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**(54) DRAWING ASSEMBLY IN MACHINES FOR WORKING METAL PROFILES AND
CORRESPONDING METHOD**

**ZIEHANORDNUNG IN MASCHINEN ZUR BEARBEITUNG VON METALLPROFILIEN UND
ENTSPRECHENDES VERFAHREN**

**ENSEMBLE D'ÉTIRAGE ÉQUIPANT DES MACHINES SERVANT À L'USINAGE DE PROFILÉS
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Description

Technical Field

[0001] The present invention concerns a drawing assembly, which can be included in machines for working metal profiles, in particular iron rods for reinforced concrete.

Background Art

[0002] It has been known that profiled irons, used for example for making reinforcements for reinforced concrete, are generally produced starting from metal profiled consisting of metal rods in coils or bars. For this purpose, metal profiles are fed, one or more, to working machines which automatically perform the manufacturing thereof, transforming them in a series of pre-designed products.

[0003] In particular, machines for working metal profiles in coils generally comprise a drawing assembly suitable to perform the feeding of the same profiles to the working members of the machine, arranged along a pre-established feeding line. Moreover, along the feeding line, straightening members are provided suitable to correct the bend of the profiles, especially in case they come from coils. For example, according to a known type, the drawing assembly can be arranged in an intermediate position between a first group of straightening members, laying on a substantially horizontal plane, and a second group of straightening members, laying on a substantially vertical plane.

[0004] The drawing assembly is generally made by one or more couples of counter-rotating wheels, arranged in series. For example, the drawing assembly can be made by a series of drawing wheels suitably motorized and a series of freely rotatable or equally motorized contrast wheels, substantially arranged on a same longitudinal plane, suitable to shape between them a feeding path, not always linear, for the metal profiles feeding to the machine. The wheels of the drawing assembly can be flat or grooved, that is having an annular throat which is engaged in use by the feeding profile.

[0005] Machines for working at the same time more profiles are known as well, for example so called "double-line" machines which allow to work simultaneously a couple of iron rods, in which the drawing assembly must be able to feed to the machine a couple of profiles, arranged side by side along a feeding line. In the case of double-line machines, the wheels of the drawing assembly can be flat or have a double groove, engaged in use by the above mentioned couple of profiles.

[0006] In the considered field, technical faults are often complained. In particular, in case of machines provided for simultaneously working more than one metal profile, the final length of profiles can sometimes result different, even though they are simultaneously fed by the same drawing members.

[0007] As long as it is concerned, it is necessary to

underline that, as it is known, fed metal rods have geometrical and size irregularities, far from the theoretical shape and size for which drawing assembly provided for their feeding are set. As a matter of facts, metal rods do not have a perfect constant or circular section, on the contrary they often have a flat or elliptical shape, having one or more longitudinal ribbings, which extend all along the length of the profile and, in particular if they are fed unfolding from a coil, they have their section twisted like a helix according to a longitudinal direction of the same rod (see figure 11). The presence of such faults, which can be more or less evident, is due to the production technology and to the unfolding from the coils.

[0008] Because of the presence of such irregularities, each metal rods reaches the drawing assembly with a longitudinally variable transversal section. In particular, for a theoretical stationary observer, placed in the passage zone defined between the drawing wheels, the helicoidal twisting produces an effect of rotation of the section, which in its turn has further shape irregularities, when passing through the drawing wheels. Obviously the difference of sections of the two metal rods being worked cannot be equal or synchronized at all. As a consequence, also the pressure of the drawing assembly on each fed rod can vary, thus producing uncontrolled slidings which finally cause undesired differences in the feeding of the rods crossing the drawing assembly.

[0009] Moreover it is necessary to remind that the drawing assembly of such machines can sometimes work with a sole rod, usually using the more internal annular groove of the drawing wheels. For this reason, this internal groove wears out more than the others and consequently it produces a different pressure between the two rods, thus increasing said undesired slidings. Furthermore rods are not smooth, but provided with an "improved adherence", thus having on the surface pronounced ribbings, which shape and arrangement depends on producer's choice.

[0010] As a result, it is possible that metal rods simultaneously fed to the machine have a different feeding and then produce profiles of different length.

[0011] The European patent no. EP0693335 A1 discloses a drawing assembly provided with a device which compensates the extension of at least two metal rods. Such compensating device comprises a couple of counter-rotating grooved rolls, one of which, at least, is mobile parallel to itself on the containment plane of the same rolls, while the other is tilting on said containment plane of the axes and subject to compensation means comprising screw means and spring elastic recall means. By differently inclining the tiltable roll, by means of the said screw means, it is possible to produce a different pressure upon the two rods placed in the grooves of the rolls, theoretically recovering the different length of rods. However, such solution does not completely satisfy the exigency of correctly draw the couple of rods, but it produces a compensation based upon the difference of average diameter which could outcome in case of setting by hand.

Such setting must anyway be performed by hand by the worker, suitably adjusting the screw means of a pre-established amount substantially on the base of the experience and of the ability of the worker.

[0012] Therefore the solutions proposed so far do not allow to completely solve the above mentioned problems, being complex and inadequate for the practical exigencies.

Disclosure

[0013] The task of the present invention is that of solving the aforementioned problems, devising a drawing unit which allows to feed in an optimal way more than one metal rod to a machine for working such metal profiles, in particular assuring the correct distribution of the load on the drawing wheels in order to obtain the identical length of each profile fed to the machine.

[0014] Within such task, it is a further scope of the present invention that of providing a drawing assembly which is able to continuously adapt to different rod sections which, time after time, reach the same drawing assembly.

[0015] Another scope of the invention is that of providing a drawing assembly having a simple conception, a surely reliable structure, a versatile use as well as relative economic costs.

[0016] The cited scopes are attained, according to the present invention, by the drawing assembly according to claim 1.

[0017] The drawing assembly, according to the invention, comprises at least a first wheel and a second wheel opposite and counter-rotating in a way as to define peripherally between them a feed path for a couple of profiles to be drawn, a motor member for driving at least one wheel of said first and said second wheel, a first support framework for the first wheel and a second support framework for said second wheel. An actuation device is provided for alternatively driving the first wheel and the second wheel between a spaced opening position and an approached tightening position, wherein the first and the second wheel are pushed one towards the other for tightening the couple of feeding profiles, with a resulting tightening force suitable to the feeding of the same profiles. The first support framework for the first wheel and the said second support framework for the second wheel are mounted tiltable to one another about a tilting axis parallel to the axes of the profiles arranged on the feed path. Such tilting axis is arranged in the passage zone of the feeding profiles, for allowing the relative tilting of the first wheel and of the second wheel with respect to such tilting axis, of width and direction so as to spontaneously compensate different variations of section for the couple of feeding profiles. Further to such spontaneous adjustment the resulting tightening force is kept equally distributed on both profiles, so as to assure that the feeding of the couple of profiles is equally balanced, that is, aligned.

[0018] In other words, further to such relative tilting ca-

pability of the drawing wheels, the same tightening or approaching force produced between the first and the second wheel forces the same wheels to be supported on both the approached profiles: the free relative tilting of the wheels produces the spontaneous orientation of the same wheels, so as to equally distribute the tightening stress on the contact zones of both the feeding profiles. This continuously occurs during the drawing, thus producing the continuous relative tilting of the couple of drawing wheels, for adapting to the different sections which arrive step by step in the passage zone for the profiles, without requiring a tracer, or pursuer member, or the operator intervention.

[0019] It is to be noted that the relative tilting capability of the first framework with respect to the second framework around the passage area of the feeding profiles allows the spontaneous adjustment of the inclination with no external intervention.

[0020] In practice, the particular position of the above mentioned tilting axis and of the direction in which the force resulting by the applied forces acts, serve as sensor for the survey of the section of both the feeding profiles, and as actuation member for the activation of the tilting suitable to constantly maintain the tightening on both feeding profiles and consequently for keeping the load equally distributed easing the construction and the quickness of the reaction when the shape of the profiles varies, always without requesting the external intervention of the operator.

[0021] Therefore, it is the same actuation device which drives the reciprocal approaching between the first drawing wheel and the second drawing wheel, that drives as well the spontaneous adjustment of the relative inclination of the two drawing wheels to the sections of the feeding profiles so as to produce the same pressure on both the feeding profiles.

[0022] Moreover it is important to underline that according to the invention the arrangement of the above mentioned tilting axis in the passage zone of the drawn profiles allows to reciprocally incline the drawing wheels without substantially modify the approaching of the wheels to the profiles and consequently the resulting tightening force, but, on the contrary, actively working for maintaining the same resultant tightening force constant and balanced on the drawn profiles.

