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(54) **DRAWING ASSEMBLY FOR DRAWING MACHINES AND RELATED METHOD**

ZIEHANORDNUNG FÜR ZIEHMASCHINEN UND VERWANDTES VERFAHREN

BANC D'ÉTIRAGE POUR MACHINES À ÉTIRER ET PROCÉDÉ ASSOCIÉ

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US-A- 5 094 340**

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Description

FIELD OF THE INVENTION

[0001] The present invention concerns a drawing assembly for drawing machines for metal products, such as bars or tubes. In particular, the drawing assembly according to the invention is of the generally continuous type and comprises at least two opposite and counter-rotating tracks, each consisting of a plurality of links disposed in sequence and able to grip the metal products in order to achieve the axial drawing thereof. A drawing assembly according to the preamble of claim 1 is e.g. known from document JP-A-10 277631. The invention relates also to the drawing method that uses the drawing assembly.

BACKGROUND OF THE INVENTION

[0002] Drawing machines for metal bars are known, comprising a drawing assembly provided with two counter-rotating tracks opposite with respect to the drawing axis.

[0003] Each track consists of a plurality of links constrained to each other in sequence, and on each of which a drawing clamp is mounted which during use acts on the bar to be drawn.

[0004] In particular, each drawing clamp cooperates with a corresponding clamp of the opposite track, so as to grip the bar to be drawn from opposite sides.

[0005] Each clamp is provided with a hollow, which is shaped specifically with respect to the cross section of the bar in its segment already drawn.

[0006] In this way, the bar to be drawn is gripped between two hollows of two opposite clamps, and the rotation of the two tracks achieves the clamping and substantially continuous drawing of the bar, so as to achieve the drawing process.

[0007] The drawing clamps are removable from the respective links, so they can be completely removed in the event of wear or a variation in section of the bar to be drawn.

[0008] It is known to produce a large number of different series of inter-replaceable clamps, normally 4-5 series for solid bars and 10 or more series for tubular bars.

[0009] Each series of clamps has the relative hollow of a size that differs from one series to the other, so that each series of clamps is suitable to effectively grip a coordinated range of bars with different diameters.

[0010] Applicant has found that in order to effect the complete replacement of the clamps from both tracks (even 50 or more for each track) it requires two qualified operators employed for about 15-20 minutes.

[0011] According to Applicant's estimates, these operations to replace the clamps, without considering the ordinary and extraordinary maintenance operations, must be carried out with the machine shut down about every 4-5 hours.

[0012] Therefore, with the drawing clamps used in the state of the art, there are high costs and long times, both in production and management, of the drawing assembly and consequently the entire drawing machine on which it is assembled.

[0013] Furthermore, the known solution needs a large store for storing the series of clamps not used.

[0014] Purpose of the present invention is to achieve a drawing assembly for drawing machines in which the replacement of the drawing clamps for effectively gripping bars with different diameters has reduced times and costs, of both production and management, compared with the state of the art.

[0015] The Applicant has devised, tested and embodied the present invention to overcome the shortcomings of the state of the art and to obtain these and other purposes and advantages.

SUMMARY OF THE INVENTION

[0016] The present invention is set forth and characterized in the independent claims, while the dependent claims describe other characteristics of the invention or variants to the main inventive idea.

[0017] In accordance with said purpose, a drawing assembly according to the present invention comprises at least two opposite and counter-rotating tracks, each consisting of a plurality of links constrained to each other and each supporting a relative drawing clamp able to grip the product to be drawn.

[0018] Each drawing clamp is selectively able to be clamped in a housing seating of the relative link by means of corresponding rapid attachment/detachment means associated with the link. According to a characteristic feature of the present invention, the drawing clamp comprises at least two hollows having different sizes and in each of which a determinate range of cross sections of said product to be drawn is able to be positioned. The drawing clamp is configured to be selectively moved, for example laterally translated, with respect to the respective link, so as to align the selected hollow with the drawing axis of the product to be drawn.

[0019] With the present invention the same clamp, having at least two hollows of different sizes, is able to guarantee the effective gripping of at least two different ranges in size of the product to be drawn.

