 is formed in a plate in which the side facing to the edge 5 of the signature 4 is tapered off.

The clamping means 53 is provided on the shaft 39.

The clamping means 53 includes blocks 41 and 41 turnably inserted in the shaft 39, the clamping member 10 fixed on the lower surface of the blocks 41 and 41, and a clamp drive means 44 for turning the clamping member 10 in the vertical direction. The clamping member 10 is formed in a plate, and which is positioned on the upper surface side of the knife 9.

A cylinder 44 as the clamp drive means is connected to the clamping member 10. Namely, a block 42 is fixed on the clamping member 10, and a leading edge portion 43 of a cylinder rod is connected to the block 42 through a pin. The end portion of the cylinder 44 in which the cylinder rod is slidable is connected to a metal fitting 45 fixed on the upper plate 36 through a pin 46.

Thus, by extending/contracting the rod of the cylinder 44 for turning the clamping member 10, the signatures 4 can be held between the lower surface of the clamping member 10 and the upper surface of the knife 9.

One end of a spring 48 is locked at the rear end portion of the knife 9, and the other end of the spring 48 is locked at a metal fitting 49 fixed on the third block 35. A stopper 50 is mounted on the metal fitting 49, and the lower surface of the stopper 50 separably abuts on the upper surface of the knife 9. Namely, the leading edge side of the knife 9 is permitted to be turned upwardly around the shaft 39, but is restricted to be turned downwardly by the stopper 50. The rear end side of the knife 9 is biased upwardly by the spring 48, and the knife 9 abuts on the stopper 50, thus setting the initial angle of the knife 9.

A cylinder 34 for extension/contraction of the arm is fixed on the plate 31, and the third block 35 is connected to the leading edge of the rod of the cylinder 34. Accordingly, by extension/contraction of the cylinder 44, the second arms 33 are moved in the vertical direction.

A stopper cylinder 37 is provided on the plate 31, and a stopper 47 is fixed on the leading edge of the rod. The stopper 47 separably abuts on the upper surface of the third block 35. Accordingly, the upward movement of the second arms 33 is restricted by the stopper 47.

As shown in Fig. 1, a semi-circular arc guide plate 51 is disposed on the upper surface side of the conveyor 1, which serves to guide the signatures 4 held and dropped by the knife 9 and the clamping member 10.

A stacker device 52 is disposed on the terminal portion of the guide plate 51 at the position upwardly from the arm shaft 6. The stacker device 52 is intended to store the signatures 4 released from the clamping means 53 and dropped.

A second rocking conveyor 60 is provided ahead of the carrying conveyor 1 for opening/closing the connection with the carrying conveyor 1 by the rocking of the

conveyor 60. When the connection is opened (shown by the solid line in Fig. 5), the carried signatures 4 are discarded downwardly from the second conveyor 60. On the other hand, when the connection is closed (60a shown by the dashed line in Fig. 5), the signatures 4 are normally carried to the subsequent process. As the conveyor 60, there may be a double row conveyor corresponding to the carrying conveyor 1 or a single row conveyor. As shown in Fig. 5, the conveyor 60 is preferably disposed such that the upper surface of the conveyor has a slight rising gradient when being connected to the carrying conveyor 1. The rising gradient on the upper surface of the conveyor is dependent on the strength of the waist of the signature 4 (mainly strength of holding the shape of the signature itself due to the thickness). In particular, in the case that the thickness of the signature 4 is thin and thereby the strength of the waist is weak and the folding is made small, it is not required to provide the rising gradient on the upper surface of the conveyor.

Next, the action of each portion will be described.

As shown in Fig. 6, the signatures 4 are carried on the carrying conveyor 1 while being overlapped to each other in a manner of tiles of a roof. At the position of the roller 2, as shown in Fig. 8, the signature 4 is lifted up at the height of the roller 2 so that the height of the edge 5 of the signature 4 is certainly distinguished from the preceding signatures 4. An interval can be confirmed between the continuous signatures 4 by the detecting sensor 3.

When the sampling signal is transmitted in association with the preliminary process of a printing machine or the like, the motor 7 as the drive unit is started for turning the arm assembly 8 standing-by at an action starting position 8a.

The arm assembly 8 is rocked between positions shown by 8a, 8b ... 8h around the arm shaft 6 as shown in Fig. 1. Furthermore, at the positions 8a, 8b, 8c, and 8d, the arm assembly 8 is moved along the guide groove 23 of the guides 22 and 22, so that the shaft 20 located at the lower end of the first arm unit is moved in parallel to the carrying conveyor 1.

Along with the start of the turning of the arm assembly 8, the rollers 24 and 24 of the first arm unit advance in the guide groove 23, and thereby the first arms 14 are extended/contracted and the second blocks 21 and 30 are linearly moved in parallel to the carrying conveyor 1 along the guides 22. Subsequently, by operation of the cylinder 34, the second arms 33 are descended, and the lower surface of the knife 9 abuts on the upper surface of the signature 4 carried on the conveyor 1.

Before the leading edge of the knife 9 abuts on the signature 4, the rear end of the knife 9 is biased upwardly by the spring 48 and abuts on the stopper 50. However, when the leading edge of the knife 9 abuts on the signature 4 and is pressed from the signature 4, the leading edge of the knife 9 is turned upwardly against the spring 48, so that the abutment between the rear end of the knife 9 and the stopper 50 is released. Thus,

the lower surface of the knife 9 softly abuts on the upper surface of the signature 4, which prevents the signature 4 from being damaged. The leading edge of the knife 9 is descended somewhat downwardly from the upper surface of the conveyor 1, and the knife 9 certainly abuts on the upper surface of the signature 4 (position 8b).