[0023] According to the invention it is possible to create the tilting connection between the first framework and the second support framework of the drawing wheels through a kinematic chain equal or equivalent to a hinge pivoted at the cited tilting or hinge axis.

[0024] Such hinge preferably comprises a first coupling portion shaped by the first framework and a second coupling portion shaped by the second framework. The first coupling portion and the second coupling portion are then associated rotatable about the cited hinge axis, shaping each a tubular passage arranged around the hinge axis, for allowing the easy passage of the drawn profiles along the feeding path.

[0025] In practice the cited hinge is preferably tubular or "hollow" for enabling the arrangement of the tilting axis of the support frameworks of the drawing wheels where the cited adjustment action through tilting is better performed, without hindering the feeding of the profiles, thus creating a "tunnel" effect.

[0026] According to a particular embodiment the first framework is fixed while the second is pivoted mobile about the first framework around the cited tilting axis.

[0027] Moreover it is possible to provide a counter-weight member suitably applied at least to the second mobile framework and linked through connection means, preferably of flexible type, to a counter-means anchored to a fixed portion of the apparatus in which the assembly is mounted, in order to compensate not only the weight of the members assembled overhang with respect to the rotation centre but also possible further unbalancing actions.

[0028] According to a preferred embodiment, the cited tilting axis is arranged in a centred position between the above mentioned couple of profiles drawn in the feeding path.

[0029] As an alternative for the hinge it is possible to provide that the tilting connection between the first and the second framework is made through a plurality of articulations arranged externally to the passage zone of the profiles inserted in the feeding path. In such case the articulations are able to define a respective centre of instantaneous rotation virtually centred between the same profiles in the passage zone of the profiles, working in a completely corresponding manner according to the invention.

[0030] It is further possible to provide that the drawing assembly comprises blocking means of the relative tilting of said first framework and of said second framework, for blocking the cited spontaneous compensation tilting and allowing in such way the passage of a single profile in the feeding path.

[0031] According to a particular embodiment it is possible to provide a couple of first wheels and a couple of opposed second wheels functioning as previously described. In such case is then possible to provide preferably that the couple of second wheels is tilting with respect to the couple of first wheels, being each wheel of said couple of second wheels tiltable in an autonomous manner on a respective second framework.

[0032] The invention concerns as well a drawing method for a couple of profiles through a drawing assembly which comprises at least a first support framework for a first drawing wheel and a second support framework for an opposed and counter-rotating second drawing wheel, wherein the cited frameworks are tiltable to one another with respect to a tilting axis parallel to the feeding direction of the profiles, arranged in the passage zone of the feeding profiles. According to the invention the method provides to produce the drawing of the couple of profiles keeping a resultant tightening force which, in a manner corresponding to the drawing assembly described and

claimed, is suitable to produce the spontaneous and reciprocal tilting of the first framework with respect to the second framework, of a width so as to compensate differentiated variation of section of the couple of profiles and keeping the above mentioned resultant tightening force equally distributed on the couple of feeding profiles.

Description of Drawings

[0033] Details of the invention shall be more apparent from the detailed description of a preferred embodiment of the drawing assembly according to the invention, illustrated for indicative purposes in the attached drawings, wherein:

figure 1 shows a perspective view of the drawing assembly object of the invention;

figures 2 and 3 respectively show a lateral view of a portion of the drawing unit according to different working conditions;

figure 4 shows a lateral view of the same drawing unit;

figures 5a and 5b respectively show a theoretical section and an actual section of a metal profile suitable to be fed to the drawing unit object of the invention;

figures from 6 to 10 respectively show lateral schematic views of the drawing unit, according to different working conditions and embodiments;

figures from 11 to 15 are respectively a lateral view, a section view, according to the trace planes XII, XIII, and XIV in figure 11, and a perspective view of a rod in the actual configuration.

Best Mode

[0034] With particular reference to such figures, the drawing assembly provided for machines for working metal profiles 2 is indicated in its entirety with 1.

[0035] The drawing assembly 1 comprises one or more drawing wheels 11, 12, at least one of which is motorized, arranged in couples, so that each couple of wheels is cooperating for peripherally shaping a feeding path for the metal profiles 2 to be fed. More precisely, that drawing assembly 1 comprises a series of first drawing wheels 11 having preferably fixed axis, arranged for example at the lower side of the feeding path for the profiles 2, and a corresponding series of counter-rotating second wheels 12, mobile on their laying plane, opposite to the first wheels 11 with respect to the above mentioned longitudinal feeding path, thus for example at the upper side. In the illustrated case, the drawing assembly 1 comprises two couples of wheels 11, 12, each comprising a first wheel 11 and a second wheel 12, but it is possible to provide a different number of drawing wheels, according to the specific working requirements.

[0036] The wheels 11, 12 preferably comprise a respective annular groove 13 for housing and tightening

the feeding metal profiles 2.

[0037] In order to allow the feeding of a couple of profiles, the wheels 11, 12 of the drawing assembly 1 thus comprise a couple of grooves 13 placed side by side. In substance, between the first drawing wheels 11 and the second contrast counter-rotating wheels 12 a couple of metal profiles 2, which are arranged side by side, is drawn in longitudinal direction. As an alternative it is possible as well that the cited grooves 13 are not provided, or to provide them alternatively on a wheel of each couple instead of on both.

[0038] The wheels 11, 12 are suitably motorized for performing the feeding of the profiles 2, through the connection with a suitable motor member 14, 15 (see figure 4). As an alternative, it is possible to motorize the first wheels 11 only or the second wheels 12 only. Anyway it is possible to motorize only one wheel of each couple, the remaining wheels being freely carried rotatable according their rotation axis.

[0039] According to the invention the first wheels 11 are mounted of a first framework 3, preferably fixed, while the second wheels 12 are mounted mobile on a second framework 4 tiltable with respect to the first framework 3.

[0040] More precisely, the second wheels 12 are carried mobile by an actuation device 5, suitable to perform a sliding displacement of the same second wheels 12 between a spaced opening position, for example lifted, and an approached position, for example lowered, in which, when one or more profiles 2 are interposed between the same wheels, the first wheels 11 and the second wheels 12 are pushed one against the other in opposite direction towards the opposite first wheels 11, performing the tightening of the interposed profiles for their drawing along the cited feeding path, through a resulting tightening force A.

[0041] The actuation device 5 preferably comprises a single actuation member 6 mounted, with for example substantially horizontal axis, between a couple of lever arms 7, in practice square shaped and pivoted, at relative pins 8, to the second mobile support framework 4 of the drawing assembly. The bell cranks 7 are articulated through connecting rods 9 for transmitting to the sliding support of the axis of the second wheels 12 the required pushing force through suitable counter-articulations. The activation in extension of the actuation member 6 causes the reciprocal spacing of the lever arms 7, so as to produce the simultaneous lifting of the second wheels 12 in the opening position of the drawing assembly 1, which allows the insertion of the profiles 2 in the respective annular grooves 13. The opposite closing movement of the actuation member 6 obviously produces the simultaneous stroke of the same second wheels 12 in the tightening position, that is in the drawing position for the metal profiles 2.

[0042] According to the present invention, the second mobile framework 4 is pivoted to the first fixed framework 3 through a hinge, around a tilting or hinge axis parallel to the axes of the profiles 2, and preferably comprised

between the planes containing the respective tightening forces acting on the same profiles 2 feeding on the drawing assembly 1, in order to enable the spontaneous adjustment of the wheels 11, 12 to the irregularities of the section of the feeding profiles 2. As previously described, indeed, the feeding profiles 2 can have an irregular actual shape 2' (see figures 5b, 12, 13, 14 and 15), characterized by ribbings 30 and grooves 31, or by other irregularities coming out from the technology used for their production, such as for example the one of giving the section a flattered or oval shape. In particular, ribbings 30 are generally provided for easing the adherence of the profile with the surrounding concrete. Ribbings 30 can be arranged inclined along the longitudinal axis of the same profile 2. In this way the wheels 11, 12 of the drawing assembly 1 receive transversal sections with continuously variable shapes. Instead, grooves 31, which can be two or more, arranged on the perimetral rim of the section all along the length of the profile 2', are undesired irregularities, usually coming out from the technology used for their production.

[0043] Finally it is necessary to underline that further to the unwinding of the coil, the profile 2' is usually twisted with a substantially helicoidal shape wound around its same longitudinal axis, as illustrated for example in figure 15.

[0044] Therefore the geometry and the diameter of the real profile 2' section interposed between wheels 11, 12 can continuously vary during the feeding through the drawing assembly 1. In particular, because of the cited helicoidal shape, profiles 2' sections continuously rotate around their longitudinal axis during the feeding through the wheels 11, 12.