[0020] In this way, it is possible to at least halve the different series of clamps provided in the state of the art so as to cover the same ranges in sizes of products to be drawn.

[0021] Furthermore, with the solution according to the present invention, to pass from one range of sizes of the products to be drawn to another, it is not necessary to completely replace the clamps of the relative links, it is sufficient to translate them, or more generally move them, with respect to the link, so as to align the new hollow with the drawing axis of the product to be drawn.

[0022] Applicant has estimated that with the solution

according to the present invention, in order to equip the machine for a new range of sizes of products to be drawn, it is sufficient to have one operator intervene, with the machine shut down, for a time of about 5 minutes.

[0023] We therefore have a considerable reduction in times and costs, both of production and of management, of the drawing assembly.

[0024] According to a variant, the two hollows provided on the same drawing clamp have a size such as to allow the effective gripping of ranges in size of products to be drawn, with completely different values.

[0025] According to another variant, the two hollows provided on the same drawing clamp have a size such as to allow the effective gripping of ranges in size of products to be drawn, having at least partly common values.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] These and other characteristics of the present invention will become apparent from the following description of a preferential form of embodiment, given as a non-restrictive example with reference to the attached drawings wherein:

- fig. 1 is a partial and lateral view of a drawing assembly according to the invention;
- fig. 2 shows a cross section from II to II of fig. 1, with the drawing clamp in the clamped condition;
- fig. 3 shows the track from fig. 2, with the drawing clamp in its unclamped condition;
- fig. 4 shows some drawing clamps usable in the drawing assembly in fig. 1.

DETAILED DESCRIPTION OF A PREFERENTIAL FORM OF EMBODIMENT

[0027] With reference to the attached drawings, a drawing assembly 10 according to the present invention is part of a drawing machine for a bar 14, of a known type and not shown in detail in the drawings.

[0028] The drawing assembly 10 comprises two counter-rotating tracks 11, shown partly in fig. 1, which are disposed symmetrical and opposite, above and below, with respect to the drawing axis "x" of the bar 14.

[0029] Each track 11 substantially consists of a plurality of links 12 constrained to each other by means of suitable articulated joints.

[0030] A relative drawing clamp 13 is mounted, selectively removably on each link 12.

[0031] Each drawing clamp 13 is provided on the upper part, in this case, with two hollows, respectively a first 15 and a second 16, substantially parallel to the axis of feed "x".

[0032] Each hollow 15 or 16 is selectively positionable in an operating condition in which it is aligned with the axis of feed "x" and cooperates with a corresponding hollow 15 or 16 of the opposite track 11, to retain a segment of the bar 14.

[0033] In this way, the bar 14 is drawn by the tracks 11 during the drawing process.

[0034] According to the invention, the first hollow 15 and the second hollow 16 have different sizes, coordinated with different ranges of size of bars 14 to be drawn.

[0035] In this case, the first hollow 15 is conformed to allow the effective gripping of a bar 14 with a diameter comprised between about 17 mm and about 22 mm.

[0036] The second hollow 16, of a much smaller size than the first hollow 15, is conformed to allow the effective clamping of a bar 14 with a diameter comprised between about 5 mm and about 7.5 mm.

[0037] As shown in fig. 4, the two hollows 15 and 16 provided on each drawing clamp 13 are conformed in such a manner as to allow the effective gripping not only of very different ranges of sizes of bars 14, but also of ranges of sizes that have common limit values, for example from about 11 mm to about 17 mm the first 15, and from about 7.5 mm to about 11 mm the second; or ranges of sizes that intersect for some values, for example from about 11 mm to about 17 mm the first 15 and from about 9 mm to about 14 mm the second 16.

[0038] The two tracks 11, in a known manner, are mounted on respective rigid supporting plates 17, they are made to rotate continuously by toothed wheels 19 and exert a pressure on the bar 14, in cooperation with intermediate chains 20 of the roller type, imparting to the bar 14 the drawing action along the axis "x".

[0039] Each clamp 13 has two front faces 13a, inclined and converging towards the outside, and is disposed in a relative housing seating 21 with a dovetailed conformation. The housing seating 21 is made transversely through on the external face of the respective link 12.