In such a state, the rotational frequency of the motor 7 is controlled such that the moving velocity of the knife 9 is smaller than the carrying velocity of the conveyor 1, or the movement of the knife 9 is stopped for a specified period of time. By forming a difference in the moving velocity between the knife 9 and the signature 4, the leading edge of the knife 9 is inserted between the signatures 4. At this time, the clamping member 10 is turned upwardly such that the signatures 4 are placed on the upper surface of the knife 9. By controlling the above-described difference in velocity or the stopping time, the number of the signatures 4 placed on the knife 9 can be controlled.

After the knife 9 is certainly inserted between the signatures 4, the knife vertically moving cylinder 34 is reversely operated to ascend the second arms 33, thus ascending the knife 9. At this time, the stopper cylinder 37 is previously operated, to set the ascending position of the second arms 33 (position 8c). The ascending position is set at a position where the lower surface of the leading edge of the knife 9 is slightly separated from the upper surface of the signature 4.

By separating the leading edge of the knife 9 from the signature 4, the knife 9 is turned by the spring 48 and abuts on the stopper 50, to be thus stabilized in its posture.

After the posture of the knife 9 is stabilized, the rod of the holding cylinder 44 is extended, and the clamping member 10 is turned, to hold the signatures 4 in a specified number lifted on the knife 9. Along with the completion of the holding of the signatures 4, the sampling motor 7 is accelerated (two to four times the speed of the carrying conveyor 1), to rotate the arm assembly 8 (positions 8d-8f), thus sampling the signatures 4 from the conveyor 4.

One or a plurality of the signatures 4 may be held on the knife. When a plurality of signatures are sampled, the parallel movement of the knife 9 is stopped for a specified time at the position 8b, and the signatures in a specified number are joggled and then held.

Additionally, in the state where the knife 9 is descended, the signatures 4 may be clamped; however, in this state, the spring 48 biases the other end of the knife 9 and thereby the stopper 50 does not abut on the knife 9 so that the operation of the cylinder 44 makes instable the posture of the knife 9, which causes the fear that the signatures 4 contacted with the lower surface of the knife 9 are damaged. Accordingly, to cope with this problem, it is desirable to ascend the knife 9 up to the rising position set by the knife stopper cylinder 37, and to clamp the signatures 4 at the position where the other end of the knife 9 stably abuts on the stopper 50.

After that, the arm assembly 8 is turned, and at the

time when the arm assembly 8 reaches the position 8g, the sampling motor 7 is stopped, and then the clamping means 53 is opened to release the signatures 4, so that the signatures 4 are discharged on the stacker 52 with a good posture. After discharge of the signatures 4, the knife vertically moving cylinder 34 and the knife stopper cylinder 37 are reversely operated, and thus the sampling motor 7 is returned at the original point and the clamping means 53 stands by the action starting position.

The foregoing action is performed for sampling the signatures 4 to the upper stacker device 52. Next, an action of sampling a plurality of signatures 4 downwardly from the junction between the carrying conveyor 1 and the second conveyor 60 will be described. Hereinafter, the action is referred to "discarding-sampling".

As shown in Fig. 5, at the start of the discarding-sampling, the knife 9 is inserted between the signatures 4 and is stopped for a specified time at the position 8b wherein they are ascended by the specified height to joggle the signatures 4 (the movement of the signatures on the driving conveyor is temporarily stopped). The joggling operation is as follows: namely, after the second conveyor 60 permits the passing of the preceding signatures 4, and is rocked to fully open the interval with the preceding signatures 4 with the matched timing to release the connection with the carrying conveyor 1.

By rocking the second conveyor 60 for releasing the connection with the carrying conveyor 1, the knife 9 reaches the position 8e, so that the joggling of the signatures 4 are released, the joggled signatures 4 are continuously discarded downwardly from the second conveyor 60.

In return of the discarding-sampling, in the case that the pitch between the signatures 4 is short, the simple rocking of the second conveyor 60 for performing the connection with the conveyor 1 does not desirably separate the continuously carried signatures 4.

To prevent such an inconvenience, by performing the same action as the holding-sampling for holding the one of the signatures 4 and pulling it, and by releasing it at the position 8e, the signatures 4 are placed on the preceding signatures 4, and the second conveyor 60 is rocked thereon, to be connected with the carrying conveyor 1, so that the signatures following the pulled signatures 4 are desirably carried and are returned to a main stream.

In addition, the embodiment described in this specification is illustrative and is not restrictive. For example, the knife vertically moving cylinder 34, the knife stopper cylinder 37, and the clamp cylinder 44 are not limited to a direct moving (linearly moving) cylinder type; but it can apparently achieve its function fully by replacement of the type with a rotary drive means such as a rotary cylinder or pulse motor. Furthermore, the arrangement of the flat products 4 on the conveyor 1 is not limited to the manner of tiles of a roof; but may be of a form in which intervals are generated between the preceding flat products and the following flat products (see Fig. 9).

The scope of the present invention is designated by the appended claims, and all of the modifications in the meanings of the claims fall within in the present invention.

Claims

1. An apparatus for sampling part of flat products (4) having a side end (5) from a conveyor (1), said flat products (4) being placed on said conveyor (1) and carried in a manner to be shifted in a carrying direction and to be exposed at said side end (5), said sampling apparatus comprises:
 - means (3) for detecting said side end (5) of a flat product to be sampled of said flat products carried by said conveyor (1);
 - means (9) for inserting under said flat product to be sampled from said side end (5) detected by said side end detecting means (3);
 - means (53) for clamping said flat product to be sampled and piled on said inserting means (9); and
 - means (8) for moving said inserting means (9) outwardly of said conveyor (1) to sample said flat product piled on said inserting means (9) from said conveyor (1);

characterized in that said means (8) for moving said inserting means (9) has an arm assembly which is disposed above said conveyor (1) in a manner to be rotatable about a horizontal axis perpendicular to a carrying direction of said conveyor (1) and to be radially expandable,

