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(54) **Warper and method of warping**
Schärmaschine und Schärverfahren
Ourdissoir et méthode d'ourdissage

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Description

[0001] The present invention refers to a warper and a method of warping.

[0002] Warpers are known machines for the preparation of loom's warp beams and comprising at least two main parts, that is, the very warper and the creel or frame provided for carrying threads-feeding reels for the warping. In general, the warping comprises the loading, that is, the placement of the reels onto the creel according to a programmed warping sequence, the very warping, that is, the joining of the ends of the thread unwinding from the reels to form a series of parallel threads, and the beaming, that is, the transfer of threads from the warper to the beam. In the warpers operating the so-called "thread-by-thread" warping, the threads are unreeled individually, that is, one at a time, in a preset sequence as related to the effect to be obtained, and guided, that is, wound up in concentric loops onto the driving belts disposed longitudinally over the warper's drum, by a device provided with a thread-holder rod. The thread-holder rod is fixed to an arm rotating at a predetermined speed about the axis of the said drum so that each thread will follow a substantially circumferential path. In the warpers operating the so-called "multi-thread" warping, the reels are mounted on a rotary creel, and more threads result contemporary wound up over the warp-transfer belts. More thread-guide rods are provided which rotate about the axis of the drum with a preset angular velocity in synchronism with the creel. Each of said rods guides a corresponding thread, that is, the thread of a corresponding reel.

[0003] Documents EP 832998, EP 882820 and EP 913511 disclose warpers operating as described above. Patent EP 652310 discloses a warper comprising means able to provide a staggered arrangement of the warper's layers formed one at a time onto the belts of the drum.

[0004] According to the teaching of said patent, in order to obtain such an arrangement of the warp's layers, the point of deposition of each thread onto the belts is made to vary instant by instant and, to this end, provision is made for either moving, during the entire thread-depositing stage, a carriage idly mounted on each belt and interposed between the same belt and the plane of rotation of the thread-guide rods, or moving the belts in a direction opposite to the normal one, that is, close to, instead of away from, the thread-guide rods along the belts.

[0005] The main object of the present invention is to propose a warper able to operate a staggered arrangement of the warp's layers but having a simpler construction and being more easily operable.

[0006] A further object of the present invention is to propose an operating method for making stratified warps - wherein the various layers of the warp are properly staggered - which method is of simpler implementation. This result has been achieved, according to the invention, by providing an apparatus and implementing a method

having the characteristics described in the independent claims. Further characteristics being set forth in the dependent claims.

[0007] The present invention makes it possible to make stratified and staggered warps by using relatively simple means which are easily constructed and operated, require a simple maintenance and are cost-effective. Moreover, an apparatus according to the invention ensures a production able to meet the users' requirements without the need of structural modifications of existing warpers, so that the implementation of said apparatus on the latter - when not implemented originally - requires relatively little operational times.

[0008] These and other advantages and characteristics of the invention will be best understood by anyone skilled in the art from a reading of the following description in conjunction with the attached drawings given as a practical exemplification of the invention, but not to be considered in a limitative sense, wherein:

- Fig. 1 shows diagrammatically the structure of a first embodiment of the warper, according to the present invention, associated with a rotary creel;
- Figs. 2A and 2B are plan views of the detail "A" of Fig. 1, in standby (Fig. 2A) and operating (Fig. 2B) conditions, respectively;
- Figs. 3A and 3B are side views of the details illustrated in Fig. 2A and respectively in Fig. 2B;
- Fig. 3C is a schematic prospective view of a chute according to a possible embodiment;
- Fig. 4A is a schematic diagram showing the operation of the system in relation to the step in which a first layer of warp is formed;
- Fig. 4B is a schematic diagram showing the staggered arrangement of the warp's layers;
- Fig. 5 is a schematic diagram showing a possible order of sequence of activation of the chutes' unit;
- Fig. 6A shows schematically a chute according to a further embodiment in a first condition;
- Fig. 6B shows the chute of Fig. 6A in a second condition;
- Fig. 7A is a plan view of a constructional detail, according to a further embodiment, in a first operating condition;
- Fig. 7B shows the detail of Fig. 7A in a second condition;
- Fig. 8 is a schematic side view of a warper according to the invention;
- Fig. 9A is a schematic front view of a cross support;
- Fig. 9B is a schematic side view of the support of Fig. 9A;
- Fig. 10A shows schematically the deposition of a thread onto the stem of an actuator in operation;
- Fig. 11 shows schematically an enlarged detail of Fig. 10;
- Figs. 12A-12C show three possible operating positions of the cross support;
- Fig. 13 is a schematic diagram showing the stag-

gered arrangement of the warp's layers;

- Fig. 14 is a simplified block diagram of operating functions;
- Figs. 15A and 15B are view similar to those of Fig. 9A and respectively 9B, but relating to a further exemplary embodiment of the present apparatus.

[0009] Reduced to its basic structure, and reference being made to figures 1-7B of the attached drawings, a warper according to the invention comprises a structure with a substantially cylindrical drum (1) on which more belts (2a, 2b) are mounted for carrying or moving the warp. The said belts (2a, 2b) are parallel to each other and to the axis (a-a) of the drum (1), and take up corresponding preset positions along the outer surface thereof. Associated with the warper, schematically illustrated in Fig. 1, is a rotary creel (CR) on which more reels (R) are located, each reel (R) feeding a corresponding thread (F) which is to form the warp.

Disposed between the warper and the creel (CR) is a plurality of thread-guide rods, each of which comprises a portion (30) engaged with a motor member (M), and a distal portion (3) intended for operating the proper guide of threads (F). According to the schematic diagram of Fig. 1, the said portions (30) of thread-guide rods are fixed to a horizontal shaft (4) engaged with the motor (M). On the opposite side, the said shaft (4) is connected to the creel (CR), so that its rotation implies driving the rods (3; 30) and reels (R) into a corresponding rotation about the axis (a-a) of drum (1).

By the said rotation of rods (3; 30) there is obtained the deposition of threads (F) onto the belts (2a, 2b) as described later on.

[0010] Advantageously, according to the invention, a unit is associated with one or more belts in correspondence of the plane of action (RO) of the distal portions (3) of thread-guide rods and comprising, for each of the belts (2a) acted upon by said unit, at least one chute (5) oriented towards the axis (a-a) of the drum (1) on the side facing the thread-guide rods (3; 30), that is, oriented centrifugally with respect to the belts (2a, 2b). The said chute (5) can be placed at a position (H) in which its free end (50) is below the active plane (PA) of belt (2a), that is, outside said plane (RO), and at a position (K) in which its free end (50) is above the active plane (PA) of belt (2a), that is, the chute (5) is at least in part higher than belt (2a) and intercepts the plane of action (RO) of the distal portions (3) of rods (3; 30). Since the belts are ring-like closed, as illustrated in the details of Figs. 3A and 3B, the active plane (PA) of same belts is defined as the surface facing the outside of the drum, that is, the one upon which the threads (F) are to be deposited.

In the schematic diagram of Fig. 1, the belts acted upon by said units (A) are designated by the reference (2a) and those not acted upon by said units (A) are designated by (2b).

[0011] According to the example shown in Figs. 2A and 2B of the attached drawings, each belt (2a) can be

associated with two of said units (A), located on opposite sides with respect of the middle longitudinal plane of the belt.

[0012] As illustrated in Figs. 2A-3C, each of said chute (5) may be made up of a right-angles body with one free end (50) and the other end engaged with a pneumatic actuator (6). More particularly, said body (5) exhibits a first portion comprising the said free end (50), a second portion (51) orthogonal to the first, and a third portion (52) adjacent to the second and orthogonal to both first and second portions, thereby constituting a transverse appendix of the latter. Such appendix (52) of body (5) is received free of sliding within a rectilinear guide (7) made up of a slot formed within a plate (70), the said guide (7) being oriented towards the axis (a-a) of drum (1) on the side of the thread-guide rods, that is, on the side of creel (CR). In other words, the said guide (7) is oriented centrifugally with respect to the corresponding belt (2a) and, reference being made to Figs. 3A, 3B, the guide (7) is disposed at an angle to said active plane (PA), with the its lowermost part being closer to the creel (CR). The transverse appendix (52) of body (5) is connected to the stem (60) of the actuator (6) by a pin (65) able to form a cylindrical hinge with its axis orthogonal to guide (7). The actuator (6) is disposed on the opposite side of body (5) with respect to the plate (70) and is connected to the latter by a pin (76) able to form a corresponding cylindrical hinge parallel to the preceding one (65). The said plate (70) is made solid to support (20) over which the belt (2a) develops by means of an intermediate plate (8). Said intermediate plate (8) is fixed to said support (20), and the plate (70) is in turn fixed to plate (8) by means of a spacer (78), so that a free space results between the two plates (70, 8) for receiving the portion (51) of body (5). The latter, therefore, results substantially between the plate (70) which supports the actuator (6), and the plate (8) fixed to the support (20) of belt (2a). The plate (8) is provided, in correspondence of an active edge facing the outside of drum (1), with a pin (80) centrifugally oriented with respect to the surface thereof, that is, oriented outwardly. The function of this part is described below.

[0013] The operation of the apparatus above described is as follows. Initially, the chutes (5) are within the respective rest positions (H) as indicated in Figs. 2A and 3A.

When wanting to begin the formation of the stratified warp, that is, of the warp made up of a succession of threads (F) intended to form a plurality of layers (W1, W2) overlapping each other over the warper's belts (2a, 2b), the chutes (5) are disposed in the respective positions (K) as shown in Figs. 2B, 3B, 4A and 4B. This positioning is obtained by operating the retraction of the stems of actuators (6) which, by being hooked up to the portion (52) of chutes (5), cause the translation thereof along the guides (7), as indicated by the arrows (Z) in Figs. 2B and 3B. As the threads (F) - guided by the portions (3) of the thread-guide rods (3; 30) rotating about the axis (a-a) of drum (1) - are made to lay down onto

the chutes (5) by virtue of the tension to which they are subjected and of the orientation of the same chutes, they result close to each other, with the first thread abutting against the stationary pin (80). In other words, the first thread slides towards and up to the pin (80) where it stops, the second thread slides towards the first one until it comes close thereto, the third thread slides close to the second one, and so on. To this respect, it should be observed that the pin (80) is positioned between the plane (RO), on which the threads are drawn along by the guide portion (3) of the rods (3, 30), and the axis of motor-driven rollers (21) on which the belts wind up on the side of rods (3, 30). As soon as the rods (3, 30) reach a preset number of revolutions about the axis (a-a), the chutes (5) are retracted by the relevant actuators (6), that is, they are brought back to the respective starting positions (H). Accordingly, owing to the tension of threads (F) being positioned on the chutes (5) to form a corresponding warp's portion, the latter sets itself onto the underlying belts (2a, 2b) which, are made to move on afterwards by a step of a preset amplitude "p" in the direction (C) in which the warp grows. By indicating with "n_f" the number of threads fed by the creel (CR), and with "t" the typical or established dimension of a thread under treatment, the said step "p" will be given by the product of n_f by t: $p = n_f \cdot t$. For example, with n_f=4 and t=0,3 mm, the result will be p=1,2 mm. If the portion of the warp in the course of formation is the first one formed on the chutes (5), then it sets itself directly onto the plane (PA) of belts (2a, 2b). If such portion is one subsequent to the first, then it sets itself partly onto said plane (PA) and partly onto the threads of the preceding portions.