[0045] Moreover, as previously indicated, the grooves 13 of the wheels 11, 12 can be themselves worn out and geometrically different, for example because of a different use of the grooves 13.

[0046] According to the invention, in order to enable a correct tightening of the profiles 2' the first wheels 11 and the second wheels 12 can tilt to one another around the hinge axis of the hinge 20, so as to make a diverted arrangement with respect to the coplanar planes of the same wheels. In particular figure 7 shows a diverted arrangement of the wheels 11, 12, suitable to compensate the diameter difference of the sections of the profiles 2 feeding through the wheels 11, 12. In figure 8 is shown a diverted arrangement essentially similar, but suitable, in this case, to compensate the difference of thickness interposed between the wheels 11, 12, produced by different orientations of two feeding oval sections. In particular this circumstance does not occur in a determined step, on the contrary it requires a continuous and unpredictable adjustment of the arrangement of the wheels, which can produce correspondent tilting of range α of the same wheels 11, 12 in both directions (see tilting angles, which range is generically indicated with symbols $+\alpha$ and $-\alpha$ in figures 2 and 3).

[0047] The hinge 20 thus serves for adjusting the re-

ciprocal arrangement between the first wheels 11 and the opposed second wheels 12, according to the section variations and to the arrangement of the feeding profiles 2, 2'. The hinge 20 can be made of a first coupling portion 21 shaped by the first framework 3 and by a second coupling portion 22 shaped by the second framework 4. The first coupling portion 21 and the second rotatable coupling portion 22 are preferably associated rotatable through the interposition of suitable bearings, for simplicity not illustrated in figures.

[0048] The first coupling portion 21 and the second coupling portion 22 shape each a tubular path 23, 24 arranged around the hinging axis, so extended that they allow the easy passage of the profiles 2, 2' drawn along the feeding path. Preferably the hinge axis of the hinge 20 is arranged in a substantially intermediate position on a plane containing the axes of the profiles feeding on the same containing plane, so as to allow as well spontaneous tilting $+\alpha$, $-\alpha$ compensating the wheels 11, 12 in both directions, for the efficient tightening of all interposed profiles 2, 2'.

[0049] Substantially, the orientation between the first wheels 11 and the second wheels 12 of the drawing assembly 1 varies according to an inclination centred on the rotation axis of the rotatable coupling defined by the hinge 20. Such adjustment of the reciprocal inclination of the planes containing the wheels 11, 12 is automatically produced as a reaction of the tightening action produced by the actuation member 6. Thanks to this continuous adjustment, the illustrated solution, in which the hinge 20 has its hinging axis arranged at the passage zone of the profiles 2, 2', that is with a tubular or "hollow" hinge, that is provided with the tubular passages 23, 24, is optimal. As an alternative, different solutions are possible in which kinematic chains of the articulated square type can be used for producing a tilting movement in both directions of the planes of the wheels 11, 12, which are equivalent to the described hinge 20 from the functional point of view. In particular such kinematic chains can comprise a plurality of articulations arranged externally to the passage zone of the profiles 2, 2', anyway they must be able to define a respective centre of rotation substantially centred between the same profiles, thus being able to spontaneously compensate in both tilting directions the section irregularities of the feeding profiles.

[0050] Finally the drawing assembly 1 can advantageously comprise a counter-weight 16, suitably applied to the first framework 3 and to the second framework 4, in order to compensate the forces produced by the weight of the overhang members constrained to the second mobile framework 4 in contrast with the automatic adjustment of the inclination of the wheels 11, 12 to the profiles 2 feeding through the drawing assembly. The counter-weight member 16 can as well compensate the weight of further working members which can be anchored to the working plane of the machine which, for ergonomic reasons, is usually arranged inclined with respect to a vertical plane. Therefore the contribution of such working

members generally tends to generate a momentum with respect to the tilting axis of the hinge 20 or of the cited equivalent solutions, suitable to contrast the correct and spontaneous compensation of the section irregularities of the drawn profiles.

[0051] In order to contrast such undesired forces the counter-weight member 16 can be connected through suitable flexible means 17, for example, wires, cables and counter-means 18, 19 with a fixed portion of the machine in which the drawing assembly 1 is used.

[0052] The functioning of the drawing assembly is easy to understand through the preceding description.

[0053] In a first insertion step, the actuation device 5 is activated for driving the drawing assembly 1 in the open position, suitable for the insertion of the profiles 2 to be fed.

[0054] Subsequently the actuation device 5 is activated for tightening the profiles 2, 2' inserted in the respective grooves 13 between the first wheels 11 and the second wheels 12 (see figure 6). The produced tightening force causes the reciprocal approaching of the wheels 11, 12 until tightening the interposed profiles 2, 2', driving the second wheel 12 in contact with the section of major thickness. Further to such dynamics, the same approaching force causes the relative tilting of the wheels 11, 12 around the hinge axis corresponding to the hinge 20 or to equivalent solutions, until reaching the contact with the peripheral surface of the wheels 11, 12 also on the other interposed section. Upon reaching such configuration, it is possible to estimate that the tightening force produced by the reciprocal approaching of the first wheels 11 and of the second wheels 12 is divided in substantially balanced way between the interposed profiles 2, 2'. In practice, the resulting approaching force A, which acts according to a direction passing through the centres of the fed profiles 2, 2', determines an instable balance, suitable to produce the relative rotation of the first wheels 11 and of the second wheels around the hinge axis when the shape of the section of the interposed profiles 2, 2' in the drawing assembly 1 is different and produces different and unbalanced drawing actions. Thus the device spontaneously tends to balance the support on both profiles 2, 2' for balancing the overall produced forces.

[0055] Subsequently the motor members 14, 15 are activated for performing the rotation of the wheels 11, 12 and consequently producing the feeding of the inserted profiles 2.

[0056] During the feeding of the profiles 2, 2' tightened between the wheels 11, 12 the transversal section of the same can vary, for example as shown in figures 7 and 8. In such cases the tightening performed by the actuation device 5 automatically determines the adjustment of the reciprocal inclination of the first wheels 11 and of the second wheels 12 to the different shapes of the sections which reach the drawing assembly. In other words, the resulting force A of the actions produced on the wheels 12 assures the constant support on the profiles 2, 2' independently from the possible sudden variation of the

interposed thickness. The resulting force A is arranged preferably in a median plane among the vertical lines passing through the axes of the profiles 2, 2' (see figure 9), but in any case between them. As a consequence, the tightening is constantly assured for the undifferentiated feeding of the profiles 2, 2' interposed between the wheels 11, 12.

[0057] In particular the counter-weight member 16 can be advantageously used for easing and perfectly balancing the tightening between the two profiles 2, 2' (see figure 10).

[0058] Therefore, in use, the metal profiles 2, 2' to be fed to the machine proceed side by side along the feeding line shaped by the first wheels 11 and the second counter-rotating wheels 12, resulting perfectly and constantly tightened in equal manner and therefore drawn of the same quantity.

[0059] The length of the tract of profile fed to the machine in such way does not depend on possible wear occurrences of the grooved of the drawing wheels or possible irregularities of the shape of the same profile, mechanical hindering, or other reasons of differences in the drawing force. In particular it is possible to feed at the same time to the machine metal profiles of diameter not perfectly identical, even if they should be equal, assuring the correct length of each of them.

[0060] Moreover in practice the first and the second wheel or both can be indifferently tilting, as well as the one or the other can be the drawing one, therefore the tilting wheel can be idle, of simple contrast or drawing too.

[0061] The drawing assembly therefore reaches the aim of feeding in an independent way more than one metal profile to a machine for working such profiles, particularly making sure that the length of each profile fed to the machine is correct, when the machine works more than one metal profile at the same time.

[0062] The drawing assembly described for indicative purpose is susceptible of numerous modifications and variants according to the diverse exigencies.

[0063] In practice, the embodiment of the invention, the materials used, as well as the shape and dimensions, may vary depending on the requirements.

[0064] Should the technical characteristics mentioned in each claim be followed by reference signs, such reference signs were included strictly with the aim of enhancing the understanding the claims and hence they shall not be deemed restrictive in any manner whatsoever on the scope of each element identified for exemplifying purposes by such reference signs.