said arm assembly includes an arm shaft (6) having the horizontal axis perpendicular to the carrying direction of said conveyor (1), a first expandable arm unit provided on said arm shaft (6), a second expandable arm unit provided on said first expandable arm unit, and a drive unit (7) for rotating said arm shaft (6), and said second arm unit is provided with said inserting means (9).
2. An apparatus as defined in claim 1, wherein said side end detecting means (3) includes a non-contact distance sensor fixed upwardly from said conveyor (1).
3. An apparatus as defined in claim 2, wherein said conveyor (1) is provided with means (2) for shifting said side end (5) upwardly from an upper surface of said conveyor (1) at a side end detecting position by said side end detecting means (3).
4. An apparatus as defined in claim 3, wherein said shifting means (2) includes a roller provided so as to project upwardly from a carrying surface of said conveyor (1).
5. An apparatus as defined in any of preceding claims 1 to 4, wherein said inserting means (9) is a knife formed in a plate.
6. An apparatus as defined in any of preceding claims 1 to 5, wherein said clamping means (53) comprises a clamping member (10) pivotably supported on said inserting means (9) and a clamp driving means (44) for rotating said clamping member (10).
7. An apparatus as defined in claim 6, wherein said clamp driving means is an air cylinder (44).
8. An apparatus as defined in any of preceding claims 1 to 7, wherein said first arm unit includes a first block (11) provided on said arm shaft (6), a first arm (14) slidably provided on said first block (11), a second block (21, 30) rotatably provided at a leading end of said first arm (14), a roller (24) provided on said second block (21), and a guide member (22) provided between an upper surface of said conveyor (1) and said arm shaft (6) while extending along the carrying direction of said conveyor (1) for a specified length, wherein said roller (24) is guided by said guide member, thereby said first arm (14) being slidable against said first block (11),
 - said second arm unit includes a second arm (33) slidably provided on said second block (30), a third block (35) provided on a lower end portion of said second arm (33), and a cylinder (34) expandably provided between said second block (30) and said second arm (33), and said inserting means (9) is provided on said third block (35).
9. An apparatus as defined in claims 8, wherein a stopper (50) is provided between said third block (35) and said inserting means (9), said stopper (50) permitting an upward rotation of but restricting a downward rotation of said inserting means (9),
 - and an elastic member (48) is provided on said stopper (50), said elastic member (48) permitting said inserting means (9) to abut on said stopper (50).
10. An apparatus as defined in claim 9, wherein said clamping means (53) includes a clamping member (10) pivotably provided on said inserting means (9), and a clamp driving means (44) for rotating said clamping member (10).
11. An apparatus as defined in any of preceding claims 8 to 10, wherein a stacker device (52) is disposed under a position where said inserting means (9) is shifted upwardly from said arm shaft (6) by upward rotation of said arm assembly (8), and said stacker device (52) serves to store said flat products (4).

dropped from said inserting means (9) by unclamping said clamping means (53).

12. An apparatus as defined in any of preceding claims 1 to 11, wherein a second conveyor (60) is separately provided on a downstream side of said conveyor (1).

Patentansprüche

1. Vorrichtung zum Prüfen eines Teils von flächenhaften Erzeugnissen (4), welche ein Seitenende (5) von einem Förderer (1) haben, wobei die flächenhaften Erzeugnisse (4) auf dem Förderer (1) angeordnet sind und derart befördert werden, daß sie in eine Förderrichtung bewegt werden und am Seitenende (5) freigelegt werden, wobei die Prüfvorrichtung folgendes aufweist:

eine Einrichtung (3) zum Detektieren des Seitenendes (5) eines flächenhaften, zu prüfenden Erzeugnisses von den flächenhaften Erzeugnissen, die vom Förderer (1) transportiert werden;

eine Einrichtung (9) zum Einführen unter das flächenhafte und zu prüfende Erzeugnis von dem Seitenende (5) her, welches mittels der Seitenenden-Detektionseinrichtung (3) erfaßt wird;

eine Einrichtung (53) zum Einspannen des flächenhaften, zu prüfenden Erzeugnisses und zum Aufstapeln auf eine Einführungseinrichtung (9); und

eine Einrichtung (8) zum Bewegen der Einführungseinrichtung (9) von dem Förderer (1) nach außen, um das auf der Einführungseinrichtung (9) von dem Förderer (1) aufgestapelte, flächenhafte Erzeugnis zu prüfen;

dadurch gekennzeichnet, daß die Einrichtung (8) zum Bewegen der Einführungseinrichtung (9) eine Armanordnung hat, welche oberhalb des Förderers (1) derart angeordnet ist, daß sie um eine horizontale Achse senkrecht zu einer Förderrichtung des Förderers (1) drehbar und radial ausfahrbar ist,

die Armanordnung eine Armwelle (6) umfaßt, welche eine horizontale Achse senkrecht zur Förderrichtung des Förderers (1) hat, eine erste ausfahrbare Armeinheit an der Armwelle (6) vorgesehen ist, eine zweite ausfahrbare Armeinheit an der ersten ausfahrbaren Armeinheit vorgesehen ist und eine Antriebseinheit (7) zum Drehantreiben der Armwelle (6) umfaßt, und

die zweite Armeinheit mit der Einführungseinrichtung (9) versehen ist.

2. Vorrichtung nach Anspruch 1, bei der die Seitenende-Detektionseinrichtung (3) einen kontaktlosen

Abstandssensor umfaßt, welcher von dem Förderer (1) nach oben fest vorgesehen ist.

3. Vorrichtung nach Anspruch 2, bei der der Förderer (1) mit einer Einrichtung (2) versehen ist, welche das Seitenende (5) von einer oberen Fläche des Förderers (1) an einer Seitenenden-Detektionseinrichtung erfaßt durch die Seitenenden-Detektionseinrichtung (3) verschiebt.

4. Vorrichtung nach Anspruch 3, bei der die Verschiebeeinrichtung (2) eine Rolle umfaßt, welche derart vorgesehen ist, daß sie von einer Tragfläche des Förderers (1) nach oben vorsteht.