[0014] With reference to the schematic diagram of Fig. 4B, wherein n_f=4 and each warp's portion is formed by causing the thread-guide rods (3; 30) to perform two revolutions, the first portion (P1) of the warp will be laid down integrally onto the plane (PA) when the chutes (5) are brought back to the respective starting positions (H). The second portion (P2) of the warp will be laid down partly onto the plane (PA), by virtue of the advancement "p" of the belts in the warp-grow direction (C), and partly onto the threads of the first portion (P1). Similarly, the third portion (P3) will be laid down onto the plane (PA) and partly onto the threads of the second portion (P2). The fourth portion (P4) will be laid down partly onto the plane (PA) and partly onto the threads of the third portion (P3), and so on, so that the warp grows in a stratified fashion, with the layers (W1, W2) being made up of different portions of warp.

[0015] The same procedure applies to the case of the so-called thread-by-thread warping, according to which there is provided for treating one thread at a time instead of more threads simultaneously. In this case, each thread unwinds from a corresponding reel disposed on a fixed creel or even on a creel of rotary type but being disposed at a fixed position, that is, not associated with the rotation of the rod which guides the thread each time under treatment.

[0016] Advantageously, according to the invention, the positioning of the chutes (5) to the respective rest (H) and operating (K) positions and the driving of belts (2a, 2b) may be operated according to a sequence taking into account the rotational velocity of the thread-guide rods (3, 30) about the axis of drum (1). More particularly, the chutes (5) can be driven in cascade, so that, with reference to Fig. 5, because of the clockwise rotation of rods (3, 30), this drive will interest the units A1, A2, ..., A6, in this order, instead of all the units simultaneously. The same cascade drive will also advantageously affect the belts (2a, 2b) as far as the said advancement "p" in the warp-grow direction (C) is concerned.

[0017] Moreover, advantageously, the driving into motion of chutes (5) may be twofold, in the sense that each chute (5) can be subjected, besides the displacement along the respective guide (7), also to a rotation to and from the plane (PA) of the respective belt (2a). To this end, reference being made to Figs. 6A and 6B, the portion of the chutes (5) comprising the free end (50) can be associated with an actuator (500) mounted on the portion (51) which, on the opposite side, is solid to the guided portion (52): the portion of the chutes (5) associated with the actuator (500) being also connected to the portion (51) that supports the latter, by means of an elastic body (53) which keeps it normally lifted (as in Fig. 6A). Upon the positioning of the chutes as indicated by (K), the portion comprising the free end (50) is lifted, as shown in Fig. 6, because of the action of the elastic body (53).

[0018] Upon the moving back of chutes (5) to the position (H), that is, upon the step of unloading or releasing the warp's portions (P1, .. P4), the actuator (500) drives said portion into rotation (as in Fig. 6B) towards the plane (PA) of the respective belt (2a) by winning the resistance of the elastic body (53). Once the chute (5) has reached the position (H) by setting itself out of said plane (RO), the actuator (500) is deactivated and the said portion of chute (5) goes up again by the action exerted by the elastic body (500).

[0019] In practice, according to the invention, a stratified warp is made by forming a plurality of warp's portions (P1, ..., P4), each warp's portion being formed on more surfaces (5) able to be positioned between the warp-transfer belts and the portion of guide (3) of the thread-guide rods (3; 30), and by transferring each warp's portion thus formed either onto the underlying belts (2a, 2b) or onto the underlying portions already formed and transferred, after having translated the belts (2a, 2b) by a step of preset amplitude in the warp grow direction (C).

[0020] According to an alternative embodiment of the present invention, reference being made to Figs. 7A and 7B of the attached drawings, the said surfaces (5) are delimited by metal filiform structures, for example, mounted in correspondence of the respective belts (2a) and associated with corresponding rotary actuators (501) able to positioning them in a condition (H') in which they result outside the action plane (RO) of the distal portions (3) of rods (3; 30) and, respectively, in a condition (K') in

which the same surfaces (5) intercept the said plane (RO), that is, they result between the threads (F) guiding portion (3) exhibited by said thread-guide rods (3; 30) and the active plane (PA) of belts (2a). For example, as shown in the drawings of Figs. 7A and 7B, the said structures may be in the form of a mixtilinear quadrilateral and connected to the respective actuators (501) by means of corresponding small connection arms, the actuators being mounted on brackets (503) cantilivered mounted on supports (20) of belts (2a).

[0021] The operation of said actuators (6; 500; 501) and of all the other movable members, can be entrusted to a programmable logic unit (not shown for the sake of clarity in the figures of the attached drawing) known per se to those skilled in the industrial automation.

[0022] With reference to the examples illustrated in Figs. 8-15B of the attached drawings, a warper according to the invention comprises a structure with a substantially cylindrical drum (1) on which more belts (2a, 2b) intended for transferring or moving the warp. The said belts are parallel to each other and to the axis (a-a) of drum (1) and take up corresponding preset positions along the outer surface thereof. Associated with the warper schematically illustrated in Fig. 8 is a rotary creel (CR) on which more reels (R) are positioned, each reel (R) feeding a corresponding thread (F) intended for the formation of the warp.

Disposed between the warper's drum and said creel is a plurality of thread-guide rods, each of which comprising a portion (30) associated with a motor member (M), and a distal portion (30) intended for carrying out the proper guide of the threads (F).

[0023] According the schematic diagram of Fig. 8, the said portions (30) of the thread-guide rods are fixed to a horizontal shaft (4) associated with the motor (M). On the opposite side, the said shaft (4) is connected to the creel (CR), so that its rotation implies the rotation of rods (3; 30) and of reels (R) about the axis (a-a) of the drum (1). By the said rotation of rods (3; 30) there is obtained the deposition of threads (F) onto the belts (2a; 2b) as described later on.

[0024] Advantageously, the warper is provided with a cross support (100), disposed centrally on the axis (a-a) of drum (1) in a plane lying between the action plane (RO) of the distal portions (3) of thread-guide rods and the front of drum (1) which results facing the creel (CR) (so that the thread-guide rods 3; 30 result between the support 100 and the creel CR): each arm (101) of the cross (100) supporting a corresponding linear actuator (102) - for example of pneumatic type - whose stem (103), when withdrawn, intercepts and passes the said plane (RO) thereby resulting at a preset distance from a belt (2a; 2b) and oriented centrifugally with respect to the same belt.

The arms of support (100) may be in any number, for example, two or three, instead of four. In any case, it is preferable that the arms of support (100) be angularly equidistant to each other.

The support (100) is fixed to a shaft (104) whose axis coincides with that (a-a) of drum (1) and whose rotation about such axis is ensured by an electric motor (105) connected thereto via a driving belt (106), so that the rotation of the shaft (104), driven by the motor (105), determines the corresponding rotation of the support (100), with the respective arms (101), about the axis (a-a). Preferably, the shaft (104) of support (100) is hollow, with conductors (107) passing therethrough and intended to operate a solenoid valve (108) by which the actuators (102) mounted on the arms of support (100) are activated, respectively deactivated: the said conductors being connected, on the opposite side, to a programmable electronic control unit (109) (known per se and not described in greater detail).

[0025] When the formation of the stratified warp, that is, of the warp made up of a succession of threads (F) intended to form a plurality of layers (W1, W2) overlapping each other onto the warper's belts (2a, 2b), is to be started, the support (100) is disposed, on command of motor (105), so that one of its arms (101) results in correspondence of a belt (2a, 2b), and the respective actuator (102) is activated so that the relevant stem (103) is drawn out by causing it to intercept and pass the said plane (RO) as shown in Figs. 10 and 11 (position K in Fig. 9B). Upon this step, the other actuators (101) mounted on the support (100) are deactivated, so that the respective stems (103) are retracted (position H in Fig. 9B) and, accordingly, do not intercept, nor pass the plane (RO). As the threads (F), being guided by the portions (3) of the thread-guide rods (30) driven into rotation about the axis (a-a) of drum (1) by the motor (M), lay down onto the surface of the stem (3) of the activated actuator (101), by virtue of the tension to which they are subjected and of the inclination of the same stem (103), they translate by moving away from the plane (RO) and set themselves close to each other as shown in Fig. 11. When the rods (3; 30) reach a predetermined number of revolutions about the axis (a-a), the support (100) is rotated (in the same direction of rotation of the thread-guide rods) and the stem of the actuator (103) is retracted. For example, with reference to Fig. 12A, the support 100 is rotated through 90° in the direction of arrow Z, so that the actuator 102a, on which the threads F were laid down, moves on to take the place of actuator 102b, which takes up the place of actuator 102c which, in turn, takes the place of actuator 102d which, finally, takes the place of the actuator 102a.

[0026] Accordingly, because of the very tension of threads (F) being positioned on the stem withdrawn from the actuator (102) to form a corresponding warp's portion, the latter sets itself onto the underlying belts (2a, 2b) which, afterwards are made to advance by a step of preset amplitude "p" in the direction (C) of warp's grow or development. Likewise in the case previously described, by calling "n_f" the number of threads fed by the creel (CR), and with "f" the typical or established dimension of a thread under treatment, the said step "p" will be given by

the product of n_f by f : $p=n_f \cdot f$. For example, with $n_f=4$ and $f=0,3$ mm, it results $p=1,2$ mm. If the portion of the warp in the course of formation is the first one formed, then it sets itself directly onto the plane (PA) of belts (2a, 2b). If it is a portion subsequent to the first, then it sets itself partly onto said plane (PA) and partly onto the threads of the preceding portions.