Claims

1. Drawing assembly for machines for working a couple of metal profiles (2, 2'), comprising at least a first wheel (11) and a second wheel (12) opposite and counter-rotating in a way as to define peripherally between them a feed path for said profiles (2, 2') to

be drawn, at least a motor member (14, 15) to drive at least one wheel of said first wheel (11) and said second wheel (12), a first support framework (3) for said first wheel (11) and a second support framework (4) for said second wheel (12), said second wheel (12) being driven by a drive device (5) between a distanced opening position and an approached tightening position, wherein said second wheel (12) is pushed towards said first wheel (11) to tighten said profiles (2, 2') being fed with a resulting tightening force (A), said assembly being **characterized in that** said first support framework (3) for said first wheel (11) and said second support framework (4) for said second wheel (12) are mounted tiltable relatively to each other about a tilting axis, which is parallel to the axes of said couple of profiles (2, 2') arranged in said feed path and is arranged in the passage area of said profiles (2, 2'), to allow the relative tilting of said first wheel (11) and of said second wheel (12) with respect to said tilting axis, of width and direction ($+\alpha$, $-\alpha$) such as to compensate instantaneously and spontaneously differentiated variations of section of said profiles (2, 2') being fed, maintaining equally distributed said resulting tightening force (A) on both said profiles (2, 2').

2. Drawing assembly according to claim 1, **characterized in that** said first framework (3) and said second framework (4) are connected through a kinetic chain equal or equivalent to a hinge (20) pivoted at said tilting or hinge axis.
3. Drawing assembly according to claim 2, **characterized in that** said hinge (20) is made by means of a first coupling portion (21) shaped by said first framework (3) and by a second coupling portion (22) shaped by said second framework (4), said first coupling portion (21) and said second coupling portion (22) being associated rotatable about said hinge axis, said first coupling portion (21) and said second coupling portion (22) each shaping a tubular passage (23, 24) arranged about said hinge axis, to allow the passage of said profiles (2, 2') drawn along said feed path.
4. Drawing assembly according to one of the previous claims, **characterized in that** said first framework (3) is fixed and said second framework (4) is pivoted mobile to said first framework (3) about said tilting axis.
5. Drawing assembly according to one of the previous claims, **characterized in that** it comprises a counterweight member (16) applied at least to said second mobile framework (4) and connected through connection means (17) to a fixed portion of the apparatus wherein said assembly is applied, to compensate the actions exerted by the weight of the

members integral to said second tiltable framework (4).

6. Drawing assembly according to one of the previous claims, **characterized in that** said tilting axis is arranged in a position centred between said couple of profiles (2, 2') in said feed path. 5
7. Drawing assembly according to claim 2, **characterized in that** said kinetic chain comprises a plurality of articulations arranged externally to the passage area of said profiles (2, 2') inserted in said feed path, said articulations being able to define a respective centre of instantaneous rotation virtually centred between the same profiles in the passage area of said profiles (2, 2'), so to be able to compensate spontaneously and in both tilting directions said instantaneous variations of section of the crossing profiles. 10 15
8. Drawing assembly according to one of the previous claims, **characterized in that** it comprises means for blocking the relative tilting of said first framework (3) and of said second framework (4), to block said spontaneous compensation tilting and allow in such a way the efficient use of said assembly with one only of said profiles (2, 2') in said feed path. 20 25
9. Method of drawing a couple of profiles (2, 2') through a drawing assembly (1) comprising at least a first wheel (11) and a second wheel (12) opposite and counter-rotating in a way as to define peripherally a feed path for said couple of profiles (2, 2'), said drawing assembly further comprising a first support framework (3) for said first wheel (11) and a second support framework (4) for said second wheel (12), said frameworks (3, 4) being tiltable with respect to each other about a tilting axis, which is parallel to the axes of said profiles (2, 2') being fed and is arranged in the passage area of said profiles being fed, the drawing method comprising the steps of 30 35 40
 - a. prearranging said first wheel (11) and said second wheel (12) in a reciprocally distanced position through the drive of a drive device (5) connected to at least one between said first wheel (11) and said second wheel (12); 45
 - b. prearranging said couple of profiles (2, 2') in said feed path, inserting a free end of said profiles (2, 2') between said first wheel (11) and said second wheel (12) in a reciprocally distanced position; 50
 - c. driving said drive device (5) to approach said first wheel (11) relatively to said second wheel (12) in a way as to tighten with a corresponding resulting tightening force (A) equally distributed on both said profiles (2, 2') inserted in said feed path; 55
 - d. driving at least one motor member (15, 16)

connected to at least one wheel of said first wheel (11) and said second wheel (12) to set in rotation said first wheel (11) and said second wheel (12) in a counter-rotating way;
 e. causing the feed of said couple of profiles (2, 2') maintaining the drive of said drive device (5) to produce the spontaneous and relative tilting of said first framework (3) with respect to said second framework (4) having a width and a direction ($+\alpha$, $-\alpha$) such as to compensate with continuity, instantaneous differentiated variations of section of said couple of profiles (2, 2') and to maintain said resulting tightening force (A) equally distributed on said couple profiles (2, 2') being fed.

Patentansprüche

1. Ziehanordnung für Maschinen zum Bearbeiten eines Paares aus Metallprofilen (2, 2'), mindestens ein erstes Rad (11) und ein zweites gegenüberliegendes Rad (12) umfassend, das in einer Weise gegendreht, dass zwischen ihnen peripher ein Zufuhrweg für die zu ziehenden Profile (2, 2') definiert ist, mindestens ein Motorelement (14, 15), um mindestens ein Rad des ersten Rades (11) und des zweiten Rades (12) anzutreiben, ein erstes Stützgestell (3) für das erste Rad (11) und ein zweites Stützgestell (4) für das zweite Rad (12), wobei das zweite Rad (12) von einer Antriebsvorrichtung (5) zwischen einer beabstandeten Öffnungsposition und einer herangerückten Anzugsposition angetrieben wird, wobei das zweite Rad (12) hin zum ersten Rad (11) gedrückt wird, um die Profile (2, 2') anzuziehen, die mit einer entstehenden Anzugskraft (A) zugeführt werden, wobei die Anordnung **dadurch gekennzeichnet ist, dass** das erste Stützgestell (3) für das erste Rad (11) und das zweite Stützgestell (4) für das zweite Rad (12) derart montiert sind, dass sie im Verhältnis zueinander um eine Neigungsachse neigbar sind, die parallel zur Achse des Paares aus Profilen (2, 2') liegt, das in dem Zufuhrweg angeordnet ist, und die im Durchlassbereich der Profile (2, 2') angeordnet ist, um das relative Neigen des ersten Rades (11) und des zweiten Rades (12) im Verhältnis zur Neigungsachse mit einer Weite und in einer Richtung ($+\alpha$, $-\alpha$) derart zu ermöglichen, dass momentan und spontan differenzierte Schwankungen des Querschnitts der zugeführten Profile (2, 2') kompensiert werden, was die entstehende Anzugskraft (A) an beiden Profilen (2, 2') gleichmäßig verteilt hält.
2. Ziehanordnung nach Anspruch 1, **dadurch gekennzeichnet, dass** das erste Gestell (3) und das zweite Gestell (4) gleich oder äquivalent einem Gelenk (20), das schwenkbar an der Neigungs- oder Gelenkachse ist, durch eine kinetische Kette verbunden sind.

3. Ziehanordnung nach Anspruch 2, **dadurch gekennzeichnet, dass** das Gelenk (20) mittels eines ersten Kopplungsabschnitts (21), der vom ersten Gestell (3) geformt ist, und mittels eines zweiten Kopplungsabschnitts (22) hergestellt ist, der durch das zweite Gestell (4) geformt ist, wobei der erste Kopplungsabschnitt (21) und der zweite Kopplungsabschnitt (22) drehbar um die Gelenkachse verbunden sind, wobei der erste Kopplungsabschnitt (21) und der zweite Kopplungsabschnitt (22) jeweils einen röhrenförmigen Durchlass (23, 24) formen, der um die Gelenkachse angeordnet ist, um den Durchlass der Profile (2, 2') zu ermöglichen, die den Zufuhrweg entlang gezogen werden. 5
4. Ziehanordnung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das erste Gestell (3) feststehend und das zweite Gestell (4) zum ersten Gestell (3) um die Neigungsachse schwenkbar beweglich ist. 10
5. Ziehanordnung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** sie ein Gegengewichtselement (16) umfasst, das mindestens an dem zweiten beweglichen Gestell (4) angewandt und durch Verbindungsmittel (17) mit einem feststehenden Abschnitt der Vorrichtung verbunden ist, wobei die Vorrichtung angewandt wird, um die Wirkungen zu kompensieren, die durch das Gewicht der Elemente ausgeübt wird, die Bestandteil des zweiten neigbaren Gestells (4) sind. 15
6. Ziehanordnung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Neigungsachse an einer Position angeordnet ist, die mittig zwischen dem Paar aus Profilen (2, 2') im Zufuhrweg liegt. 20
7. Ziehanordnung nach Anspruch 2, **dadurch gekennzeichnet, dass** die kinetische Kette mehrere Gelenke umfasst, die äußerlich des Durchlassbereiches der in den Zufuhrweg eingesetzten Profile (2, 2') angeordnet sind, wobei die Gelenke in der Lage sind, eine entsprechende Mitte momentaner Drehung zu definieren, die faktisch zwischen selbigen Profilen im Durchlassbereich der Profile (2, 2') mittig liegt, so dass sie in der Lage sind, momentane Schwankungen des Querschnitts der durchlaufenden Profile spontan und in beiden Neigungsrichtungen zu kompensieren. 25
8. Ziehanordnung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** sie Mittel zum Blockieren der relativen Neigung des ersten Gestells (3) und des zweiten Gestells (4) umfasst, um die spontane Kompensationsneigung zu blockieren und auf diese Weise die effiziente Verwendung der Anordnung mit nur einem der Profile 30

(2, 2') im Zufuhrweg zu ermöglichen.