5. Vorrichtung nach einem der Ansprüche 1 bis 4, bei der die Einführungseinrichtung (9) eine Klinge ist, welche an einer Platte ausgebildet ist.

6. Vorrichtung nach einem der vorangehenden Ansprüche 1 bis 5, bei der die Spanneinrichtung (53) ein Spannteil (10) aufweist, welches drehbeweglich an der Einführungseinrichtung (9) gelagert ist, und eine Spannantriebseinrichtung (44) aufweist, welche das Spannteil (10) verdreht.

7. Vorrichtung nach Anspruch 6, bei der die Spannantriebseinrichtung ein Luftzylinder (44) ist.

8. Vorrichtung nach einem der vorangehenden Ansprüche 1 bis 7, bei der die erste Armeinheit einen ersten Block (11), welcher an der Armwelle (6) vorgesehen ist, einen ersten Arm (14) welcher gleitbeweglich am ersten Block (11) vorgesehen ist, einen zweiten Block (21, 30), welcher an einem vorauslaufenden Ende des ersten Arms (14) drehbeweglich vorgesehen ist, eine Rolle (24), welche an dem zweiten Block (21) vorgesehen ist, und ein Führungsteil (22) umfaßt, welches zwischen einer oberen Fläche des Förderers (1) und der Armwelle (6) vorgesehen ist, und welche sich in Förderrichtung des Förderers (1) um eine vorbestimmte Längserstreckung erstreckt, wobei die Rolle (24) durch das Führungsteil geführt ist und hierdurch der erste Arm (14) gegenüber dem ersten Block (11) gleitbeweglich ist,

die zweite Armeinheit einen zweiten Arm (33), welcher gleitbeweglich auf dem zweiten Block (30) vorgesehen ist, einen dritten Block (35), welcher auf dem unteren Endabschnitt des zweiten Arms (33) vorgesehen ist, und einen Zylinder (34) umfaßt, welcher ausfahrbar zwischen dem zweiten Block (30) und dem zweiten Arm (33) vorgesehen ist; und die Einführungseinrichtung (9) an dem dritten Block (35) vorgesehen ist.

9. Vorrichtung nach Anspruch 8, bei der ein Anschlag

(50) zwischen dem dritten Block (35) und der Einführungseinrichtung (9) vorgesehen ist, und der Anschlag (50) eine aufwärtsgerichtete Drehbewegung zuläßt, aber eine abwärtsgerichtete Drehbewegung der Einführungseinrichtung (9) begrenzt, und

ein elastisches Teil (48) auf dem Anschlag (50) vorgesehen ist, wobei das elastische Teil (48) ermöglicht, daß die Einführungseinrichtung (9) zur Anlage an dem Anschlag (50) kommt.

10. Vorrichtung nach Anspruch 9, bei der die Spanneinrichtung (53) ein Spannteil (10) umfaßt, welches drehbeweglich an der Einführungseinrichtung (9) vorgesehen ist, und eine Spannantriebseinrichtung (44) umfaßt, welche das Spannteil (10) verdreht.
11. Vorrichtung nach einem der vorangehenden Ansprüche (8 bis 10), bei der eine Stapeleinrichtung (52) unterhalb einer Position angeordnet ist, an der die Einführungseinrichtung (9) von der Armwelle (6) durch eine Drehbewegung der Armanordnung (8) nach oben bewegt wird, und bei der die Stapeleinrichtung (52) dazu dient, die flächenhaften Erzeugnisse (4) aufzunehmen, die von der Einführungseinrichtung (9) durch das Entspannen der Spanneinrichtung (53) herabgefallen sind.
12. Vorrichtung nach einem der vorangehenden Ansprüche 1 bis 11, bei der ein zweiter Förderer (60) gesondert auf eine stromabwärtigen Seite des Förderers (1) vorgesehen ist.

Revendications

1. Appareil pour prélever d'un convoyeur (1) des échantillons de produits plats (4) qui ont chacun un bord (5), lesdits produits plats (4) étant placés sur ledit convoyeur (1) et transportés de façon à être décalés dans une direction de transport, en ayant leurs bords (5) exposés vers l'aval, ledit appareil de prélèvement comprenant:
 - un moyen de détection (3) dudit bord (5) d'un produit plat à prélever dans lesdits produits plats transportés par ledit convoyeur (1);
 - un moyen d'insertion (9) sous ledit produit plat à prélever à partir dudit bord (5) détecté par le moyen de détection (3);
 - un moyen (53) de serrage dudit produit plat à prélever empilé sur ledit moyen d'insertion (9); et
 - un moyen de déplacement (8) dudit moyen d'insertion (9) à l'extérieur dudit convoyeur (1) pour prélever ledit produit plat empilé sur ledit moyen d'insertion (9) à partir dudit convoyeur (1):

caractérisé en ce que ledit moyen de

déplacement (8) dudit moyen d'insertion (9) comporte un ensemble de bras qui est disposé au-dessus dudit convoyeur (1) de façon à pouvoir tourner autour d'un axe horizontal perpendiculaire à la direction de transport dudit convoyeur (1) et à pouvoir s'allonger radialement,

ledit ensemble de bras comprend un arbre de bras (6) ayant son axe horizontal perpendiculaire à la direction de transport dudit convoyeur (1), un premier élément de bras extensible prévu sur ledit arbre de bras (6), un second élément de bras extensible prévu sur ledit premier élément de bras extensible, et un élément d'entraînement (7) pour faire tourner ledit arbre de bras (6), et

ledit second élément de bras est pourvu dudit moyen d'insertion (9).

