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(54) **ROLLING APPARATUS FOR ROLLED PRODUCTS**

WALZVORRICHTUNG FÜR WALZPRODUKTE

APPAREIL ROULANT POUR PRODUITS ENROULÉS

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(72) Inventors:

- **CAPRA, Salvatore**
I-33048 San Giovanni Al Natisone (IT)
- **DE GIORGIO, Tiziano**
I-33100 Udine (IT)

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(74) Representative: **Petraz, Gilberto Luigi et al**

GLP S.r.l.
Viale Europa Unita, 171
33100 Udine (IT)

(73) Proprietor: **Danieli & C. Officine Meccaniche S.p.A.**
33042 Buttrio (IT)

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Description

FIELD OF THE INVENTION

[0001] The present invention concerns a rolling apparatus comprising a marking device to mark long rolled products, usable in the iron and steel industry to indelibly mark alphanumerical characters and/or graphic symbols on products exiting from a rolling stand.

[0002] The invention also concerns a guide device of said rolling apparatus, provided with the marking device.

BACKGROUND OF THE INVENTION

[0003] It is known that in many markets it is required that rolled products, such as for example threaded metal bars used in the mining sector, must be marked indelibly with symbols and/or alphanumerical characters for example, so that they can be identified and recognized.

[0004] In the state of the art the marking of the rolled products takes place mainly in an autonomous station, outside the rolling line. In this autonomous station, either manually or by means of specific apparatuses, the characters required are printed using ink. Examples of these solutions are shown in US 4172429 and US 2674941.

[0005] The use of ink has the disadvantage, however, that with the passage of time, the marking tends to fade or disappears altogether. Moreover, if they are done in relief, the markings can create problems the moment the marked products are used, for example when these consist of threaded bars. Indeed, in this case, the markings can create interference in possible screwing or play.

[0006] It is also known from the American patent US-A-3,638,712 to use a marking device for rolled bars disposed on the opposite side with respect to shears suitable to shear to size the bars exiting from rolling, so each bar is marked at the same time as it is sheared to size.

[0007] From the American patent US-A-3,800,696 it is known to provide an apparatus exclusively dedicated to marking a bar, disposed at the end of the heat process, with subsequent reduction in hourly productivity. Moreover, the presence of an autonomous marking apparatus requires a suitable space for it, more maintenance and additional electric energy. In the known apparatus, the marking, that is, the application of a code, is carried out using two rolls, both motorized and thrust one toward the other, with the bar passing between the two rolls, one of which acts as support roll and the other as marking roll.

[0008] Document FR 2.191.480 describes a marking device for rolled products, associated during use to a rolling stand, which provides a specific marking cylinder with autonomous drive, which has on it in relief the marking characters to be applied on the rolled product. In particular, the solution of FR'480 provides that the marking occurs in a position and a time distinct from that of rolling, with a different, independent and separate machine; this machine therefore not only requires an autonomous drive, but also requires movement, guide, centering, sta-

bilizing and support elements, all separate and autonomous with respect to the rolling stand.

[0009] One purpose of the present invention is to make a rolling apparatus with a marking device to mark in the line, and in a permanent and indelible manner, rolled products, in particular long rolled products such as bars, round pieces, rods or other similar products, both smooth and threaded, which is easily insertable in the line immediately downstream of a rolling stand and which does not require a particular space and/or a particular source of power.

[0010] Another purpose of the present invention is to make a rolling apparatus with a marking device to mark rolled products that uses as much as possible rolling and/or guide members already present in a rolling line, and that reduces to a minimum the need for dedicated members, structures and commands.

[0011] Another purpose of the present invention is to make a rolling apparatus with a marking device which gives the result of a permanent marking that does not have a negative influence on the subsequent use of the rolled products.

[0012] Another purpose of the present invention is to make a rolling apparatus with a marking device that allows to mark said rolled products automatically and cyclically, when they are still hot, that is, at a temperature higher than several hundred degrees Celsius.

[0013] Another purpose is to reduce times and costs for maintenance and substitution operations.

[0014] 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

[0015] 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.

[0016] In accordance with the above purposes, a rolling apparatus with a marking device to mark rolled products according to the present invention comprises at least a marking member.

[0017] According to a characteristic feature of the present invention, the marking member is mounted on the periphery of a rotatable member, in particular a roll, of a guide device located downstream of a rolling stand of the rolled product that is to be marked.