[0040] The dovetailed couplings of the links 12 and the relative clamps 13 determine a constraint that prevents both the accidental fall and also the longitudinal removal of the clamps 13.

[0041] In order to replace them, or to selectively position a hollow 15, 16 in the condition aligned with the axis of feed "x", the clamps 13 can be released from the relative links 12 only by means of lateral extraction from the relative housing seatings 21.

[0042] Each link 12 comprises a rapid attachment/detachment member 22, provided with a central clamping element and a relative activation element, in order to clamp stably, and removably, the relative clamp 13 inside the housing seating 21.

[0043] In this case, the clamping element consists of a ball 23, while the activation element consists of a thruster 25 associated at the rear with a spring 26.

[0044] The thruster 25 comprises at the upper part a cavity 27, substantially semi-spherical in shape, which functions as a positioning cam profile for the ball 23.

[0045] When the thruster 25 is in its clamping position (fig. 2), the ball 23 cooperates with the upper edge of the cavity 27.

[0046] In this way, the ball 23 is thrust towards the outside and is partly inserted inside a first blind hole 29 pro-

vided on the lower surface of the clamp 13, thus clamping the latter to the relative link 12.

[0047] The first blind hole 29 is made in a position such that the partial insertion therein of the ball 23 guarantees the aligned positioning of the first hollow 15 with the axis of feed "x".

[0048] Displacing the thruster 25 axially in the release position (fig. 3), by compressing the spring 26, the ball 23 is located inside the cavity 27, lowering itself and becoming released from the blind hole 29.

[0049] In this way, the clamp 13 is released and can be translated laterally with respect to the relative link 12.

[0050] In this released condition, the clamp 13 can be translated until it takes the ball 23 into substantial alignment with a second blind hole 30 provided on the lower surface of the clamp 13.

[0051] The second blind hole 30 is made in a position such that the partial insertion therein of the ball 23 guarantees the aligned positioning of the second hollow 16 with the axis of feed "x".

[0052] Then, returning the thruster 25 to the clamping position, the ball 23 is lifted, taking it into partial insertion in the blind hole 30 and thus clamping the clamp 13 to the link 12, with the second hollow 16 in an operating position aligned with the axis of feed "x".

[0053] It is clear, however, that modifications and/or additions of parts may be made to the drawing assembly 10 as described heretofore, without departing from the field and scope of the present invention as defined by the appended claims.

[0054] For example, it comes within the field of the present invention to provide that each drawing clamp 13 is provided with three or more hollows of different sizes and each conformed to effectively grip a different range of sizes of bars 14.

[0055] It also comes within the field of the present invention to provide that instead of the ball 23 the central clamping element comprises a clamping pin, mounted axially sliding inside a cavity made on the link 12, substantially orthogonal to the plane on which the clamp 13 lies and communicating with the housing seating 21.

[0056] It also comes within the field of the present invention to provide that the activation element comprises a thruster mounted laterally on the link 12 and located substantially orthogonal to said clamping pin.

[0057] It is also clear that, although the present invention has been described with reference to some specific examples, a person of skill in the art shall certainly be able to achieve many other equivalent forms of drawing assembly for drawing machines, having the characteristics as set forth in the claims and hence all coming within the field of protection defined thereby.

Claims

1. Drawing assembly comprising at least two opposite and counter-rotating tracks (11), each consisting of

a plurality of links (12) constrained to each other and each supporting a relative drawing clamp (13) able to grip the product to be drawn (14), wherein each drawing clamp (13) is able to be selectively clamped inside a housing seating (21) of the relative link (12) by means of corresponding rapid attachment/detachment means (22) associated with said link (12), wherein said drawing clamp (13) comprises at least two external hollows (15, 16) of different sizes and in each of which a determinate range of cross sections of said product to be drawn (14) is able to be positioned, **characterized in that** said drawing clamp (13) is configured to be selectively moved with respect to the respective link (12), so as to align the selected hollow (15 or 16) with the feed axis ("x") of the product to be drawn (14).