9. Verfahren zum Ziehen eines Paares aus Profilen (2, 2') durch eine Ziehanordnung (1), die mindestens ein erstes Rad (11) und ein zweites gegenüberliegendes Rad (12) umfasst, das in einer Weise gegendrehend, dass peripher ein Zufuhrweg für das Paar aus Profilen (2, 2') definiert wird, wobei die Ziehvorrichtung ferner ein erstes Stützgestell (3) für das erste Rad (11) und ein zweites Stützgestell (4) für das zweite Rad (12) umfasst, wobei die Gestelle (3, 4) im Verhältnis zueinander um eine Neigungsachse neigbar sind, die parallel zur Achse der zugeführten Profile (2, 2') liegt und im Durchlassbereich der Profile (2, 2') angeordnet ist, wobei das Ziehverfahren folgende Schritte umfasst: 35
 - a. Voranordnen des ersten Rades (11) und des zweiten Rades (12) in einer wechselseitig beabstandeten Position durch den Antrieb einer Antriebsvorrichtung (5), die mit dem ersten Rad (11) und/oder dem zweiten Rad (12) verbunden ist,
 - b. Voranordnen des Paares aus Profilen (2, 2') im Zufuhrweg, Einsetzen eines freien Endes der Profile (2, 2') zwischen das erste Rad (11) und das zweite Rad (12) in einer wechselseitig beabstandeten Position,
 - c. Antreiben der Antriebsvorrichtung (5) zum Heranrücken des ersten Rades (11) relativ zum zweiten Rad (12) in einer Weise, dass sie mit einer entsprechenden entstehenden Anzugskraft (A) angezogen werden, die auf beide in den Zufuhrweg eingesetzte Profile (2, 2') gleichmäßig verteilt ist,
 - d. Antreiben mindestens eines Motorelements (15, 16), das mit mindestens einem Rad des ersten Rades (11) und des zweiten Rades (12) verbunden ist, um das erste Rad (11) und das zweite Rad (12) in gegendrehender Weise in Drehung zu versetzen,
 - e. Bewirken der Zufuhr des Paares aus Profilen (2, 2'), Aufrechterhalten des Antriebs der Antriebsvorrichtung (5), um das spontane und relative Neigen des ersten Gestells (3) im Verhältnis zum zweiten Gestell (4) zu erzeugen, das eine Weite und eine Richtung ($+\alpha$, $-\alpha$) aufweist, so dass momentane differenzierte Schwankungen des Querschnitts des Paares aus Profilen (2, 2') kontinuierlich kompensiert werden, und um die entstehende Anzugskraft (A) gleichmäßig auf das zugeführte Paar aus Profilen (2, 2') verteilt zu halten. 40

Revendications

1. Ensemble d'étirage pour des machines destinées à 45

- traiter une paire de profilés métalliques (2, 2'), comprenant au moins une première roue (11) et une deuxième roue (12) opposée et tournant en sens contraire de manière à définir périphériquement entre elles un chemin d'alimentation pour lesdits profilés (2, 2') à étirer, au moins un élément moteur (14, 15) pour entraîner au moins une roue parmi ladite première roue (11) et ladite deuxième roue (12), un premier bâti de support (3) pour ladite première roue (11) et un deuxième bâti de support (4) pour ladite deuxième roue (12), ladite deuxième roue (12) étant entraînée par un dispositif d'entraînement (5) entre une position d'ouverture éloignée et une position de serrage approchée, dans lequel ladite deuxième roue (12) est poussée vers ladite première roue (11) pour serrer lesdits profilés (2, 2') qui sont alimentés avec une force de serrage résultante (A), ledit ensemble étant **caractérisé en ce que** ledit premier bâti de support (3) pour ladite première roue (11) et ledit deuxième bâti de support (4) pour ladite deuxième roue (12) sont montés de manière basculable l'un par rapport à l'autre autour d'un axe de basculement, qui est parallèle aux axes de ladite paire de profilés (2, 2') agencés dans ledit chemin d'alimentation et est agencé dans la surface de passage desdits profilés (2, 2'), pour permettre le basculement relatif de ladite première roue (11) et de ladite deuxième roue (12) par rapport audit axe de basculement, avec une largeur et une direction ($+\alpha$, $-\alpha$) permettant de compenser instantanément et automatiquement des variations différenciées de la section desdits profilés (2, 2') qui sont alimentés, maintenant ainsi ladite force de serrage résultante (A) également distribuée sur lesdits profilés (2, 2').
2. Ensemble d'étirage selon la revendication 1, **caractérisé en ce que** ledit premier bâti (3) et ledit deuxième bâti (4) sont connectés via une chaîne cinétique égale ou équivalente à une charnière (20) pivotant autour dudit axe de basculement ou de charnière.
 3. Ensemble d'étirage selon la revendication 2, **caractérisé en ce que** ladite charnière (20) est constituée d'une première portion de couplage (21) conformée par ledit premier bâti (3) et une deuxième portion de couplage (22) conformée par ledit deuxième bâti (4), ladite première portion de couplage (21) et ladite deuxième portion de couplage (22) étant associées de manière à pouvoir tourner autour dudit axe de charnière, ladite première portion de couplage (21) et ladite deuxième portion de couplage (22) formant chacune un passage tubulaire (23, 24) agencé autour dudit axe de charnière, pour permettre le passage desdits profilés (2, 2') étirés le long dudit chemin d'alimentation.
 4. Ensemble d'étirage selon l'une des revendications précédentes, **caractérisé en ce que** ledit premier
- bâti (3) est fixé et ledit deuxième bâti (4) est pivoté de façon mobile par rapport audit premier bâti (3) autour dudit axe de basculement.
5. Ensemble d'étirage selon l'une des revendications précédentes, **caractérisé en ce qu'il** comprend un élément de contrepoids (16) appliqué au moins audit deuxième bâti mobile (4) et connecté via un moyen de connexion (17) à une portion fixe de l'appareil dans lequel ledit ensemble est utilisé, pour compenser les actions exercées par le poids des éléments qui constituent ledit deuxième bâti basculable (4).
 6. Ensemble d'étirage selon l'une des revendications précédentes, **caractérisé en ce que** ledit axe de basculement est agencé dans une position centrée entre ladite paire de profilés (2, 2') dans ledit chemin d'alimentation.
 7. Ensemble d'étirage selon la revendication 2, **caractérisé en ce que** ladite chaîne cinétique comprend une pluralité d'articulations agencées à l'extérieur de la surface de passage desdits profilés (2, 2') insérés dans ledit chemin d'alimentation, lesdites articulations étant capables de définir un centre respectif de rotation instantanée virtuellement centré entre les mêmes profilés dans la surface de passage desdits profilés (2, 2'), de manière à pouvoir compenser, automatiquement et dans les deux directions de basculement, lesdites variations instantanées de section des profilés qui traversent.
 8. Ensemble d'étirage selon l'une des revendications précédentes, **caractérisé en ce qu'il** comprend un moyen de blocage du basculement relatif dudit premier bâti (3) et dudit deuxième bâti (4), pour bloquer ledit basculement automatique de compensation et permettre ainsi une utilisation efficace dudit ensemble avec un seul desdits profilés (2, 2') dans ledit chemin d'alimentation.
 9. Procédé d'étirage d'une paire de profilés (2, 2') à travers un ensemble d'étirage (1) comprenant au moins une première roue (11) et une deuxième roue (12) opposée et tournant en sens contraire de manière à définir périphériquement un chemin d'alimentation pour ladite paire de profilés (2, 2'), ledit ensemble d'étirage comprenant en outre un premier bâti de support (3) pour ladite première roue (11) et un deuxième bâti de support (4) pour ladite deuxième roue (12), lesdits bâtis (3, 4) étant basculables l'un par rapport à l'autre autour d'un axe de basculement, qui est parallèle aux axes desdits profilés (2, 2') qui sont alimentés et est agencé dans la surface de passage desdits profilés qui sont alimentés, le procédé d'étirage comprenant les étapes suivantes :
 - a. pré-agencement de ladite première roue (11)