[0018] According to another characteristic feature of the present invention, the marking member comprises a marking ring, mounted on the guide roll located at the exit of the rolling stand, which marking ring carries in relief, on its external peripheral surface, the symbols and/or alphanumerical characters to be marked on the rolled product.

[0019] According to another characteristic feature of the present invention, the marking member has no au-

tonomous power and is suitable to be made to rotate, together with the guide roll on which it is mounted, by the rolled product exiting from the rolling stand.

[0020] For this reason, as well as not requiring any power, kinematism, automation or source of energy, since its drive is determined by the same drawing action on the rolled product determined by the rolling stand, the marking member exploits the alignment and position of the rolled product to be marked determined by the rolling stand and by the guide rolls disposed immediately at the exit from the rolling stand.

[0021] Moreover, the correct positioning of the guide rolls on the basis of shape and size of the rolled product automatically also determines the consequent correct positioning of the marking member with respect to the rolled product, without requiring any operation of adjustment and positioning.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] These and other characteristics of the present invention will become apparent from the following description of one form of embodiment, given as a non-restrictive example with reference to the attached drawings wherein:

- fig. 1 is a lateral view of a marking device according to the present invention, installed in a guide device inserted downstream of a rolling stand;
- fig. 2 is a partial and schematized section from II to II of fig. 1;
- fig. 3 is a lateral view of a detail of the marking device in fig. 1;
- fig. 4 is a view from above of the detail in fig. 3;
- fig. 5 is a section from V to V of fig. 3;
- fig. 6 is a section from VI to VI of fig. 4;
- fig. 7 is an exploded view of the detail in fig. 3.

DETAILED DESCRIPTION OF ONE FORM OF EMBODIMENT OF THE PRESENT INVENTION

[0023] With reference to fig. 1, a rolling apparatus according to the present invention comprises a marking device 10 to mark a rolled product 11, for example a threaded metal bar, exiting from a rolling stand 12, for example the last of a rolling train of the known type and with two opposite rolling cylinders 13.

[0024] The marking device 10 is installed on a guide device 14, located as near as possible to the exit of the rolling stand 12.

[0025] The guide device 14 is, for example, substantially similar to the one described in the application for a patent of industrial invention UD2011A000175 filed on 02.11.2011 by the Applicant, which is incorporated herewith for reference.

[0026] In this case, the guide device 14 comprises a first pair of guide rolls 15 (fig. 2) with a vertical axis and coplanar with respect to each other, and a second pair

of guide rolls 16 (fig. 1) with a horizontal axis and coplanar with respect to each other. The guide rolls 15 and 16 are mounted idle on respective axes of rotation. Moreover, the diameters of the guide rolls 15 and 16 and the inter-axis of the guide rolls of each pair, which can be adjusted, are chosen so that the four guide rolls 15 and 16 are constantly in contact with the rolled product 11 that passes between them, but without exerting any further rolling on the rolled product 11. In this way it is the rolled product 11 itself that makes the guide rolls 15 and 16 rotate.

[0027] When it exits from the rolling stand 12 and passes through the guide device 14, the rolled product 11 still has a rather high temperature, for example from about 800°C to about 900°C.

[0028] The marking device 10 comprises a marking member 17 (figs. 3 to 7), which in the example given here consists of a marking ring 18, which on the external peripheral surface carries in relief the symbols and alphanumerical characters 19 that are to be marked in a permanent and indelible manner on the rolled product 11. The symbols and alphanumerical characters 19 protrude by some tenths of a millimeter, for example from 0.3 mm to 3 mm, from the external peripheral surface of the marking ring 18. The marking ring 18 is mounted on one of the two guide rolls 15.

[0029] In this case, at least one of the guide rolls 15, that is, the one on which the marking ring 18 is mounted, is formed by two guide rings 20 and 21 coupled with each other and each having a flared surface suitable to contact the rolled product 11. The upper guide ring 20 also comprises a cylindrical part 22 on which the marking ring 18 is precision coupled. A central tube 23 is disposed inside the two guide rings 20 and 21 and is provided with an upper flange 24. The central tube 23 is coupled by bolts 25 to a lower flange 26 and clamps the marking ring 18 to the two guide rings 20 and 21.