2. Drawing assembly as in claim 1, **characterized in that** said two external hollows (15, 16) have sizes such as to allow the effective gripping of two coordinated ranges of sizes of said products to be drawn (14) having completely different values.
3. Drawing assembly as in claim 1, **characterized in that** said two external hollows (15, 16) have sizes such as to allow the effective clamping of two coordinated ranges of sizes of said products to be drawn (14) having at least partly common values.
4. Drawing assembly as in any claim hereinbefore, **characterized in that** said rapid attachment/detachment means (22) comprises at least a clamping element (23) mobile axially along an axis substantially orthogonal to the plane on which said track (11) lies, and an activation element (25) mobile axially and able to displace said clamping element (23) between a clamping position in which it cooperates with a mating seating (29, 30) made on a lower surface of said drawing clamp (13), and a second release position in which it is released from said seating (29, 30).
5. Drawing assembly as in claim 4, **characterized in that** said activation element (25) is associated with elastic means (26) able to maintain said clamping element (23) in said first clamping position.
6. Drawing assembly as in claim 4 or 5, **characterized in that** said clamping element comprises a spherical or semi-spherical element (23) able to be at least partly inserted inside said seating (29, 30), and **in that** said activation element (25) comprises a cavity (27) made in an upper segment thereof cooperating with said spherical or semi-spherical element (23).
7. Drawing assembly as in claim 4, 5 or 6, **characterized in that** said drawing clamp (13) comprises at least two seatings (29, 30) for said clamping element

(25), each seating (29, 30) being made in such a manner as to define the positioning of a respective one of said at least two external hollows (15, 16), in a condition aligned with said axis of feed "x".

8. Drawing assembly as in any claim hereinbefore, **characterized in that** said drawing clamp (13) comprises three or more external hollows (15, 16).

9. Drawing method for drawing metal products (14), such as bars or tubes, comprising a step wherein a product (14) is gripped by two opposite and counter-rotating tracks (11), each consisting of a plurality of links (12) constrained to each other and each supporting a relative drawing clamp (13) by means of corresponding rapid attachment/detachment means (22), **characterized by** the further steps of:

- providing on each of said clamps (13) at least two external hollows (15, 16) of different sizes and in each of which a determinate range of cross sections of said product to be drawn (14) is able to be positioned;

- moving said clamps (13) with respect to the respective link (12), so as to align the selected hollow (15 or 16) with a feed axis ("x") of the product to be drawn (14) depending on the size of said product (14).

10. Drawing method as in claim 9, **characterized in that** the direction of the movement of the clamp (13) with respect to the respective link (12) is a lateral translation along an axis substantially orthogonal to the plane on which said track (11) lies.

Patentansprüche

1. Ziehanordnung mit mindestens zwei gegenüberliegenden und gegeneinander rotierenden Ketten (11), die jeweils aus mehreren Gliedern (12) bestehen, die miteinander verbundenen sind und jeweils eine Ziehklemme (13) tragen, die fähig ist, das zu ziehende Produkt (14) zu greifen, wobei jede Ziehklemme (13) innerhalb eines Gehäusesitzes (21) des jeweiligen Gliedes (12) mittels einer mit dem Glied (12) verknüpften zugehörigen Schnellbefestigungs-/Trenneinrichtung (22) selektiv klemmbar ist, wobei die Ziehklemme (13) mindestens zwei äußere Aussparungen (15, 16) verschiedener Größen, enthält in die jeweils ein bestimmter Querschnittsbereich des zu ziehenden Produkts (14) positionierbar ist, **dadurch gekennzeichnet, dass** die Ziehklemme (13) dazu ausgelegt ist, bezüglich des entsprechenden Glieds (12) selektiv bewegt zu werden, so dass die gewählte Aussparung (15 oder 16) mit der Vorschubachse ("x") des zu ziehenden Produkts (14) übereinstimmt.

2. Ziehanordnung nach Anspruch 1, **dadurch gekennzeichnet, dass** die zwei äußeren Aussparungen (15, 16) Größen haben, die das effektive Greifen zweier abgestimmter Größenbereiche der zu ziehenden Produkte (14) mit ganz verschiedenen Werten ermöglichen.