[0027] With reference to the schematic diagram of Fig. 13, wherein $n_f=4$ and each warp's portion is formed by causing the thread-guide rods (3; 30) to perform two revolutions, the first portion (P1) of the warp will be laid down integrally onto the plane (PA) when the stem of the active actuator is retracted. The second portion (P2) of the warp will be laid down partly onto the plane (PA), by virtue of the advancement "p" of the belts in the warp-grow direction (C), and partly onto the threads of the first portion (P1). Similarly, the third portion (P3) will be laid down onto the plane (PA) and partly onto the threads of the second portion (P2). The fourth portion (P4) will be laid down partly onto the plane (PA) and partly onto the threads of the third portion (P3), and so on, so that the warp grows in a stratified fashion, with the layers (W1, W2) being made up of different portions of warp.

[0028] The same procedure applies to the case of the so-called thread-by-thread warping, according to which there is provided for treating one thread at a time rather than more threads simultaneously. In this case, each thread unwinds from a corresponding reel disposed on a fixed creel or even on a creel of rotary type but being disposed at a fixed position, that is, not associated with the rotation of the rod which guides the thread each time under treatment.

[0029] In the example of Fig. 12A, the active actuator (102a), that is, the actuator with the stem (103) being withdrawn, is in the middle plane (MC) of an underlying belt (2a). However, the support (100) may be positioned, upon the formation of warp's portions, in a different manner, that is, in such a way that the active actuator (102a) will result at a preset distance from the said plane (MC): for example, such as represented in Figs. 12B and 12C. To these various positions is made to correspond a different tension of the threads which is then transferred onto the warp's belts: the tension being greater the higher the distance from the active actuator from the plane MC (higher tension according to diagram of Fig. 12C, intermediate tension according to diagram of Fig. 12B and lower tension according to diagram of Fig. 12A).

With reference to the example illustrated in Figs. 15A and 15B of the attached drawings, to the arms (101) of support (100) there are associated rotary (107), instead of linear actuators. Mounted on each of said actuators (107) is a flag-like element (108) whose surface is able to intercept and pass the said plane (RO), thereby resulting at a preset distance from a belt (2a; 2b) of the drum and centrifugally oriented with respect to the same belt (position K). Under operating conditions (position H), the element (108) is outside the said plane (RO), that is, it does not intercept it.

[0030] The operation is similar to that previously described, save that the movement imposed on the elements (108) to make them reach one of said positions (H, K) is rotational instead of linear.

Claims

1. Warper comprising a structure with a substantially cylindrical drum (1) on which several belts (2a, 2b) are mounted for carrying or moving the warp, said belts (2a, 2b) being parallel to each other and to the longitudinal axis (a-a) of the drum (1), and taking up corresponding preset positions along the outer surface thereof, means for feeding one or more threads (F) intended to form a warp, said means comprising a rotary creel (CR) from which said threads (F) unwind and one or more thread-guide rods (3; 30) rotating at a preset angular velocity about the axis (a-a) of said drum (1), **characterized in that** it comprises a plurality of surfaces (5; 103) disposed in the vicinity of one or more belts (2a) and able to be placed at an inoperative position (H; H') wherein said surfaces result outside the plane of action (RO) of the distal portions (3) of rods (3; 30) and respectively at an operative position (K; K') wherein said surfaces (5; 103) intercept said plane (RO), that is, result between the guide portion (3) of threads (F) exhibited by said thread-guide rods (3; 30) and the active plane (PA) of the belts (2a): said surfaces (5; 103) being associated with corresponding driving means able to dispose them to said inoperative position (H; H') and said operative positions (K; K'), respectively, wherein each of said surfaces (5; 103) makes up a chute inclined towards the axis (a-a) of drum (1) on the side facing the thread-guide rods (3; 30), that is, inclined centrifugally with respect to said active plane (PA) of the respective belt (2a).
2. Warper according to claim 1, **characterized in that** each of said chutes (5; 103) is associated with a corresponding linear actuator (6) which drives it into motion between said positions (H) and (K), respectively.
3. Warper according to one or more preceding claims, **characterized in that** each of said chutes (5) exhibits a portion movable to and from the active plane (PA) of the respective belt (2a) under control of a corresponding rotary actuator (500).
4. Warper according to claim 1, **characterized in that** said surfaces (5) are delimited by structures associated with corresponding rotary actuators (501) able to determine the positioning thereof in a state (H') in which they result outside the plane of action (RO) of the distal portion (3) of rods (3; 30) and, respectively in a state (K') in which said surfaces (5) intercept said plane (RO), that is, they result between the

threads (F) guide portion (3) exhibited by said thread-guide rods (3; 30) and the active plane (PA) of belts (2a).

5. Warper according to claim 1, **characterized in that** said surfaces (5) belong to actuators (102; 107) associated with a support (100) mounted for rotation about the axis (a-a) of drum (1). 5
6. Warper according to claim 5, **characterized in that** said support (100) is cross-shaped, that is, it is provided with four arms (101) each of which carries a corresponding actuator (102, 107). 10
7. Warper according to claim 6, **characterized in that** said support (100) is associated with a corresponding electric motor (105). 15
8. Method of warping, comprising the steps of feeding one or more threads (F) onto the belts (2a; 2b) of a warper having a drum (1) on which the same belts (2a; 2b) are disposed parallel to each other and to the longitudinal axis (a-a) of drum (1), thereby taking up corresponding preset positions along the surface of the latter, **characterized in that** it includes forming several warp's portions (P1, ..., P4), each warp's portion being formed by a plurality of surfaces (5; 103) inclined towards the axis (a-a) of drum (1) centrifugally with respect to the active plane (PA) of said belts and being able to be positioned between the warp-transfer belts and the guide portion (3) of the thread-guide rods (3; 30), and being able to transfer each warp portion so formed either onto the underlying belts (2a, 2b) or onto the underlying warp portions already formed and transferred, after having translated the belts (2a, 2b) by a step (p) of a preset amplitude in the warp-grow direction (C). 20 25 30 35

Patentansprüche 40

1. Schärmaschine, die eine Struktur mit einer im Wesentlichen zylindrischen Trommel (1), auf der mehrere Riemen (2a, 2b) montiert sind zum Tragen oder Bewegen der Kette, wobei diese Riemen (2a, 2b) parallel zueinander und zu der Längsachse (a-a) der Trommel (1) sind und entsprechende voreingestellte Positionen entlang der äußeren Oberfläche von ihr annehmen, Mittel zum Zuführen von einem oder mehreren Fäden (F), die vorgesehen sind, um eine Kette zu bilden, aufweist, wobei diese Mittel ein rotierendes Gatter (CR), von dem diese Fäden (F) sich abwickeln und ein oder mehrere Fadenführerstangen (3; 30) aufweisen, die mit einer voreingestellten Winkelgeschwindigkeit um die Achse (a-a) dieser Trommel (1) rotieren, **dadurch gekennzeichnet, dass** sie eine Vielzahl von Flächen (5; 103) aufweist, die angeordnet sind in der Nachbarschaft von einem 45 50 55

oder mehreren Riemen (2a) und in der Lage sind, in einer unwirksamen Position (H; H') platziert zu werden, worin diese Flächen im Ergebnis außerhalb der Wirkebene (RO) der äußeren Abschnitte der Stangen (3; 30) sind, beziehungsweise in einer Betriebsposition (K; K'), worin diese Flächen (5; 103) diese Ebene (RO) unterbrechen, d.h. im Ergebnis zwischen dem Führungsabschnitt (3) der Fäden (F), der dargestellt ist durch die Fadenführerstangen (3; 30), und der aktiven Ebene (PA) der Riemen (2a) sind: diesen Flächen (5; 103) sind entsprechende Antriebsmittel zugeordnet, die in der Lage sind, sie in einer unwirksamen Position (H; H') bzw. diesen Betriebspositionen (K; K') anzuordnen, worin jede dieser Flächen (5; 103) eine Rutsche bildet, die in Richtung der Achse (a-a) der Trommel (1) auf der Seite, die den Fadenführerstangen (3; 30) gegenüber steht, d.h. zentrifugal, geneigt ist mit Bezug auf die aktive Ebene (PA) des jeweiligen Riemens (2a).

2. Schärmaschine nach Anspruch 1, **dadurch gekennzeichnet, dass** jeder der Rutschen (5; 103) ein entsprechender Linearaktuator (6) zugeordnet ist, der sie in Bewegung zwischen diesen Positionen (H bzw. K) antreibt.
3. Schärmaschine nach einem oder mehreren vorangehenden Ansprüchen, **dadurch gekennzeichnet, dass** jede der Rutschen (5) einen Teil aufweist, der zu und von der aktiven Ebene (PA) des jeweiligen Riemens (2a) unter Steuerung eines entsprechenden rotierenden Aktuators (500) bewegbar ist.
4. Schärmaschine nach Anspruch 1, **dadurch gekennzeichnet, dass** die Flächen (5) begrenzt sind durch Strukturen, denen entsprechende Rotationsaktuatoren (501) zugeordnet sind, die in der Lage sind, die Positionierung von ihnen in einen Zustand (H') zu bestimmen, in der sie im Ergebnis außerhalb der Wirkebene (RO) der äußeren Abschnitte (3) der Stangen (3; 30) sind bzw. in einem Zustand (K'), in dem diese Flächen diese Ebene (RO) unterbrechen, d.h. sie im Ergebnis zwischen den Fäden (F) Führungsabschnitten (3), die die Fadenführerstangen (3; 30) aufweisen, und der aktiven Ebene (PA) der Riemen (2a) sind.
5. Schärmaschine nach Anspruch 1, **dadurch gekennzeichnet, dass** diese Flächen (5) zu Aktuatoren (102; 107) gehören, die einem Träger (100) zugeordnet sind, der rotierend um die Achse (a-a) der Trommel (1) montiert ist.
6. Schärmaschine nach Anspruch 5, **dadurch gekennzeichnet, dass** der Träger (100) kreuzförmig ist, d.h. er versehen ist mit vier Armen (101), von denen jeder einen entsprechenden Aktuator (102, 107) trägt.