et de ladite deuxième roue (12) dans une position réciproquement éloignée via la commande d'un dispositif d'entraînement (5) connecté à au moins une roue parmi ladite première roue (11) et ladite deuxième roue (12) ; 5

b. pré-agencement de ladite paire de profilés (2, 2') dans ledit chemin d'alimentation, en insérant une extrémité libre desdits profilés (2, 2') entre ladite première roue (11) et ladite deuxième roue (12) dans une position réciproquement éloignée ; 10

c. commande dudit dispositif d'entraînement (5) pour approcher ladite première roue (11) de ladite deuxième roue (12) de manière à serrer avec une force de serrage résultante (A) correspondante également distribuée les deux dits profilés (2, 2') insérés dans ledit chemin d'alimentation ; 15

d. commande d'au moins un élément moteur (15, 16) connecté à au moins une roue parmi ladite première roue (11) et ladite deuxième roue (12) pour mettre en rotation ladite première roue (11) et ladite deuxième roue (12) de manière à ce qu'elle tournent en sens contraire ; 20

e. commande de l'alimentation de ladite paire de profilés (2, 2') maintenant l'entraînement dudit dispositif d'entraînement (5) pour produire le basculement spontané et relatif dudit premier bâti (3) par rapport audit deuxième bâti (4) ayant une largeur et une direction ($+\alpha$, $-\alpha$) permettant de compenser instantanément et continuellement des variations différenciées de la section de ladite paire de profilés (2, 2') et de maintenir ladite force de serrage résultante (A) également distribuée sur ladite paire de profilés (2, 2') qui sont alimentés. 35

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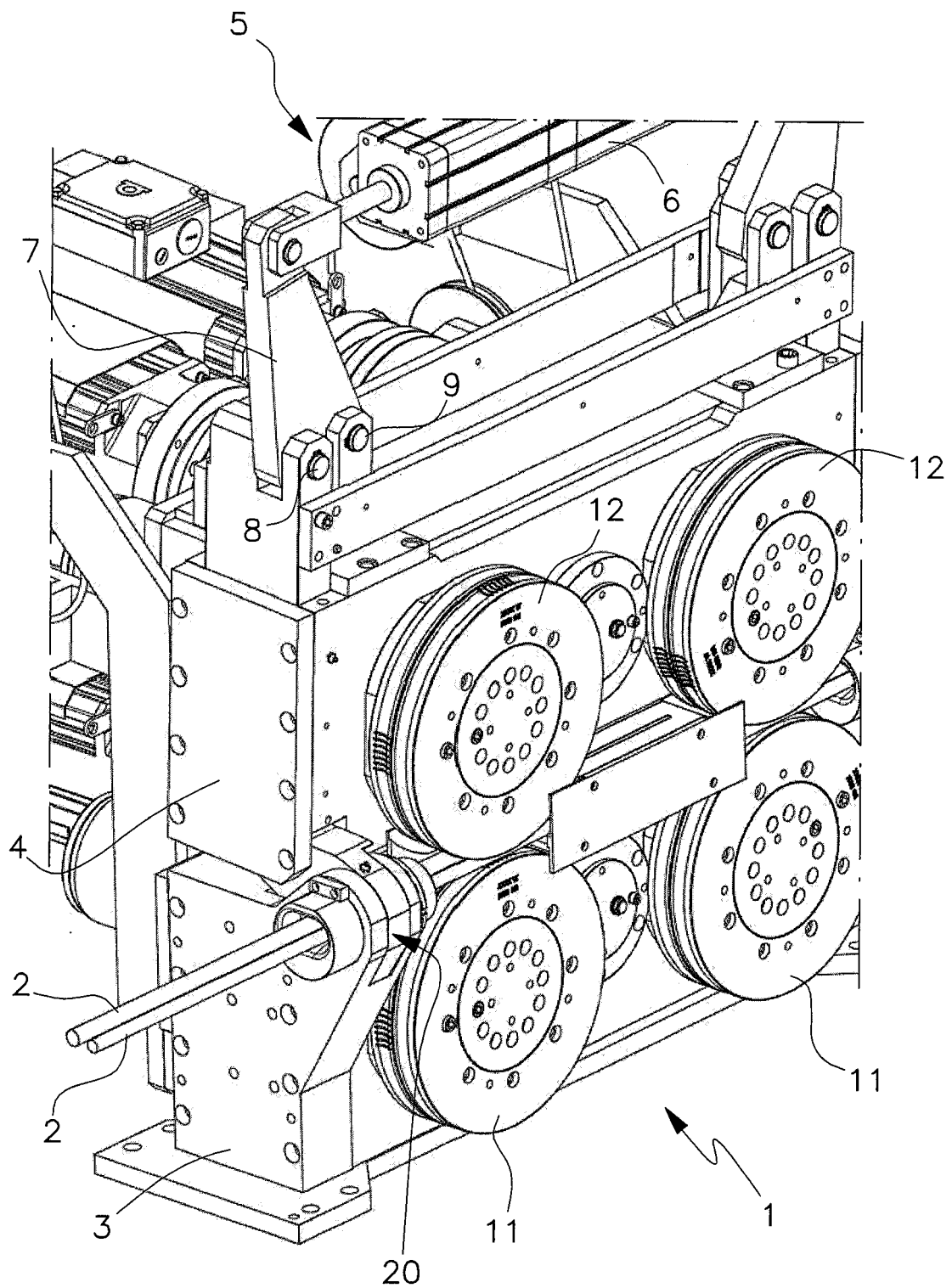