3. Ziehanordnung nach Anspruch 1, **dadurch gekennzeichnet, dass** die zwei äußeren Aussparungen (15, 16) Größen haben, die das effektive Klemmen zweier abgestimmter Größenbereiche der zu ziehenden Produkte (14) mit teilweise übereinstimmenden Werten ermöglichen.

4. Ziehanordnung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Schnellbefestigungs-/Trenneinrichtung (22) mindestens ein Klemmelement (23), das entlang einer Achse axial bewegbar ist, die im Wesentlichen orthogonal zur Ebene ist, in der die Kette (10) liegt, und ein axial bewegbares Betätigungselement (25) enthält, das dazu ausgelegt ist, das Klemmelement (23) zwischen einer Klemmposition, in der es mit einer an einer Unterseite der Ziehklemme (13) angebrachten Gegenstückaufnahme (29, 30) zusammenwirkt, und einer zweiten Freigabeposition, in der es von der Aufnahme (29, 30) freigegeben ist, zu versetzen.

5. Ziehanordnung nach Anspruch 4, **dadurch gekennzeichnet, dass** das Betätigungselement (25) mit einer elastischen Einrichtung (26) verknüpft ist, die dazu ausgelegt ist, das Klemmelement (23) in der ersten Klemmposition zu halten.

6. Ziehanordnung nach Anspruch 4 oder 5, **dadurch gekennzeichnet, dass** das Klemmelement ein kugelförmiges oder halbkugelförmiges Element (23) enthält, das dazu ausgelegt ist, mindestens teilweise in die Aufnahme (29, 30) eingeführt zu werden, und **dadurch, dass** das Betätigungselement (25) einen in einem oberen Segment davon ausgebildeten Hohlraum (27) enthält, der mit dem kugelförmigen oder halbkugelförmigen Element (23) zusammenwirkt.

7. Ziehanordnung nach Anspruch 4, 5 oder 6, **dadurch gekennzeichnet, dass** die Ziehklemme (13) mindestens zwei Aufnahmen (29, 30) für das Klemmelement (25) enthält, wobei jede Aufnahme (29, 30) derart ausgebildet ist, dass sie die Positionierung einer entsprechenden der mindestens zwei äußeren Aussparungen (15, 16) in einer mit der Vorschubachse "x" übereinstimmenden Bedingung definiert.

8. Ziehanordnung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Ziehklemme (13) drei oder mehr äußere Aussparun-

gen (15, 16) aufweist.

9. Ziehverfahren zum Ziehen von Metallprodukten (14), wie Stangen oder Rohre, wobei ein Produkt (14) durch zwei gegenüberliegende und gegeneinander rotierende Ketten (11) gegriffen wird, die jeweils aus mehreren miteinander verbundenen Gliedern (12) bestehen, die jeweils eine zugehörige Ziehklemme (13) mittels einer entsprechenden Schnellbefestigungs-/Trenneinrichtung (22) tragen, **dadurch gekennzeichnet, dass:**

an jeder der Klemmen (13) mindestens zwei äußere Aussparungen (15, 16) unterschiedlicher Größen vorgesehen sind, in denen jeweils ein bestimmter Querschnittsbereich des zu ziehenden Produkts (14) positionierbar ist; die Klemmen (13) bezüglich des entsprechenden Gliedes (12) bewegt werden, so dass abhängig von der Größe des Produkts (14) die gewählte Aussparung (15 oder 16) mit einer Vorschubachse ("x") des zu ziehenden Produkts (14) übereinstimmt.

10. Ziehverfahren nach Anspruch 9, **dadurch gekennzeichnet, dass** die Bewegungsrichtung der Klemme (13) bezüglich des entsprechenden Gliedes (12) eine seitliche Verschiebung entlang einer Achse ist, die im Wesentlichen orthogonal zur Ebene ist, in der die Kette liegt.