[0030] In this way, when it passes between the pair of guide rolls 15, the rolled product 11 makes rotate both the guide rolls 15 and also the marking ring 18 which is solid with them. Consequently, with every rotation of the guide rolls 15, the symbols and alphanumerical characters 19 are imprinted in bas-relief, longitudinally, on the rolled product 11, which is still at a high temperature and therefore easily marked.

[0031] It must be noted that marking proper, that is, the pressure of the symbols and alphanumerical characters 19 in relief on the rolled product 11, could cause the latter to slow down. For this reason, it is advantageous that the first pair of guide rolls 15 of the guide device 14 is located as near as possible to the rolling stand 12, at the limit of interference, so that the speed of the rolled product 11 is as stable as possible. Moreover, in this way the possible problems of rejection are limited, which the rolled product 11 could have on entering in the guide device 14, and so possible blockages are avoided.

[0032] To this end, the clamping tie-rods 27 (fig. 1), of the known type, present in the device guide 14, are conveniently located between the two pairs of guide rolls 15

and 16.

[0033] The marking device 10 disposed in association with one of the guide rolls 15 thus allows to mark any type of rolled product 11, including threaded bars, for example with a diameter from 19 mm to 32 mm and more, since the resulting marking, precisely because it is done in bas-relief, does not interfere with the threaded part of the bars and therefore does not have a negative influence on their use.

[0034] It should be noted that with the marking device 10 as described heretofore at least the following advantages can be obtained:

- an in-line marking, in bas-relief, of any rolled product, including threaded bars;
- the possibility of marking the rolled products permanently and indelibly, without needing to provide a dedicated marking apparatus to be inserted in the rolling line and without using a dedicated power source to make the marking member rotate; indeed the latter is made to rotate by the rolled product itself;
- the possibility of substituting only the marking ring, to change the symbols and/or alphanumerical characters if necessary, without needing to change the entire guide roll on which it is mounted;
- the elimination of every problem relating to possible blockages due to the presence of the marking device in the guide device located immediately downstream of the last rolling stand.

Claims

1. Rolling apparatus for rolled products (11), comprising a rolling stand (12) with rolling cylinders (13), a guide device (14) according to claim 9 disposed downstream of said rolling cylinders (13).
2. Rolling apparatus as in claim 1, **characterized in that** said symbols and/or alphanumerical characters (19) protrude by some tenths of a millimeter with respect to said periphery of said marking ring (18).
3. Rolling apparatus as in claim 1 or 2, **characterized in that** said guide rolls (15) are mounted idle on respective axes of rotation and have an interaxis such as to be constantly in contact with said rolled product (11) exiting from said rolling cylinders (13) so that it is the rolled product (11) which makes said guide rolls (15) and therefore said marking ring (18) rotate.
4. Rolling apparatus as in any claim hereinbefore, **characterized in that** said guide roll (15) comprises two guide rings (20, 21) coupled to each other and between which said marking ring (18) is clamped.
5. Rolling apparatus as in claim 4, **characterized in that** said two guide rings (20, 21) each have a flared

surface suitable to contact said rolled product (11).

6. Rolling apparatus as in claim 4 or 5, **characterized in that** one of said two guide rings (20) comprises a cylindrical part (22) precision coupled with said marking ring (18).
7. Rolling apparatus as in claim 6, **characterized in that** a central tube (23), disposed inside said two guide rings (20, 21) and provided with an upper flange (24), is coupled with a lower flange (26) and renders said marking ring (18) solid with said two guide rings (20, 21).
8. Rolling apparatus as in any claim hereinbefore, **characterized in that** the guide device (14) also comprises a second pair of guide rolls (16) with an axis orthogonal to the axis of the first pair of rolls (15).
9. Guide device configured to guide a rolled product (11) exiting from a rolling stand (12) and comprising at least a pair of guide rolls (15, 16), **characterized in that** at least one of said guide rolls (15) comprises a marking member (17) consisting of a marking ring (18) mounted on the periphery of one of said guide rolls (15) and having in relief symbols and/or alphanumerical characters (19) to be marked on the rolled product (11).