Fig.1

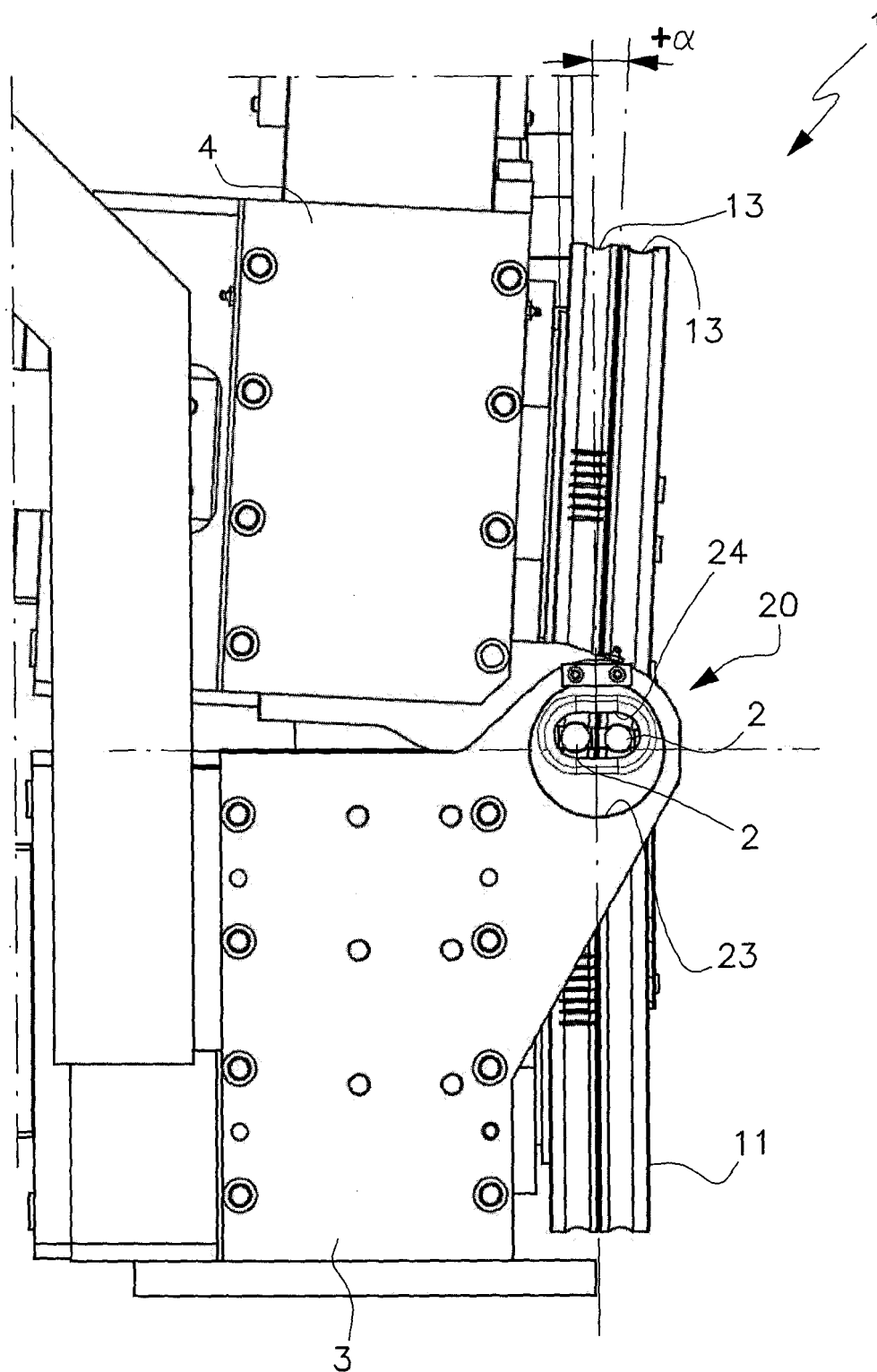


Fig.2

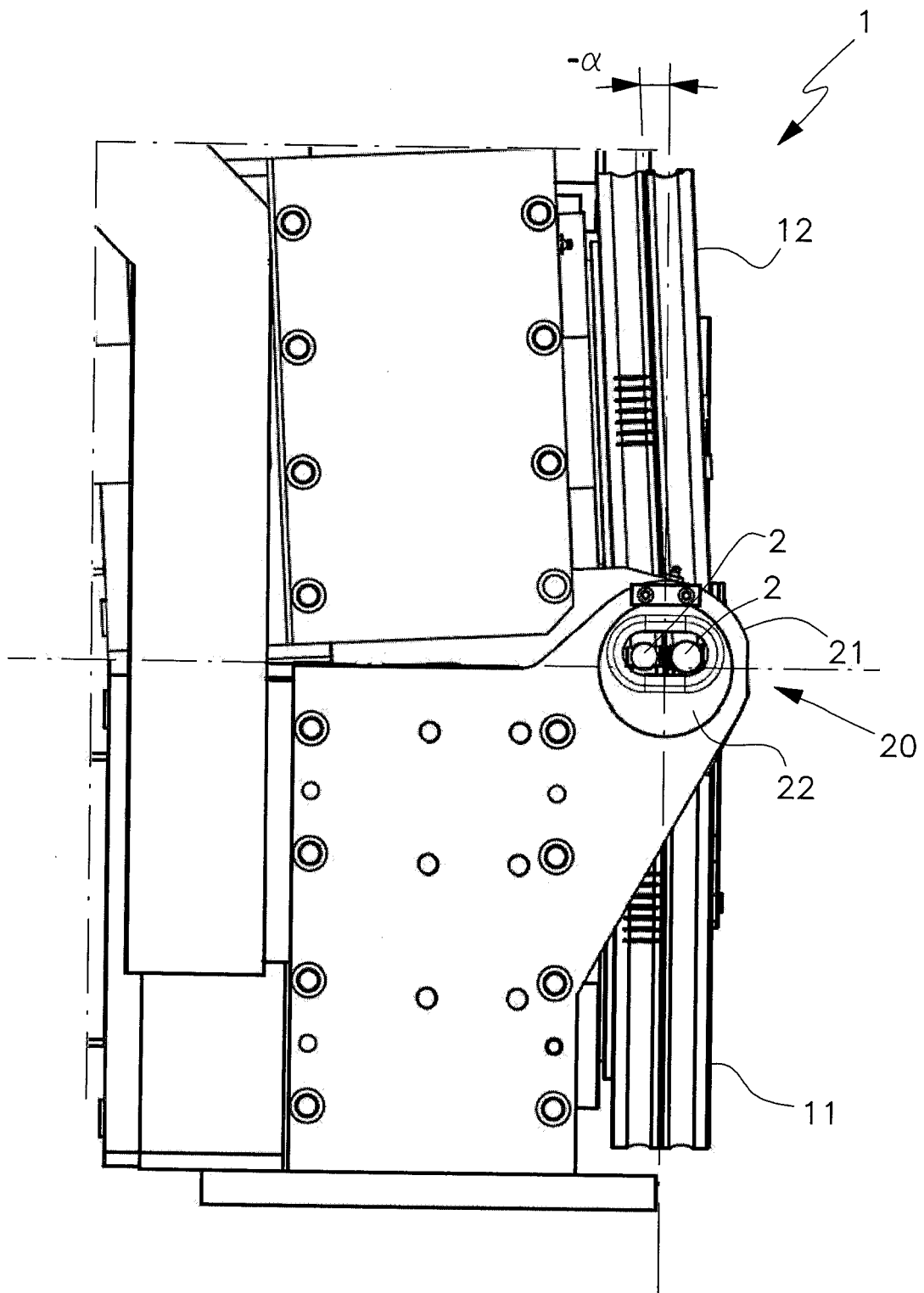


Fig.3

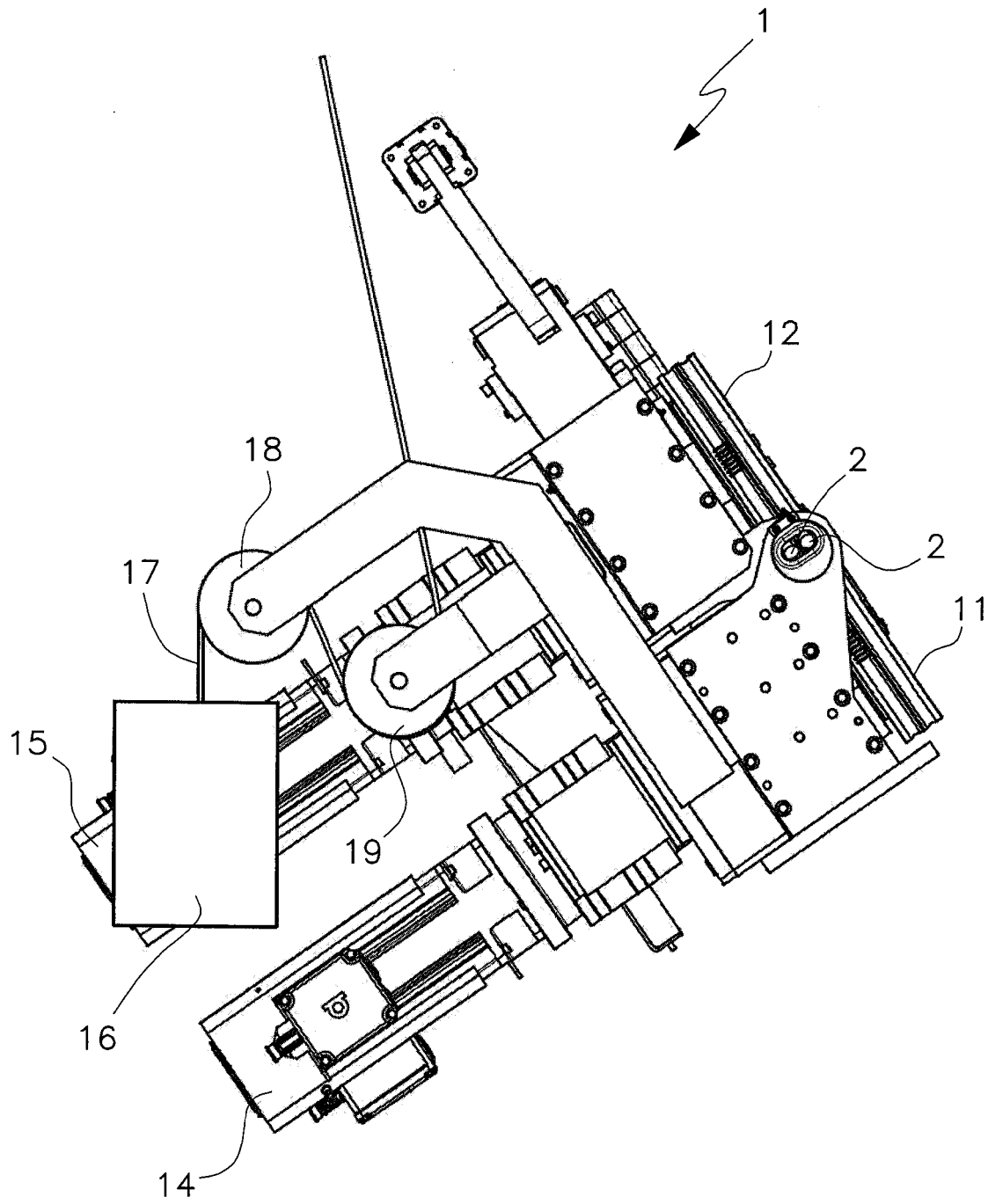


Fig.4

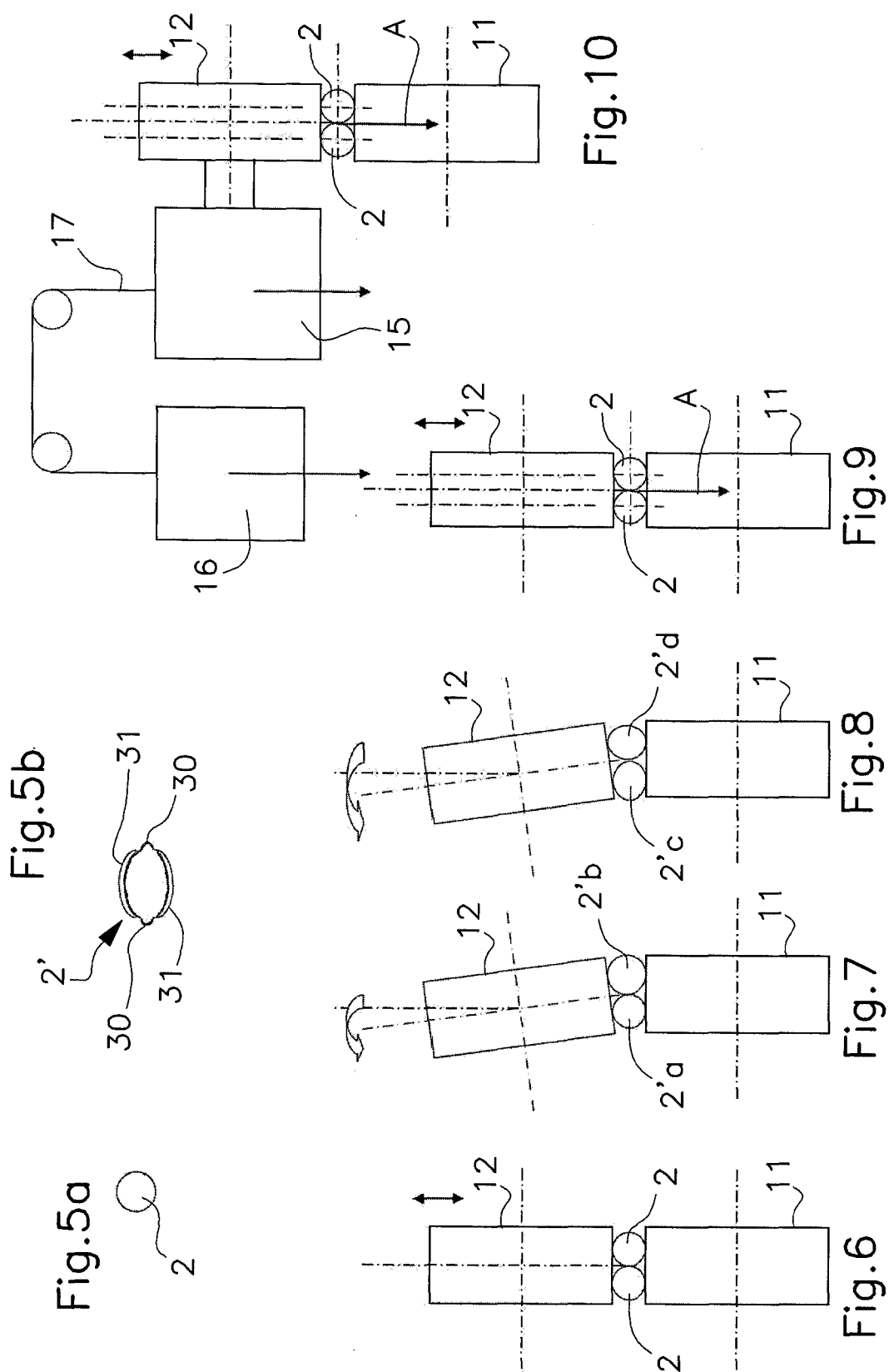


Fig.11

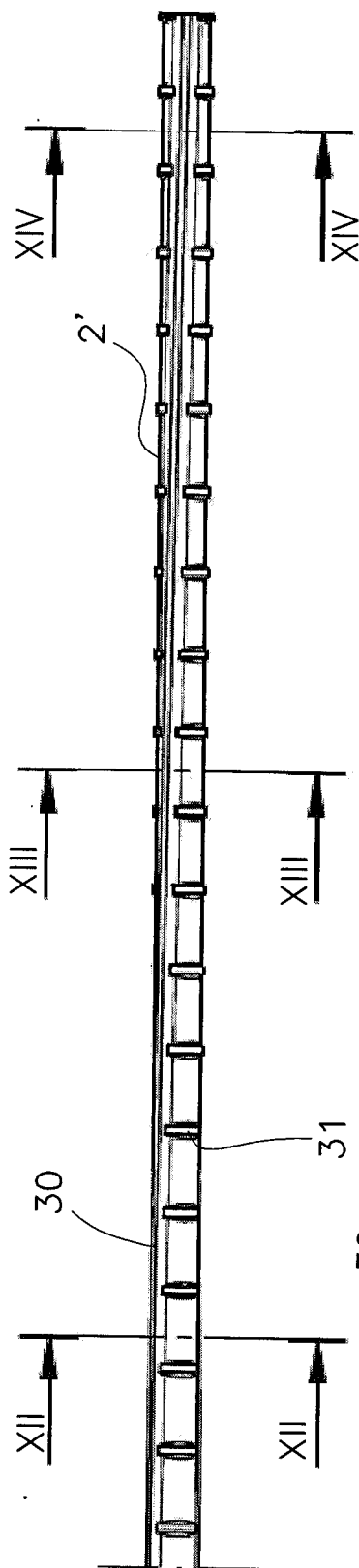


Fig.12