Revendications

1. Groupe de traction comprenant au moins deux chenilles opposées et tournant en sens inverse (11), se composant chacune d'une pluralité de maillons (12) contraints entre eux et supportant chacun un étai de traction (13) peut saisir le produit à tréfiler (14), dans lequel chaque étai de traction (13) pouvant être sélectivement bloqué à l'intérieur d'un siège de logement (21) du maillon (12) relatif au moyen de moyens de fixation/détachement rapide (22) correspondants associés avec ledit maillon (12), dans lequel ledit étai de traction (13) comprend au moins deux creux externes (15, 16) de tailles différentes et dans chacun desquels on peut positionner une plage déterminée de sections transversales dudit produit à tréfiler (14), **caractérisé en ce que** l'étai de traction (13) est configuré pour être sélectivement déplacé par rapport au maillon (12) respectif, afin d'aligner le creux (15 ou 16) sélectionné avec l'axe d'alimentation (« x ») du produit à tréfiler (14).
2. Groupe de traction selon la revendication 1, **caractérisé en ce que** lesdits deux creux externes (15, 16) ont des dimensions telles qu'elles permettent la préhension effective de deux plages de tailles coordonnées desdits produits à tréfiler (14) ayant des valeurs complètement différentes.

données desdits produits à tréfiler (14) ayant des valeurs complètement différentes.

3. Groupe de traction selon la revendication 1, **caractérisé en ce que** lesdits deux creux externes (15, 16) ont des dimensions telles qu'elles permettent le serrage effectif de deux plages de dimensions coordonnées desdits produits à tréfiler (14) ayant au moins des valeurs partiellement communes.
4. Groupe de traction selon l'une quelconque des revendications précédentes, **caractérisé en ce que** lesdits moyens de fixation/détachement rapide (22) comprennent au moins un élément de serrage (23) partiellement mobile le long d'un axe sensiblement orthogonal au plan sur lequel ladite chenille (11) se trouve, et un élément d'activation (25) axialement mobile et pouvant déplacer ledit élément de serrage (23) entre une position de serrage dans laquelle il coopère avec un siège de couplage (29, 30) réalisé sur une face inférieure dudit dispositif de serrage de traction (13), et une deuxième position de libération dans laquelle il est libéré dudit siège (29,30).
5. Groupe de traction selon la revendication 4, **caractérisé en ce que** ledit élément d'activation (25) est associé à des moyens élastiques (26) pouvant maintenir ledit élément de serrage (23) dans ladite première position de serrage.
6. Groupe de traction selon la revendication 4 ou 5, **caractérisé en ce que** ledit élément de serrage comprend un élément sphérique ou semi-sphérique (23) pouvant être au moins partiellement inséré à l'intérieur dudit siège (29, 30), et **en ce que** ledit élément d'activation (25) comprend une cavité (27) réalisée dans son segment supérieur coopérant avec ledit élément sphérique ou semi-sphérique (23).
7. Groupe de traction selon la revendication 4, 5 ou 6, **caractérisé en ce que** ledit étai de traction (13) comprend au moins deux sièges (29, 30) pour ledit élément de serrage (25), chaque siège (29, 30) étant réalisé afin de définir le positionnement d'un creux respectif desdits au moins deux creux externes (15, 16), dans une condition alignée avec ledit axe d'alimentation «x».
8. Groupe de traction selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ledit étai de traction (13) comprend trois creux externes (15, 16) ou plus.
9. Procédé de tréfilage pour tréfiler des produits métalliques (14), tels que des barres ou des tubes, comprenant une étape dans laquelle un produit (14) est saisi par deux chenilles opposées et tournant en

sens inverse (11), chacune se composant d'une pluralité de maillons (12) contraints entre eux et supportant chacun un étau de traction (13) relatif au moyen de moyens de fixation/détachement rapide (22) correspondants, **caractérisé par** les étapes supplémentaires consistant à :

prévoir sur chacun desdits étaux (13) au moins deux creux externes (15, 16) de dimensions différentes et dans chacun desquels une plage déterminée de sections transversales dudit produit à tréfiler (14) peut être positionnée ;
déplacer lesdits étaux (13) par rapport au maillon (12) respectif, afin d'aligner le creux (15 ou 16) sélectionné avec un axe d'alimentation (« x ») du produit à tréfiler (14) en fonction de la dimension dudit produit (14).

10. Procédé de tréfilage sur la revendication 9, **caractérisé en ce que** la direction de mouvement de l'étau (13) par rapport au maillon (12) respectif est une translation latérale le long d'un axe sensiblement orthogonal au plan sur lequel ladite chenille (11) se trouve.