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Patentansprüche

1. Walzvorrichtung für Walzprodukte (11), umfassend ein Walzgerüst (12) mit Walzzyindern (13) und eine Führungsvorrichtung (14) gemäß Anspruch 9, die stromabwärts von den Walzzyindern (13) angeordnet ist.
2. Walzvorrichtung gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die Symbole und/oder alphanumerischen Buchstaben (19) einige Zehntelmillimeter in Bezug auf die Peripherie des Markierungsring (18) vorstehen.
3. Walzvorrichtung gemäß Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die Führungswalzen (15) ruhend auf jeweiligen Rotationsachsen montiert sind und eine Zwischenachse aufweisen, wodurch sie in ständigem Kontakt mit dem Walzprodukt (11), welches aus den Walzzyindern (13) austritt, stehen, so dass das Walzprodukt (11) die Rotation der Führungswalzen (15) und damit des Markierungsring (18) bewirkt.
4. Walzvorrichtung gemäß irgendeinem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Führungswalze (15) zwei Führungsringe (20, 21) umfasst, die miteinander verbunden sind

und zwischen denen der Markierungsring (18) befestigt ist.

5. Walzvorrichtung gemäß Anspruch 4, **dadurch gekennzeichnet, dass** die beiden Führungsringe (20, 21) jeweils eine aufgeweitete Oberfläche aufweisen, die geeignet ist, mit dem Walzprodukt (11) in Kontakt zu treten.
6. Walzvorrichtung gemäß Anspruch 4 oder 5, **dadurch gekennzeichnet, dass** einer der beiden Führungsringe (20) einen zylindrischen Abschnitt (22) umfasst, der mit dem Markierungsring (18) mit Präzision verbunden ist.
7. Walzvorrichtung gemäß Anspruch 6, **dadurch gekennzeichnet, dass** eine zentrale Röhre (23), die innerhalb der beiden Führungsringe (20, 21) angeordnet und mit einem oberen Flansch (24) versehen ist, mit einem unteren Flansch (26) verbunden ist und eine feste Verbindung von Markierungsring (18) mit den beiden Führungsringen (20, 21) schafft.
8. Walzvorrichtung gemäß irgendeinem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Führungsvorrichtung (14) ferner ein zweites Paar Führungswalzen (16) umfasst, die eine Achse orthogonal zu der Achse des ersten Walzenpaares (15) aufweisen.
9. Führungsvorrichtung, die zur Führung eines Walzprodukts (11), welches aus einem Walzgerüst (12) austritt, konfiguriert ist, und wenigstens ein Paar Führungswalzen (15, 16) umfasst, **dadurch gekennzeichnet, dass** wenigstens eine der Führungswalzen (15) ein Markierungselement (17) umfasst, welches aus einem Markierungsring (18) besteht, der an der Peripherie von einer der Führungswalzen (15) befestigt ist und in dem Reliefsymbole und/oder alphanumerische Zeichen (19), mit denen das Walzprodukt (11) markiert werden soll, vorliegen.

Revendications

1. Appareil de laminage pour produits laminés (11), comprenant un poste de laminage (12) avec des cylindres de laminage (13), un dispositif de guidage (14) selon la revendication 9, disposé en aval desdits cylindres de laminage (13).
2. Appareil de laminage selon la revendication 1, **caractérisé en ce que** lesdits symboles et / ou caractères alphanumériques (19) font saillie de quelques dixièmes de millimètre par rapport à ladite périphérie dudit anneau de marquage (18).
3. Appareil de laminage selon la revendication 1 ou la

revendication 2, **caractérisé en ce que** lesdits rouleaux de guidage (15) sont montés librement tournants sur des axes de rotation respectifs et ont un entraxe tel qu'ils sont constamment en contact avec ledit produit laminé (11) sortant desdits cylindres de laminage (13) de sorte que c'est le produit laminé (11) qui fait tourner lesdits rouleaux de guidage (15) et par conséquent ledit anneau de marquage (18).