2. Appareil suivant la revendication 1, dans lequel ledit moyen de détection (3) du bord comprend un capteur de distance sans contact fixé au-dessus dudit convoyeur (1).
3. Appareil suivant la revendication 2, dans lequel ledit convoyeur (1) est pourvu d'un moyen (2) pour décaler ledit bord (5) au-dessus de la surface supérieure dudit convoyeur (1) en une position de détection de bord par ledit moyen de détection (3) du bord.
4. Appareil suivant la revendication 3, dans lequel ledit moyen de décalage (2) comprend un galet prévu de manière à faire une saillie au-dessus de la surface de transport dudit convoyeur (1).
5. Appareil suivant l'une des revendications précédentes 1 à 4, dans lequel ledit moyen d'insertion (9) est un couteau en forme de plaque.
6. Appareil suivant l'une des revendications précédentes 1 à 5, dans lequel ledit moyen de serrage (53) comprend un élément de serrage (10) monté pivotant sur ledit moyen d'insertion (9) et un moyen d'entraînement (44) pour faire tourner ledit élément de serrage (10).
7. Appareil suivant la revendication 6, dans lequel ledit moyen d'entraînement est un vérin pneumatique (44).
8. Appareil suivant l'une des revendications précédentes 1 à 7, dans lequel ledit premier élément de bras comprend un premier bloc (11) prévu sur ledit arbre de bras (6), un premier bras (14) prévu pouvant glisser sur ledit premier bloc (11), un deuxième bloc (21, 30) prévu tournant à l'extrémité avant dudit premier bras (14), un galet (24) prévu sur ledit second bloc (21), et un élément guide (22) prévu

entre la surface supérieure dudit convoyeur (1) et ledit arbre de bras (6), le long de la direction de transport dudit convoyeur (1) sur une longueur prédéterminée, dans lequel ledit galet (24) est guidé par ledit élément guide de manière que ledit premier bras puisse glisser sur ledit premier bloc (11),

ledit second élément de bras comprend un second bras (33) prévu pouvant glisser sur ledit deuxième bloc (30), un troisième bloc (35) prévu sur une partie d'extrémité basse du second bras (33), et un vérin (34) prévu extensible entre ledit deuxième bloc (30) et ledit second bras (33), et ledit moyen d'insertion (9) est prévu sur ledit troisième bloc (35).

9. Appareil suivant la revendication 8, dans lequel une butée (50) est prévue entre ledit troisième bloc (35) et ledit moyen d'insertion (9), ladite butée (50) permettant la rotation vers le haut dudit moyen d'insertion (9), mais limitant sa rotation vers le bas, et

un élément élastique (48) est prévu sur ladite butée (50), ledit élément élastique (48) permettant audit moyen d'insertion (9) de venir buter sur ladite butée (50).

10. Appareil suivant la revendication 9, dans lequel ledit moyen de serrage (53) comprend un élément de serrage (10) prévu pouvant pivoter sur ledit moyen d'insertion (9), et un moyen d'entraînement (44) pour faire tourner ledit élément de serrage (10).

11. Appareil suivant l'une des revendications précédentes 8 à 10, dans lequel un dispositif chargeur (52) est monté sous la position où ledit moyen d'insertion (9) est monté par ledit arbre de bras (6) par rotation vers le haut dudit ensemble de bras (8), et ledit dispositif chargeur (52) sert à stocker lesdits produits plats (4) tombés dudit moyen d'insertion (9) par desserrage dudit moyen de serrage (53).

12. Appareil suivant l'une des revendications précédentes 1 à 11, dans lequel un second convoyeur (60) est prévu séparément sur le côté aval dudit convoyeur (1).