7. Schärmaschine nach Anspruch 6, **dadurch gekennzeichnet, dass** dem Träger (100) ein entsprechender elektrischer Motor (105) zugeordnet ist.
8. Schärverfahren, das die Schritte des Zuführens von einem oder mehreren Fäden (F) auf die Riemen (2a; 2b) einer Schärmaschine aufweist, die eine Trommel (1) aufweist, auf der dieselben Riemen (2a, 2b) parallel zueinander und zu der Längsachse (a-a) der Trommel angeordnet sind, wobei sie dabei entsprechende vorbestimmte Positionen entlang der Oberfläche von Letzterer aufnehmen, aufweist, **dadurch gekennzeichnet, dass** es aufweist die Bildung von verschiedenen Kettenabschnitten (P1,...P4), wobei jeder Kettenabschnitt gebildet wird durch eine Vielzahl von Flächen (5; 103), die in Richtung auf die Achse (a-a) der Trommel (1) zentrifugal mit Bezug auf die aktive Ebene (PA) dieser Riemen geneigt sind und die in der Lage sind, zwischen den Kettenübertragungsriemen und dem Führungsabschnitt (3) der Fadenführungsstangen (3; 30) positioniert zu werden und die in der Lage sind, jeden Kettenabschnitt, der so gebildet ist, entweder auf die unterliegenden Riemen (2a, 2b) oder auf die unterliegenden Kettenabschnitte, die bereits gebildet und übertragen worden sind, abzulegen, nachdem die Riemen um einen Schritt (p) einer vorbestimmten Amplitude in der Kettenwachsrichtung (C) verlagert worden sind.

Revendications

1. Ourdissoir comprenant une structure comportant un tambour sensiblement cylindrique (1) sur lequel plusieurs courroies (2a, 2b) sont montées pour transporter ou déplacer la chaîne, lesdites courroies (2a, 2b) étant parallèles l'une à l'autre et à l'axe longitudinal (a-a) du tambour (1), et prenant des positions prédéterminées correspondantes le long de la surface extérieure de celui-ci, des moyens pour amener un ou plusieurs fil(s) (F) destiné(s) à former une chaîne, lesdits moyens comprenant une bobine rotative (CR) à partir de laquelle lesdits fils (F) sont déroulés, et une ou plusieurs tiges de guidage de fil (3; 30) tournant à une vitesse angulaire prédéterminée autour de l'axe (a-a) dudit tambour (1), **caractérisé en ce qu'il** comprend une pluralité de surfaces (5; 103) disposées dans le voisinage d'une ou de plusieurs courroie(s) (2a) et qui peuvent être placées dans une position inopérante (H; H'), dans laquelle lesdites surfaces aboutissent à l'extérieur du plan d'action (RO) des parties distales (3) des tiges (3; 30), et respectivement dans une position opérationnelle (K; K') dans laquelle lesdites surfaces (5; 103) interceptent ledit plan (RO), c'est-à-dire qu'elles aboutissent entre la partie de guidage (3) des fils (F) présentée par lesdites tiges de guidage de fil (3; 30)

et le plan actif (PA) des courroies (2a); lesdites surfaces (5; 103) étant associées à des moyens de commande correspondants capables de les placer dans ladite position inopérante (H; H') et dans lesdites positions opérationnelles (K; K'), respectivement, dans lesquelles chacune desdites surfaces (5; 103) forme une chute inclinée en direction de l'axe (a-a) du tambour (1) sur le côté faisant face aux tiges de guidage de fil (3; 30), c'est-à-dire qu'elles sont inclinées de façon centrifuge par rapport audit plan actif (PA) de la courroie respective (2a).

2. Ourdissoir selon la revendication 1, **caractérisé en ce que** chacune desdites chutes (5; 103) est associée à un actionneur linéaire correspondant (6) qui la met en mouvement entre lesdites positions (H) et (K), respectivement.
3. Ourdissoir selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** chacune desdites chutes (5) présente une partie mobile vers le plan actif (PA) de la courroie respective (2a), et à partir de celui-ci, sous le contrôle d'un actionneur rotatif correspondant (500).
4. Ourdissoir selon la revendication 1, **caractérisé en ce que** lesdites surfaces (5) sont délimitées par des structures associées à des actionneurs rotatifs correspondants (501) capables de déterminer le positionnement de celles-ci dans un état (H') dans lequel ils aboutissent à l'extérieur du plan d'action (RO) de la partie distale (3) des tiges (3; 30) et, respectivement dans un état (K') dans lequel lesdites surfaces (5) interceptent ledit plan (RO), c'est-à-dire qu'elles aboutissent entre la partie de guidage (3) des fils (F) présentée par lesdites tiges de guidage de fil (3; 30) et le plan actif (PA) de courroies (2a).
5. Ourdissoir selon la revendication 1, **caractérisé en ce que** lesdites surfaces (5) appartiennent aux actionneurs (102; 107) associés à un support (100) monté de manière à tourner autour de l'axe (a-a) du tambour (1).
6. Ourdissoir selon la revendication 5, **caractérisé en ce que** ledit support (100) est en forme de croix, c'est-à-dire qu'il est pourvu de quatre bras (101), chaque bras portant un actionneur correspondant (102, 107).
7. Ourdissoir selon la revendication 6, **caractérisé en ce que** ledit support (100) est associé à un moteur électrique correspondant (105).
8. Procédé d'ourdissage, comprenant les étapes consistant à amener un ou plusieurs fil (s) (F) sur les courroies (2a; 2b) d'un ourdissoir comprenant un tambour (1) sur lequel lesdites courroies (2a; 2b)

sont disposées parallèlement l'une à l'autre et à l'axe longitudinal (a-a) du tambour (1), prenant ainsi des positions prédéterminées correspondantes le long de la surface de ce dernier, **caractérisé en ce qu'il** comprend la formation de plusieurs parties de chaîne (P1, ..., P4), chaque partie de chaîne étant formée par une pluralité de surfaces (5; 103) inclinées en direction de l'axe (a-a) du tambour (1) de façon centrifuge par rapport au plan actif (PA) desdites courroies, et pouvant être positionnée entre les courroies de transfert de chaîne et la partie de guidage (3) des tiges de guidage de fil (3; 30), et étant capable de transférer chaque partie de chaîne ainsi formée soit sur les courroies sous-jacentes (2a, 2b), soit sur les parties de chaîne sous-jacentes déjà formées et transférées, après avoir déplacé les courroies (2a, 2b) d'un pas (p) d'une grandeur prédéterminée dans la direction de grossissement de la chaîne (C).

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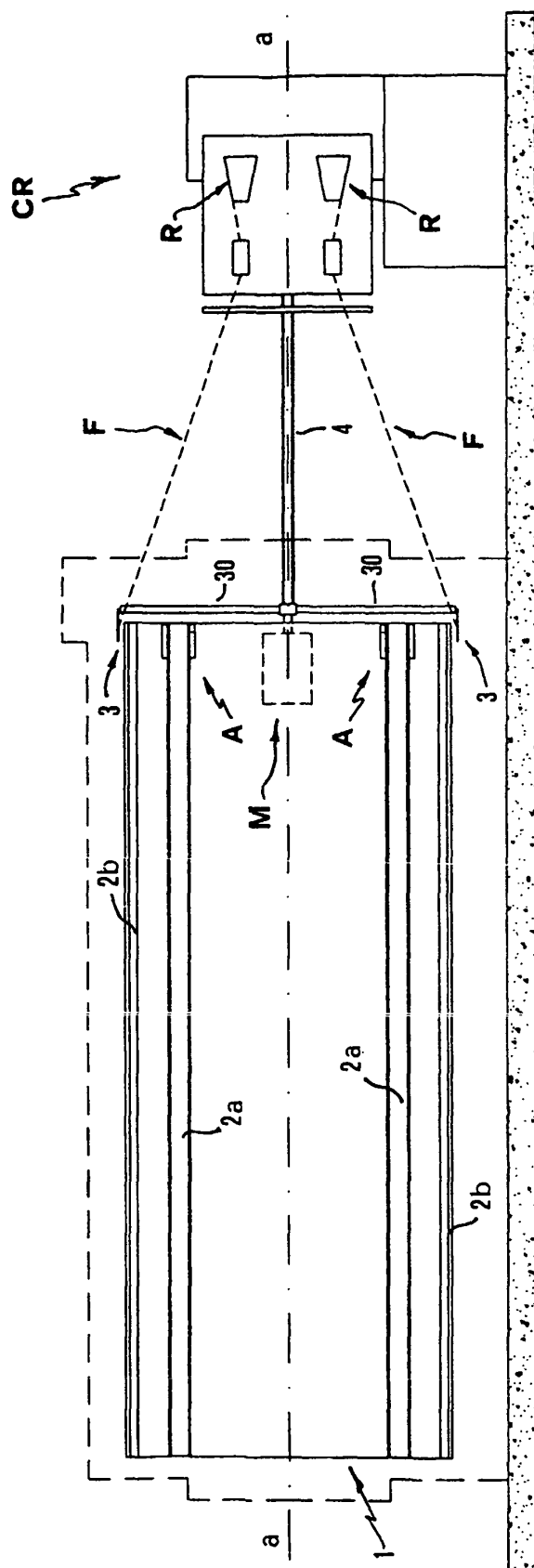
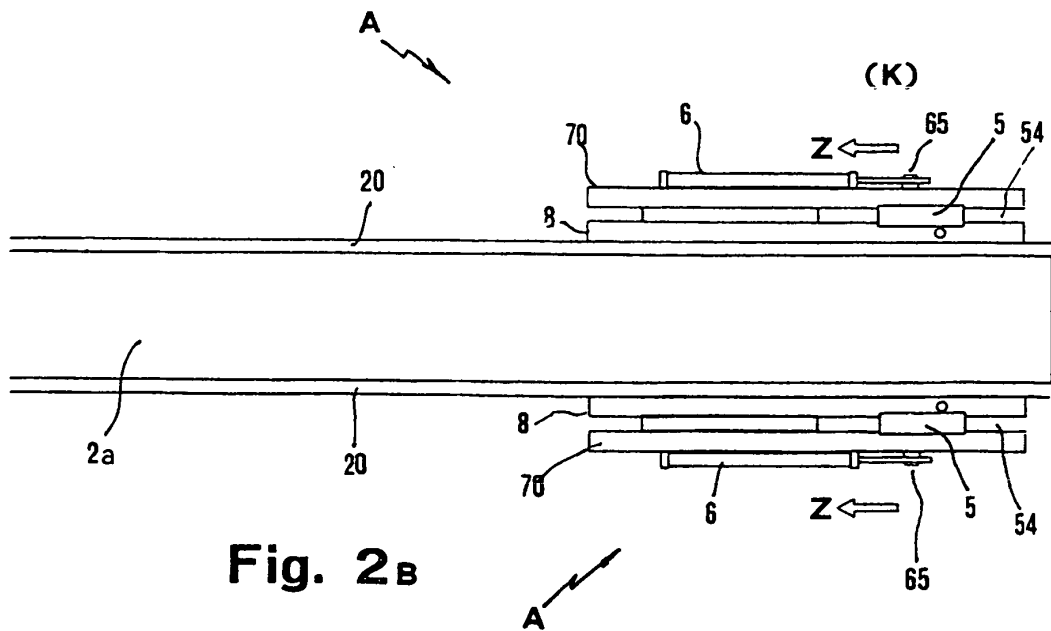
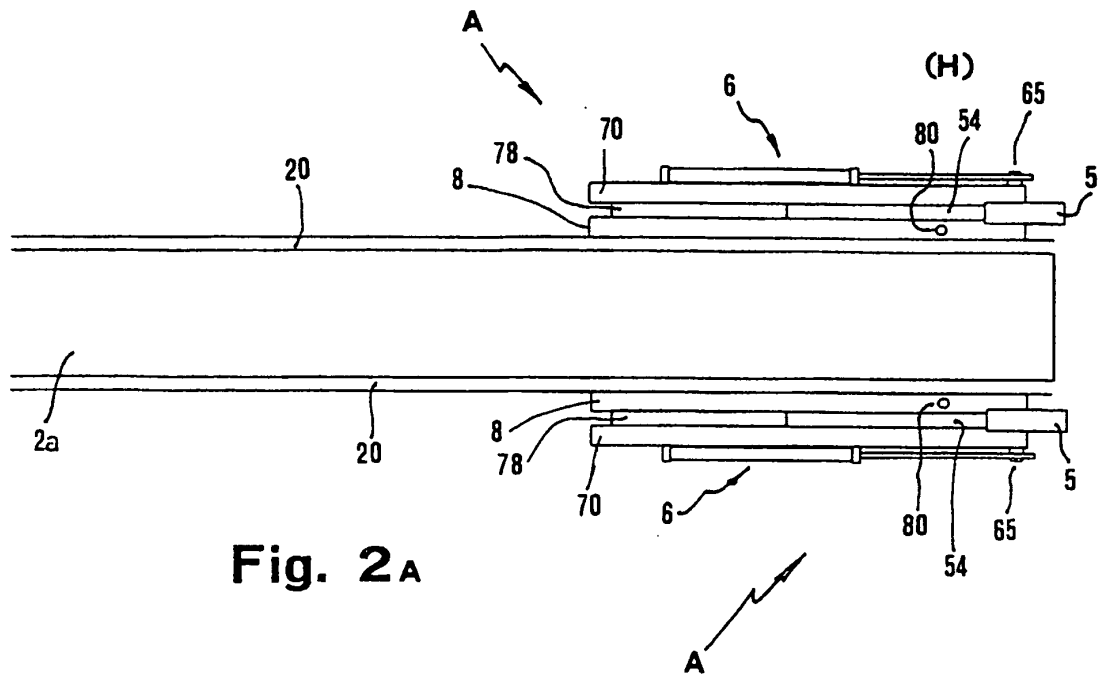