4. Appareil de laminage selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ledit rouleau de guidage (15) comprend deux anneaux de guidage (20, 21) reliés l'un à l'autre et entre lesquels ledit anneau de marquage (18) est serré.
5. Appareil de laminage selon la revendication 4, **caractérisé en ce que** les deux anneaux de guidage (20, 21) ont chacun une surface évasée appropriée pour venir en contact avec ledit produit laminé (11).
6. Appareil de laminage selon la revendication 4 ou la revendication 5, **caractérisé en ce que** l'un desdits deux anneaux de guidage (20) comprend une partie cylindrique (22) reliée avec précision audit anneau de marquage (18).
7. Appareil de laminage selon la revendication 6, **caractérisé en ce qu'un** tube central (23), disposé à l'intérieur des deux anneaux de guidage (20, 21) et présentant une bride supérieure (24), est relié à une bride inférieure (26) et rend ledit anneau de marquage (18) solidaire desdits deux anneaux de guidage (20, 21).
8. Appareil de laminage selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le dispositif de guidage (14) comprend également une deuxième paire de rouleaux de guidage (16) ayant un axe orthogonal à l'axe de la première paire de rouleaux (15).
9. Dispositif de guidage configuré pour guider un produit laminé (11) sortant d'un poste de laminage (12) et comprenant au moins une paire de rouleaux de guidage (15, 16), **caractérisé en ce qu'au** moins un desdits rouleaux de guidage (15) comprend un organe de marquage (17) constitué d'un anneau de marquage (18) monté sur la périphérie de l'un desdits rouleaux de guidage (15) et présentant des symboles et / ou des caractères alphanumériques (19) en relief destinés à être marqués sur le produit laminé (11).