FIG.1

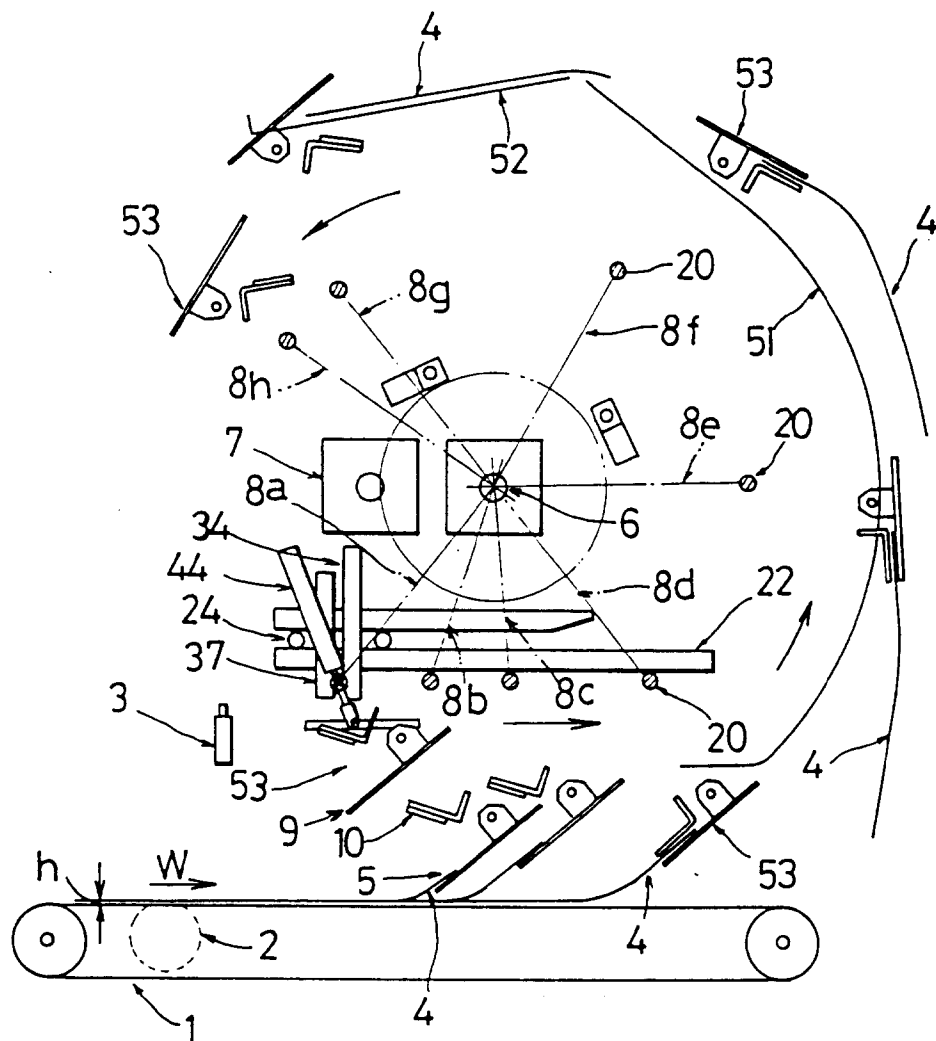


FIG. 2

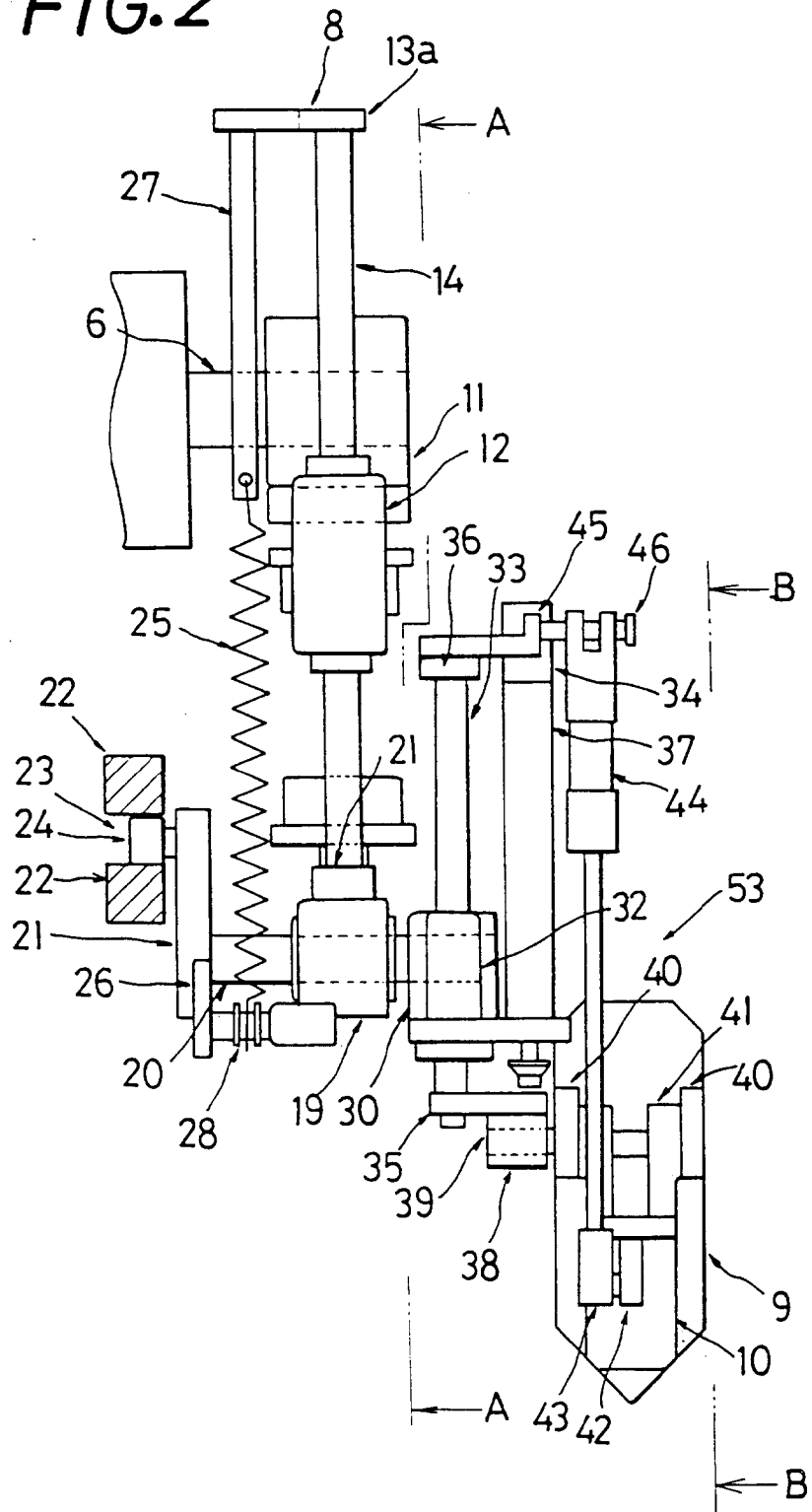


FIG. 3

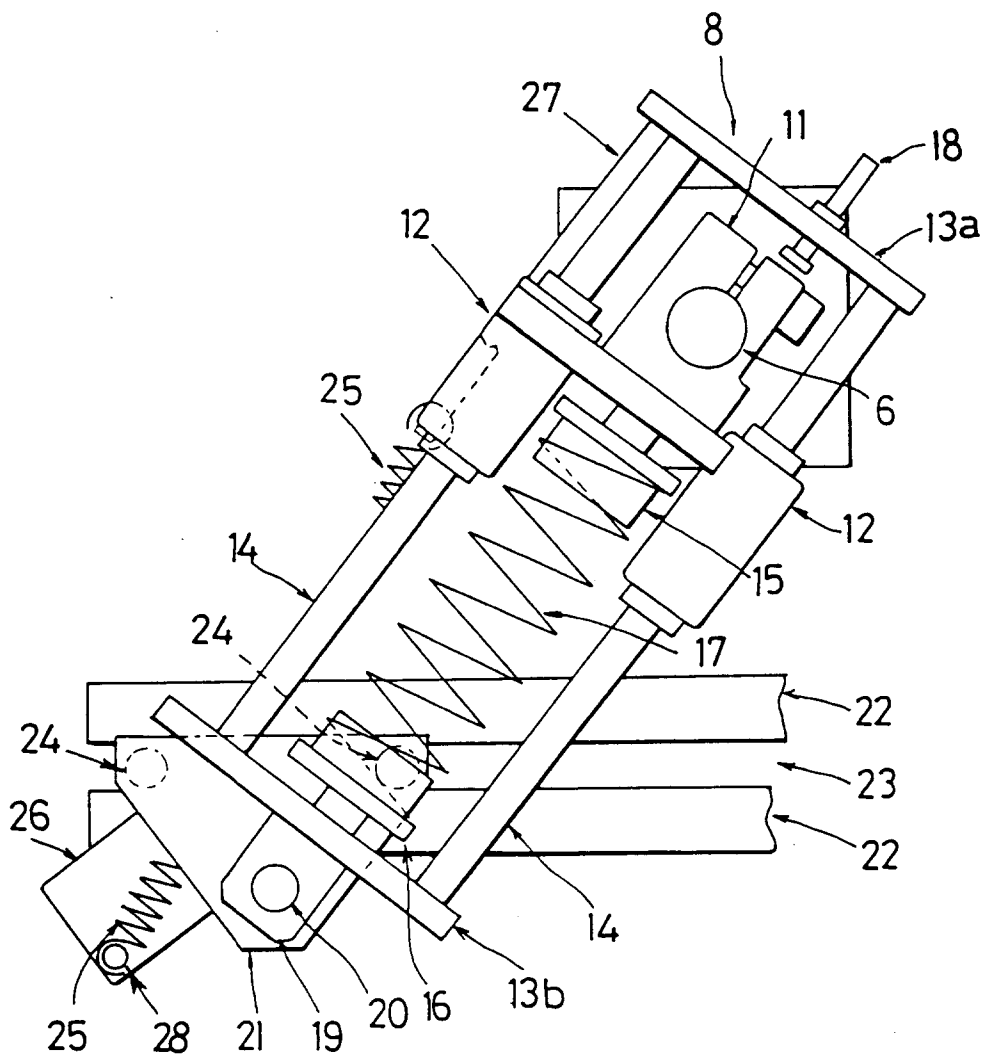