Fig. 1



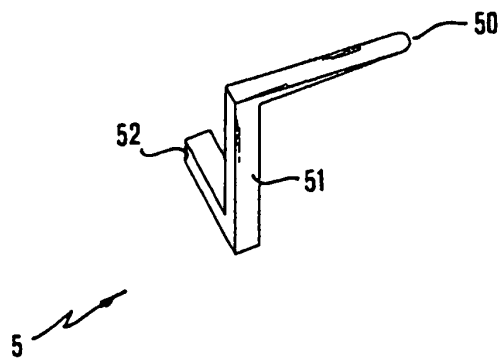


Fig. 3c

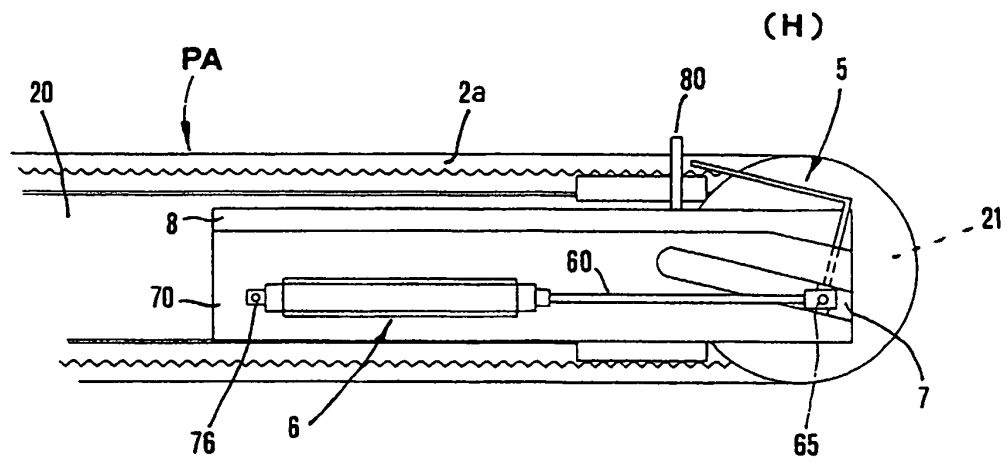


Fig. 3A

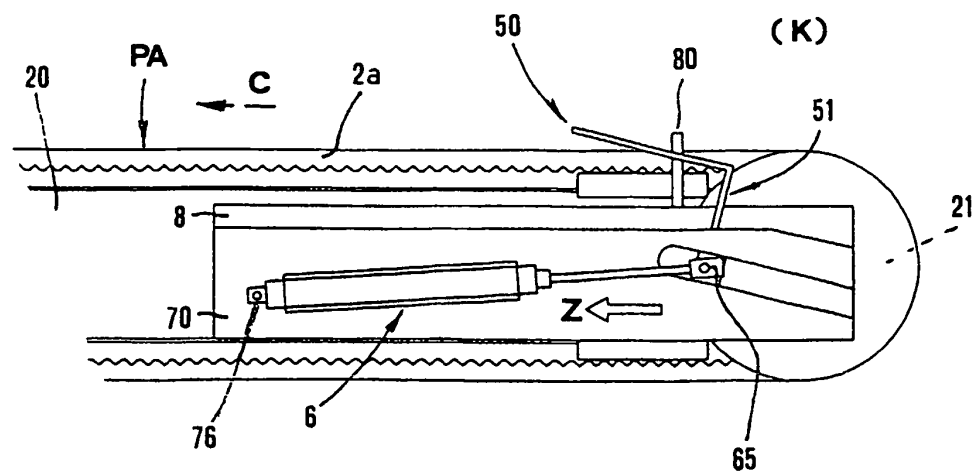


Fig. 3B

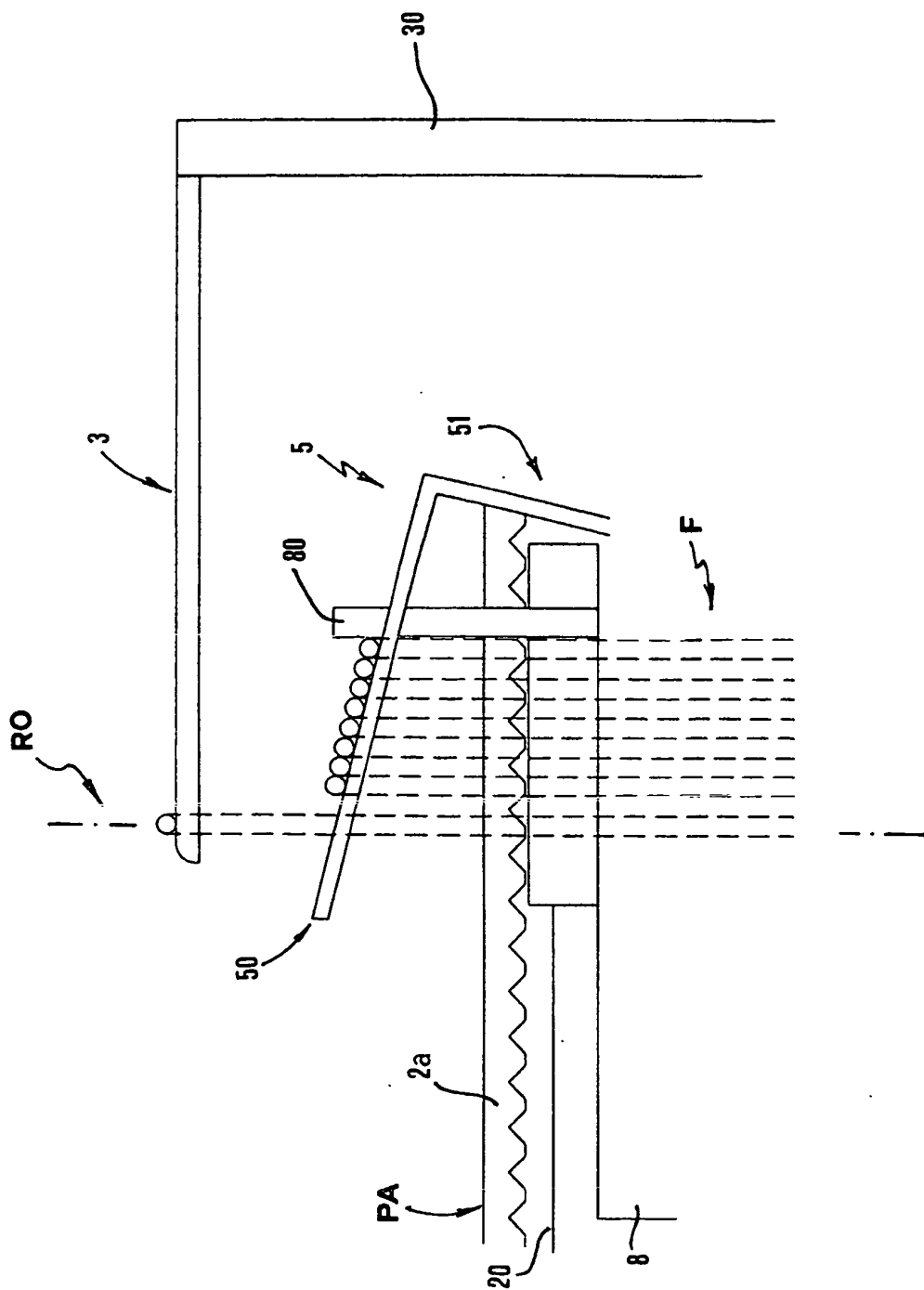


Fig. 4A

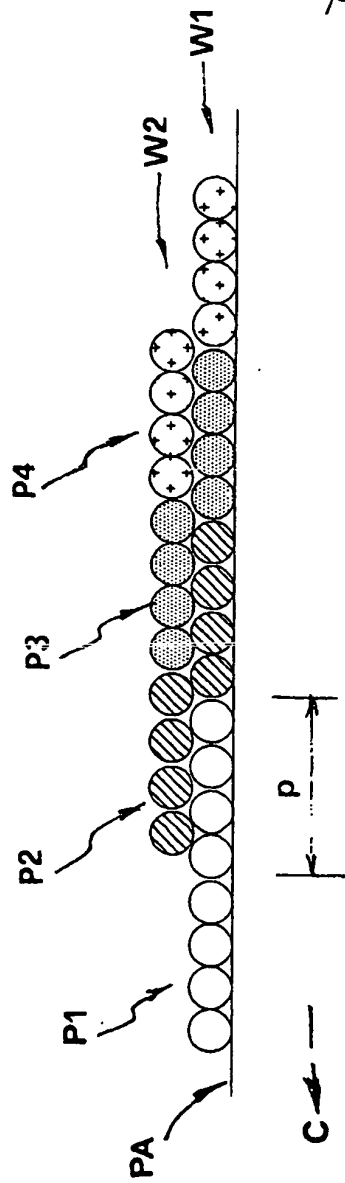