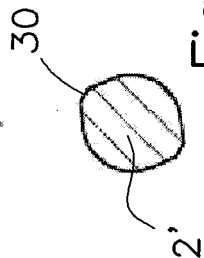


Fig.13

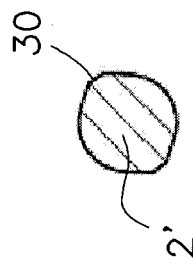


Fig.14

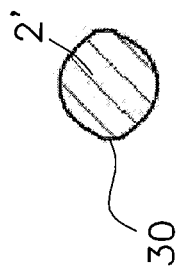
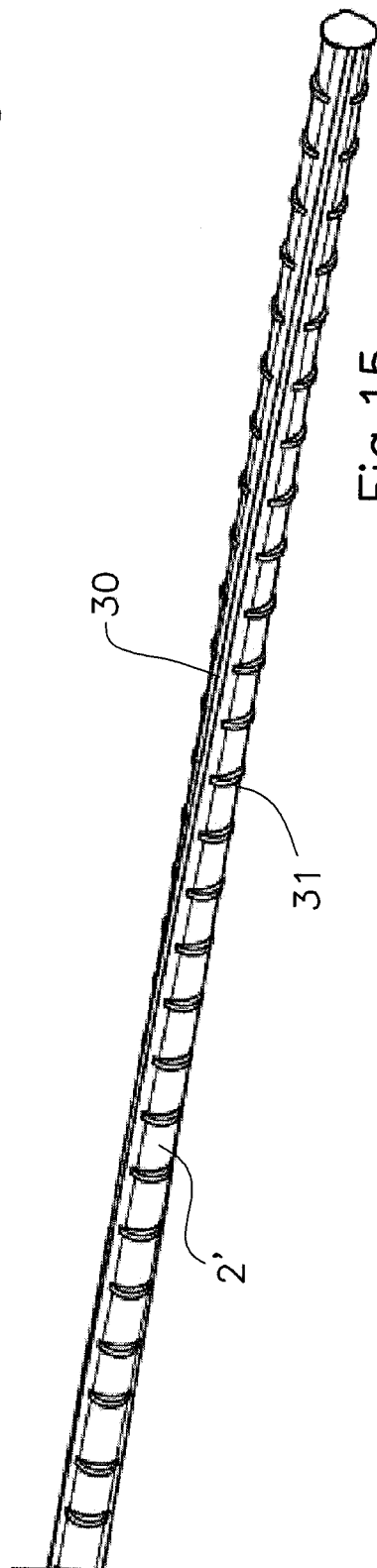


Fig.15



REFERENCES CITED IN THE DESCRIPTION

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