FIG. 4

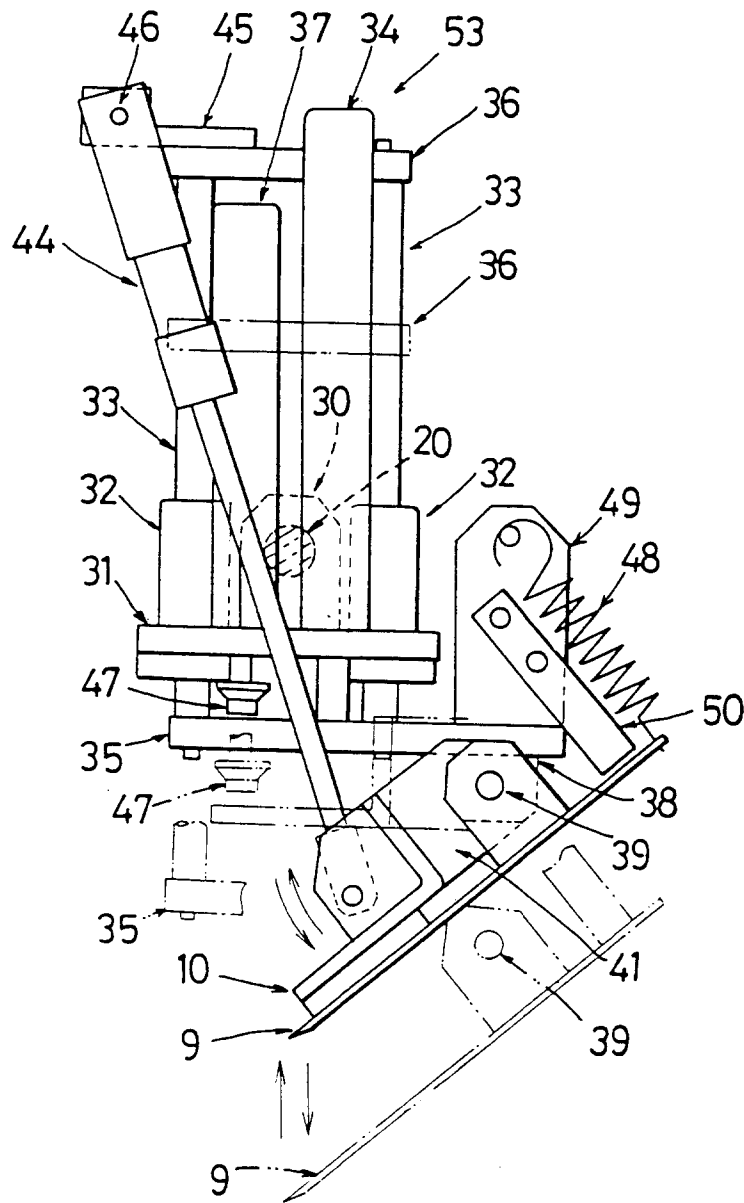


FIG. 5

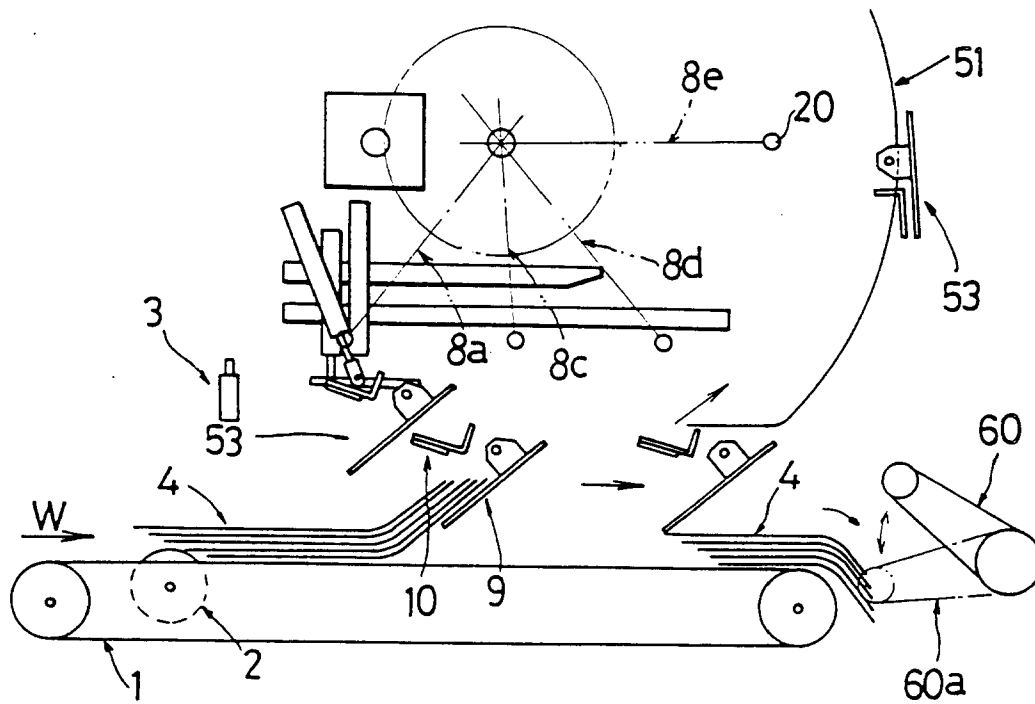


FIG.6