Fig. 4B

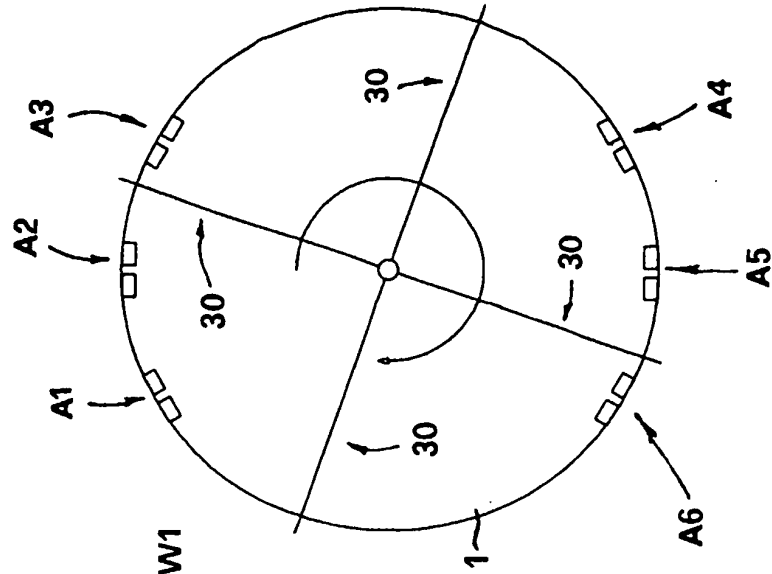


Fig. 5

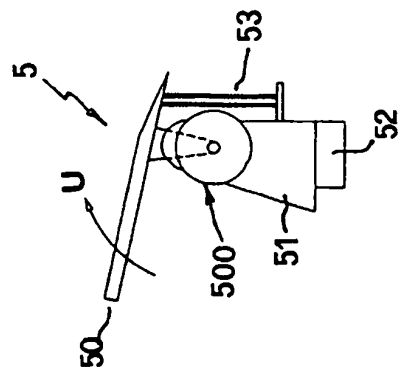


Fig. 6A

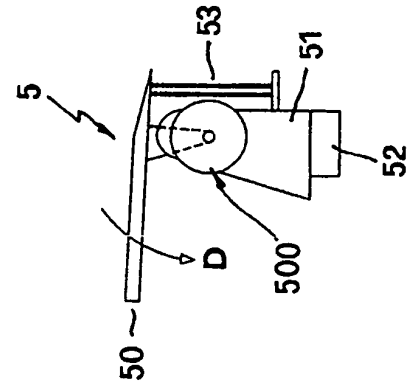
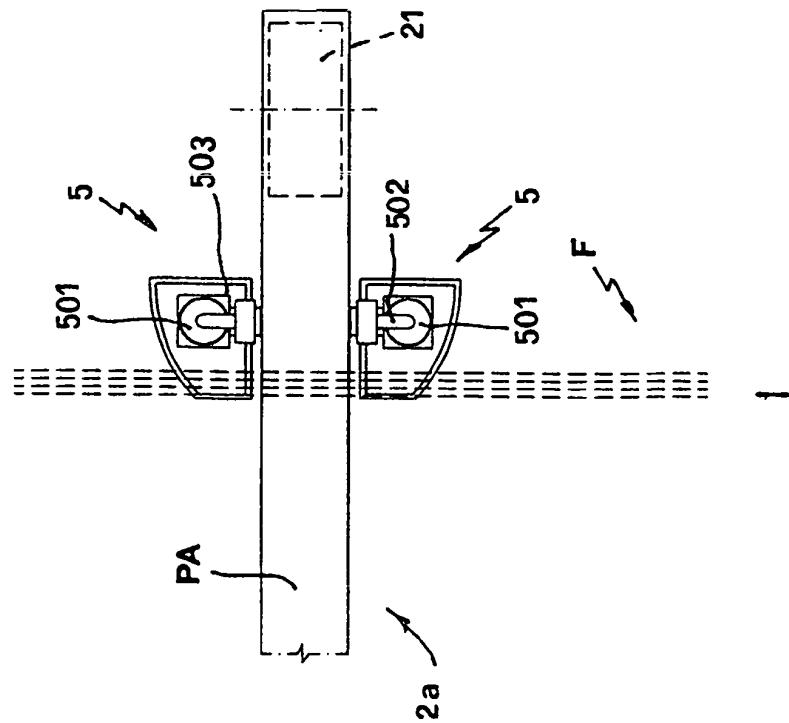
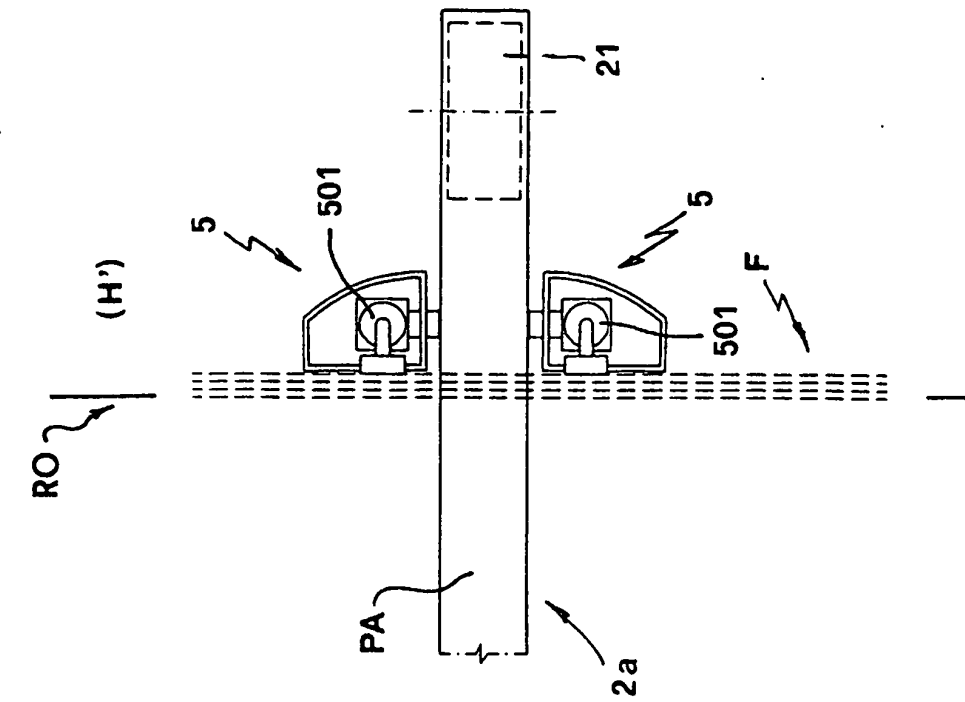