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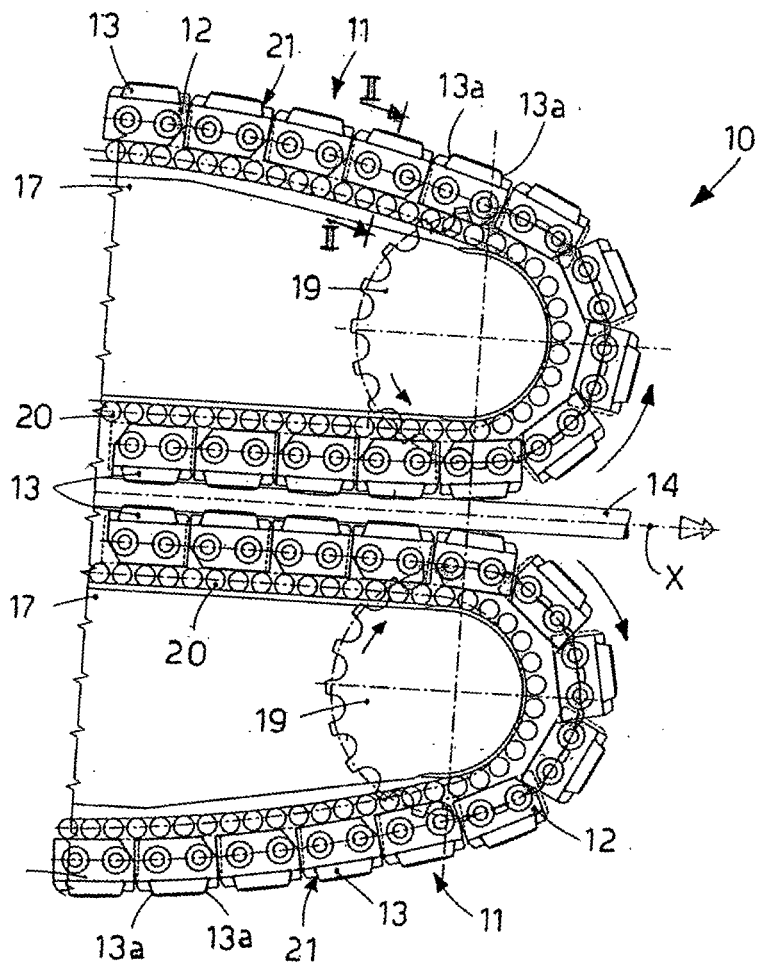