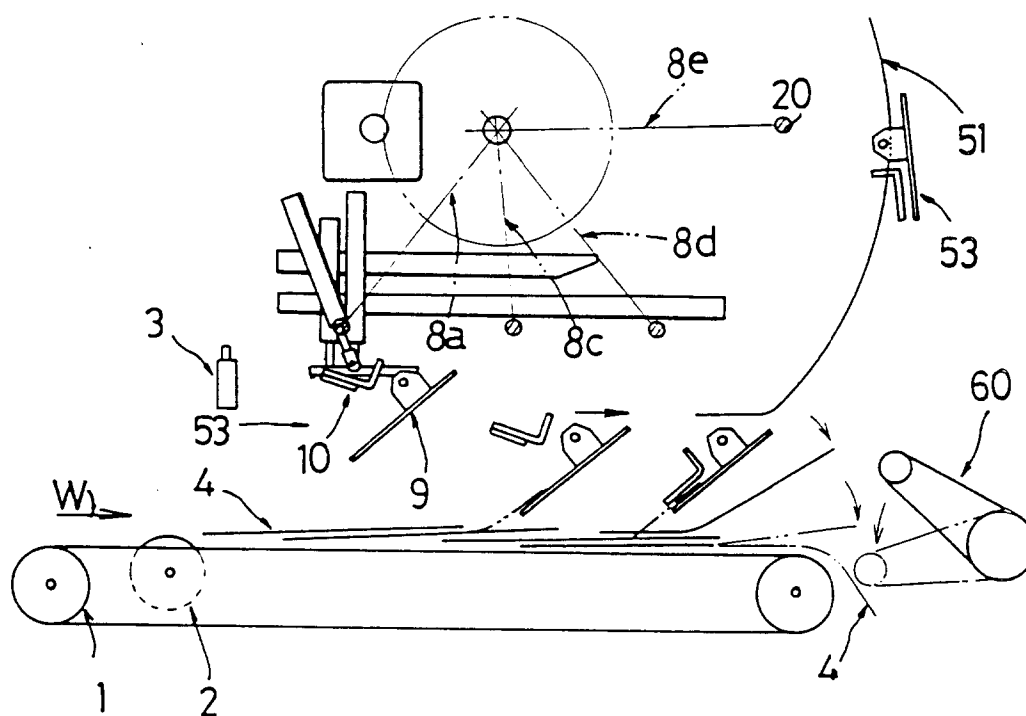


FIG. 7

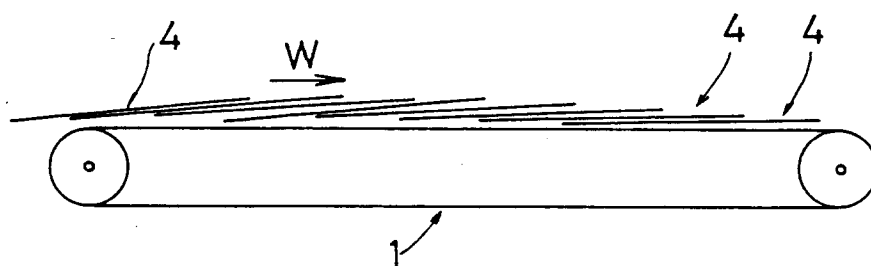


FIG. 8

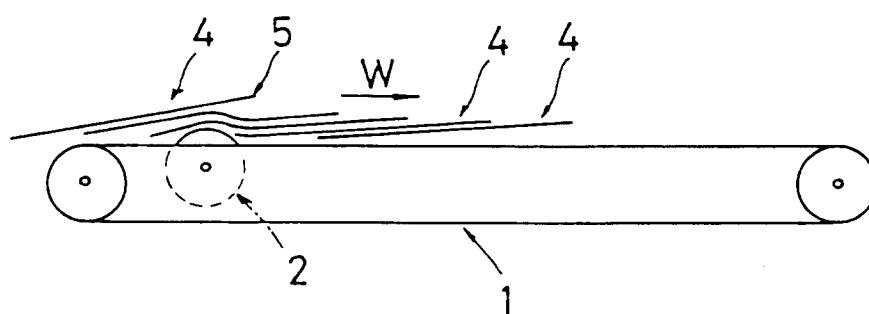


FIG. 9