Fig. 6B



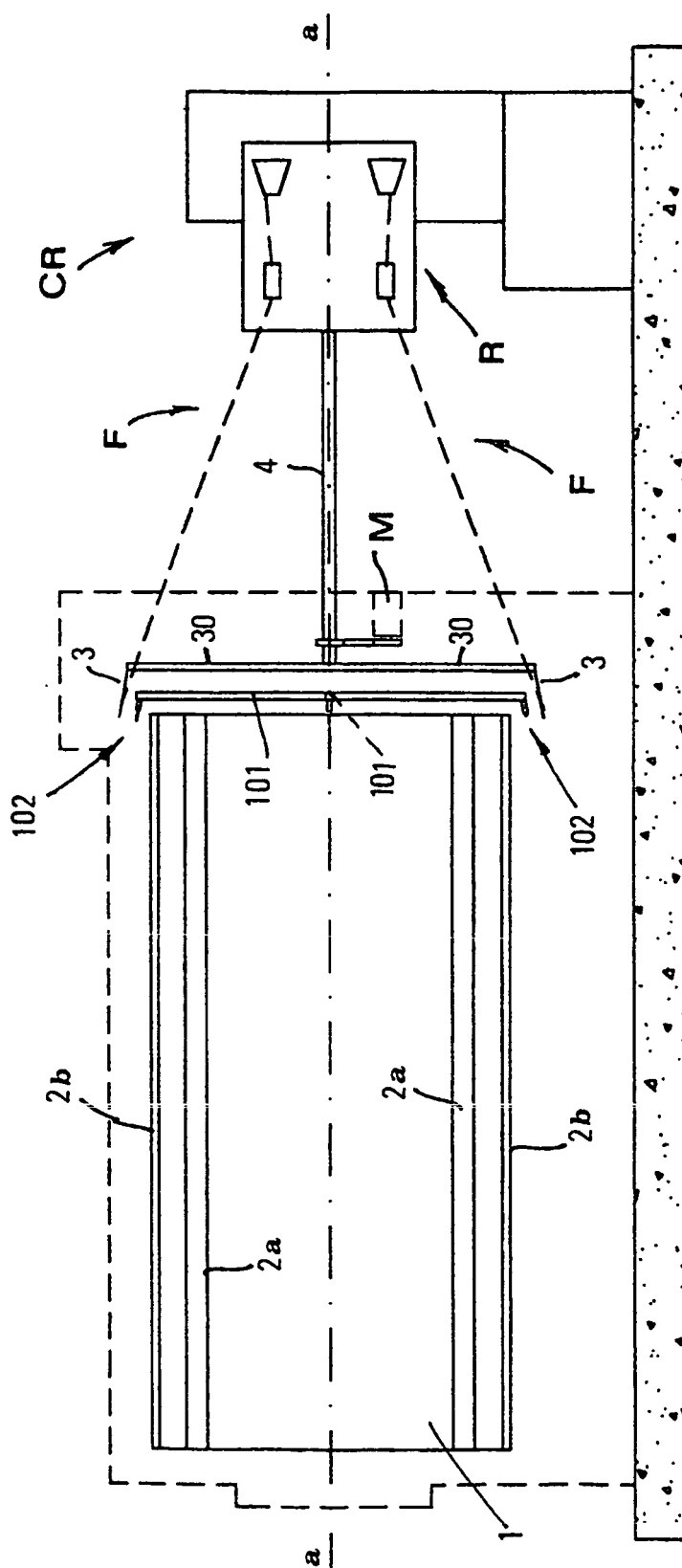


Fig. 8

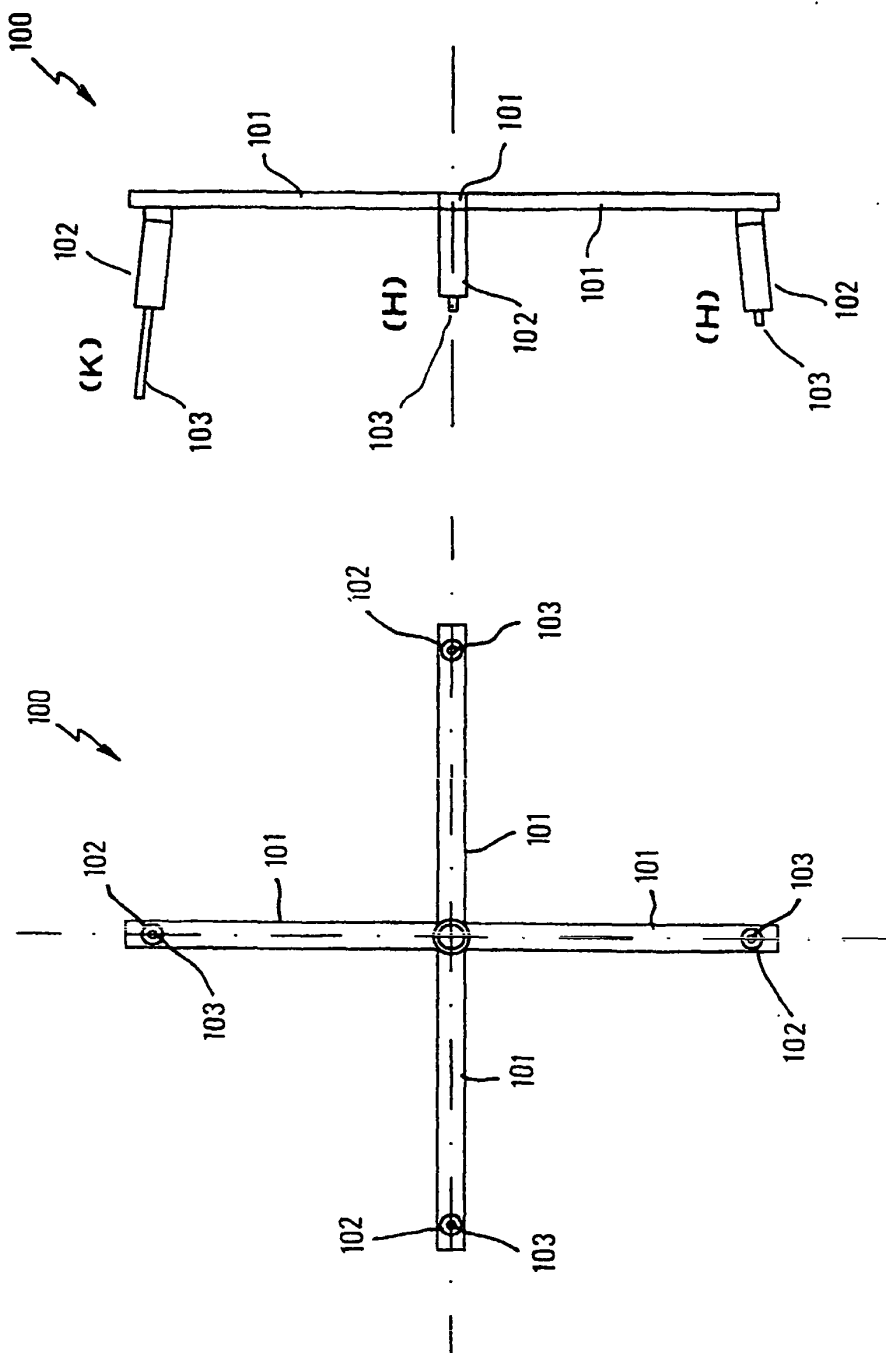


Fig. 9B

Fig. 9A

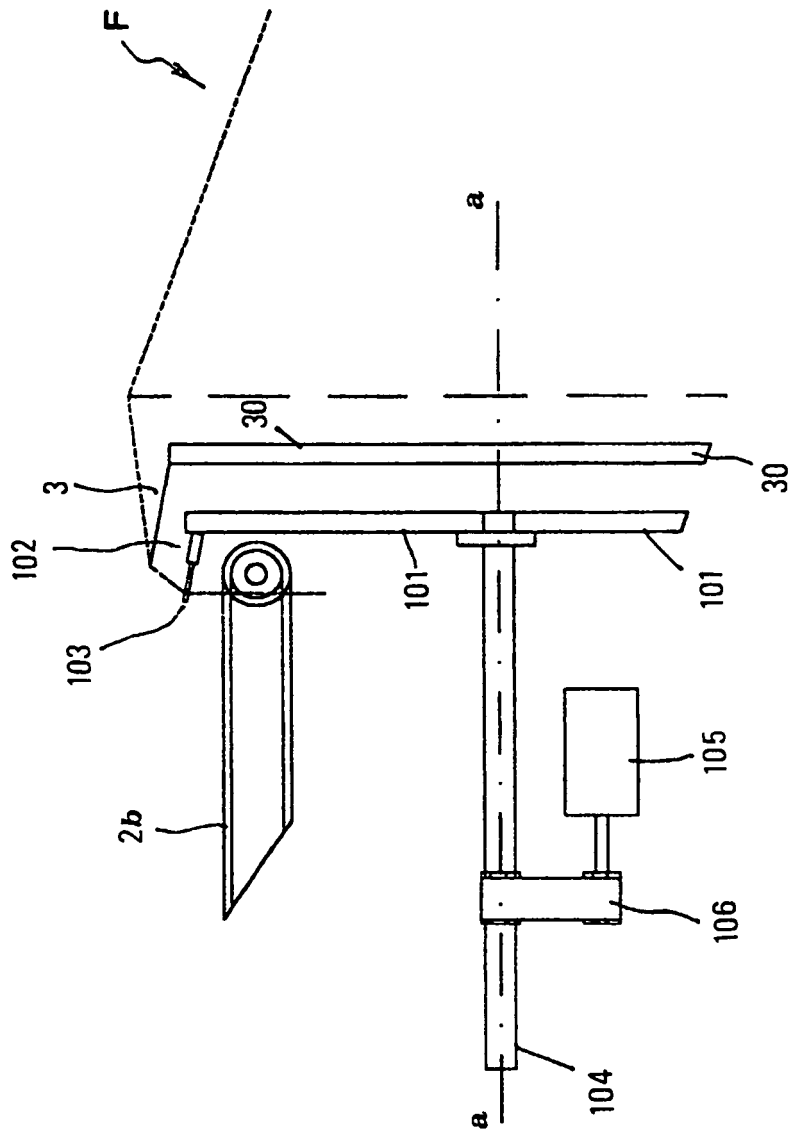


Fig. 10

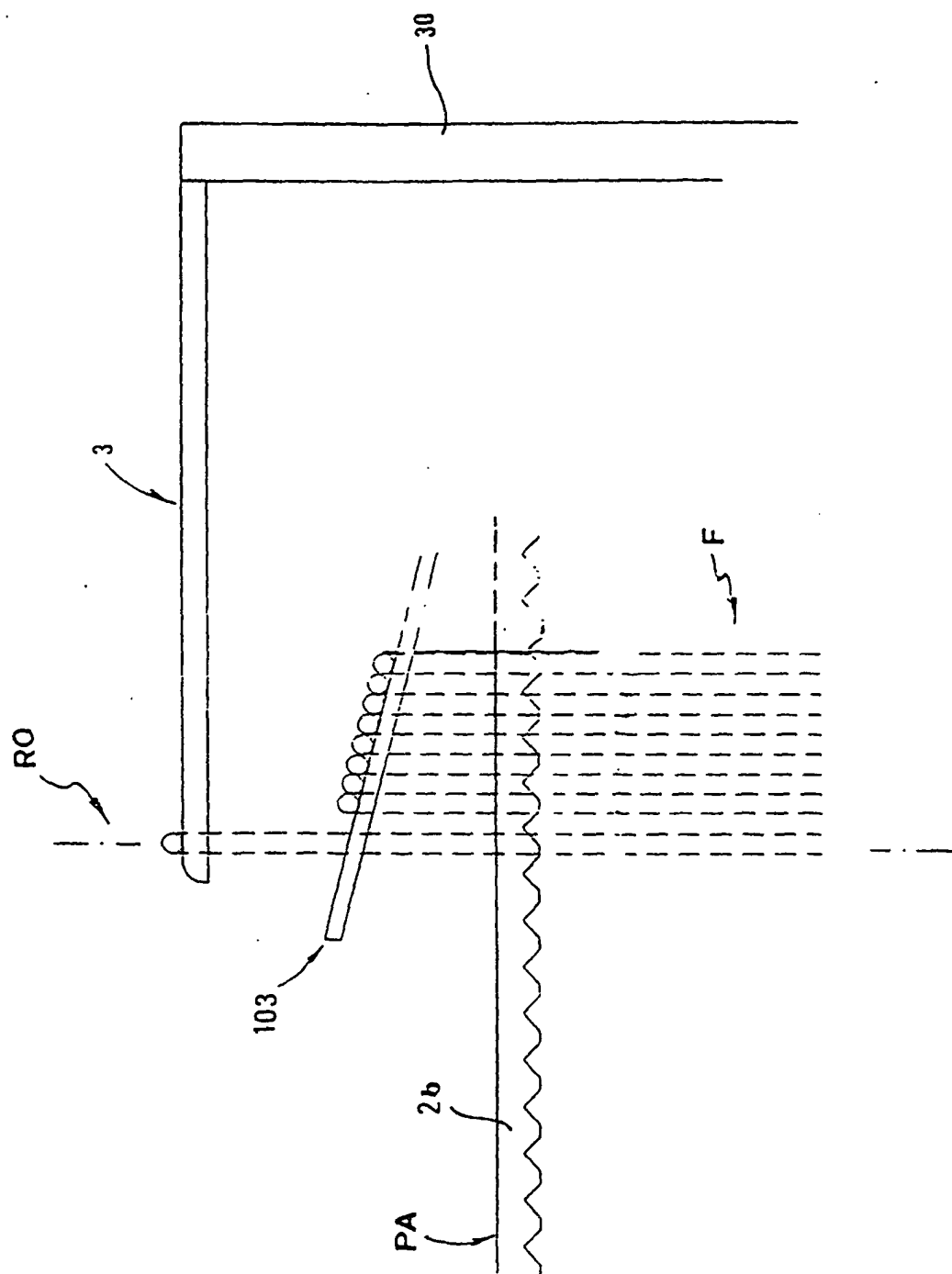


Fig. 11

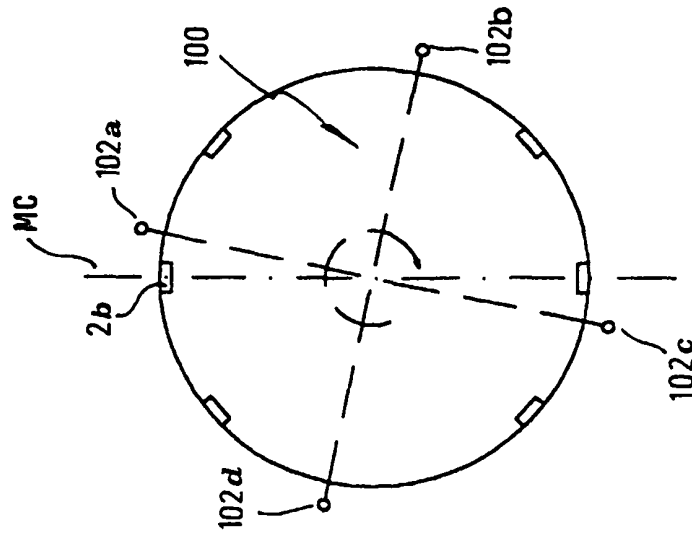


Fig. 12A

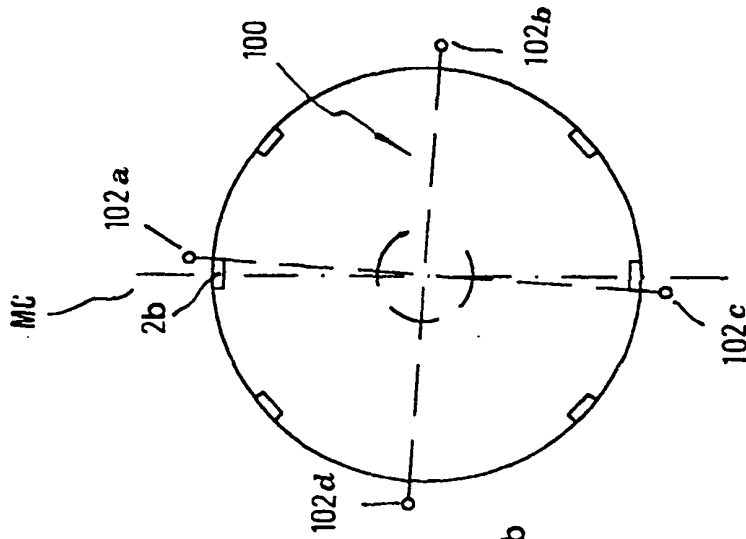