fig. 1

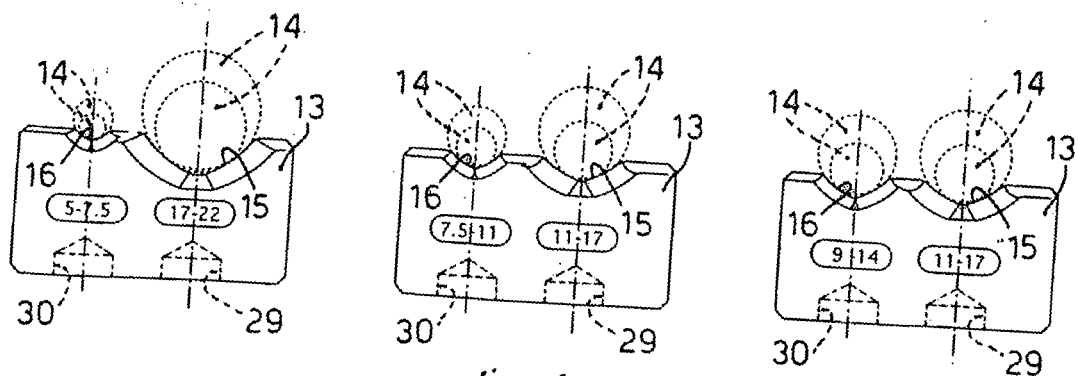


fig. 4

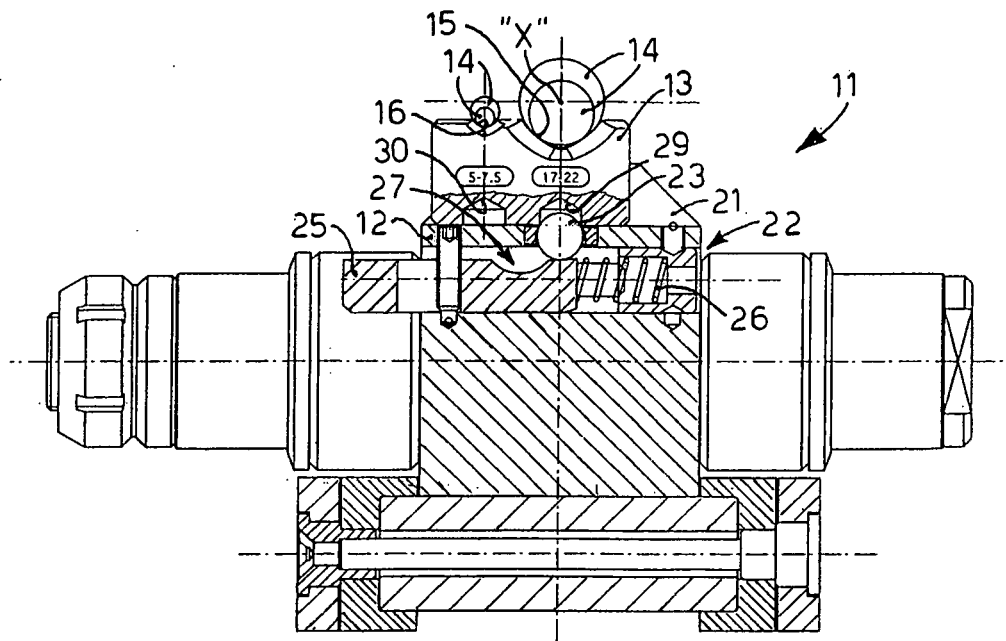


fig. 2

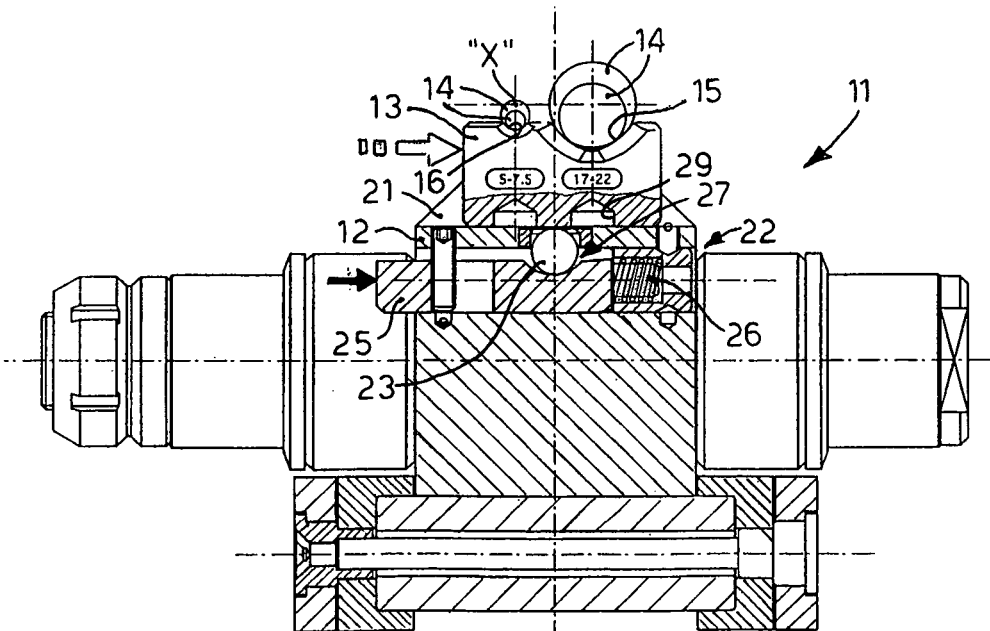


fig. 3

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 10277631 A [0001]