Fig. 12B

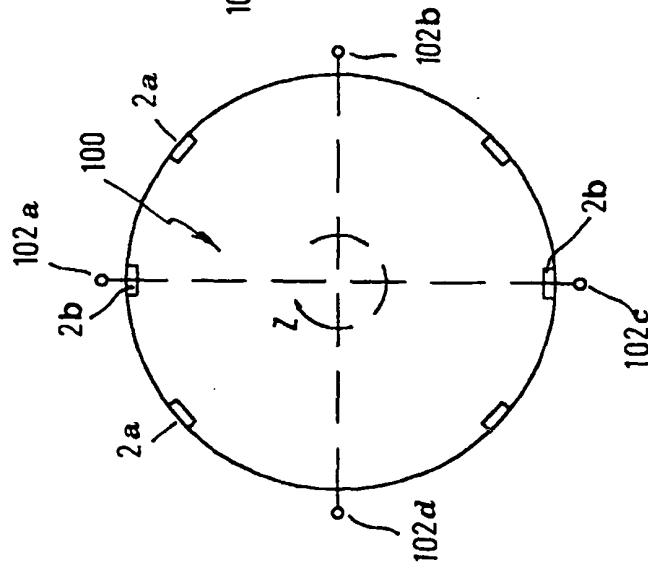


Fig. 12C

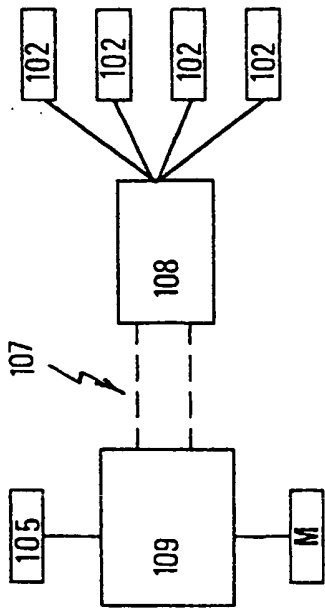


Fig. 14

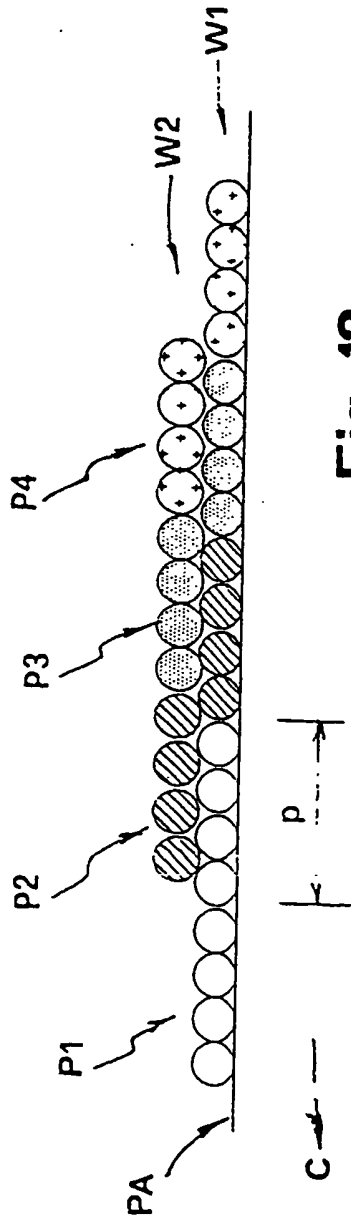


Fig. 13

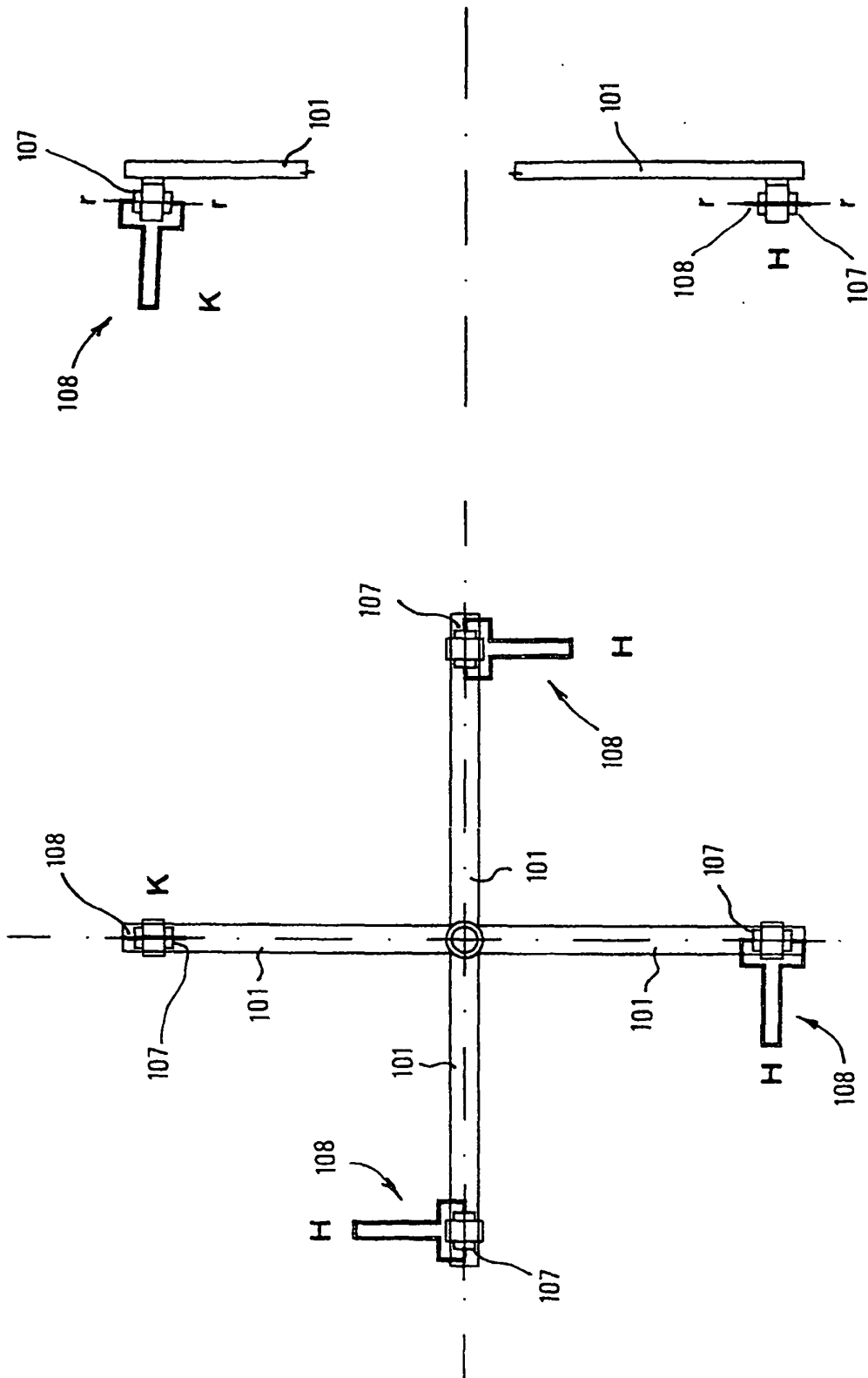


Fig. 15B

Fig. 15A

REFERENCES CITED IN THE DESCRIPTION

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