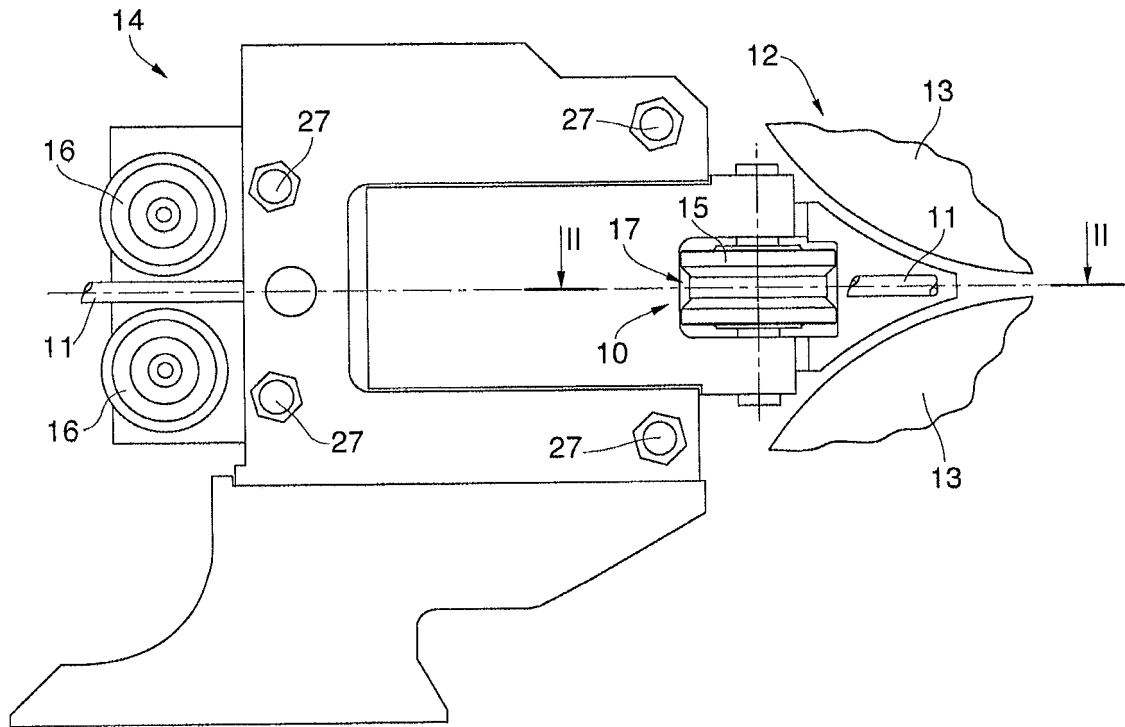


fig. 1

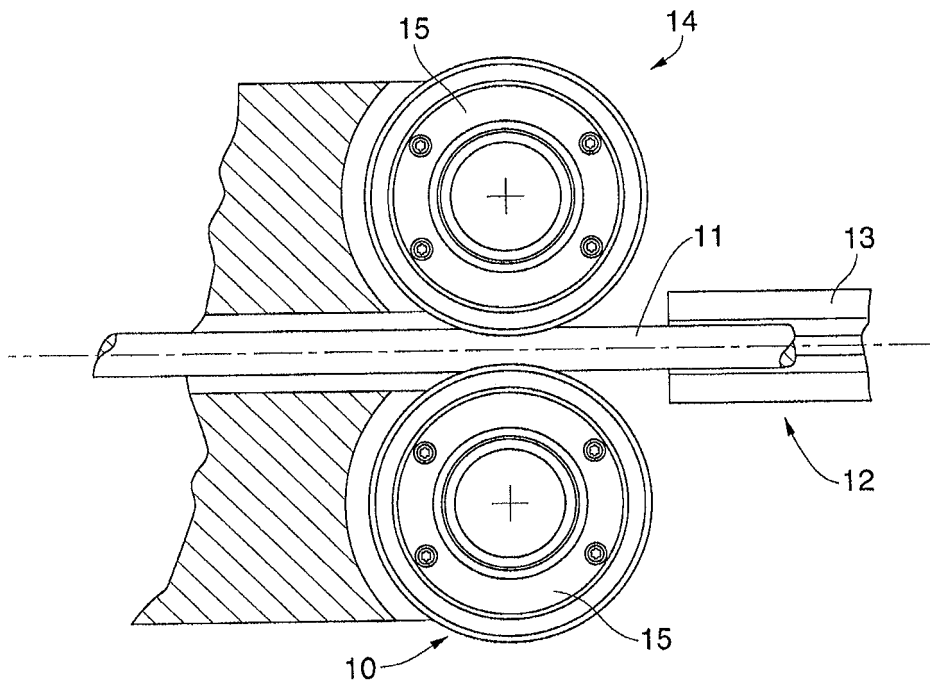


fig. 2

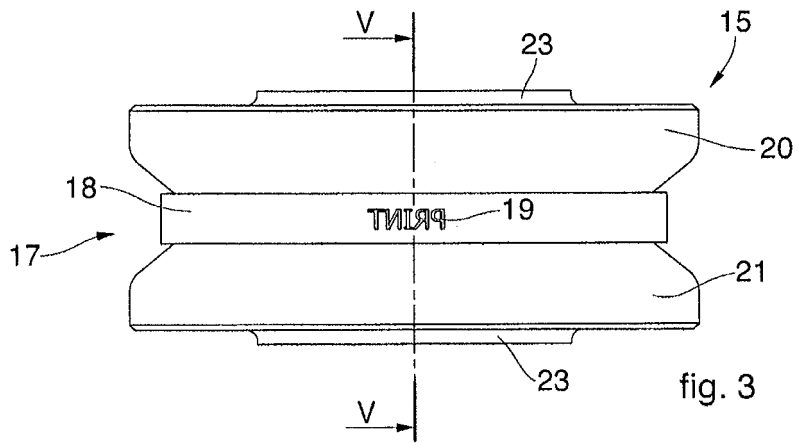


fig. 3

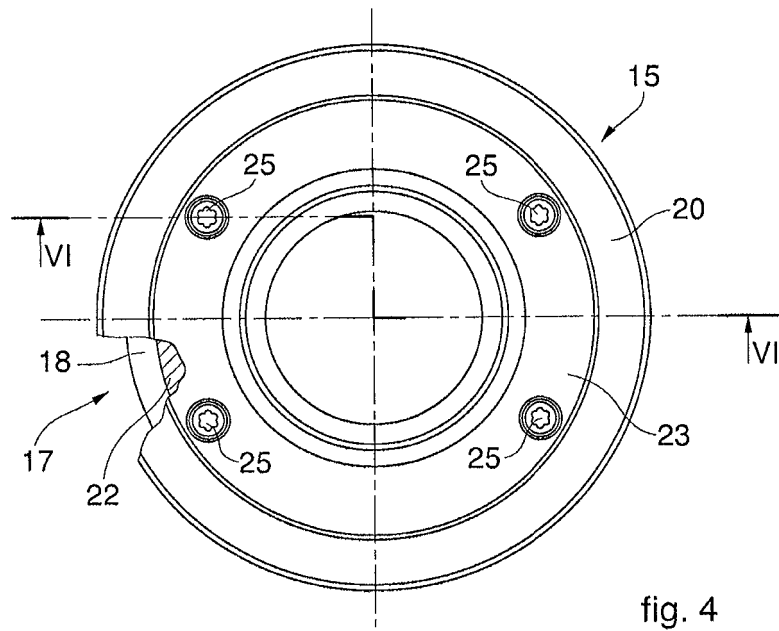


fig. 4

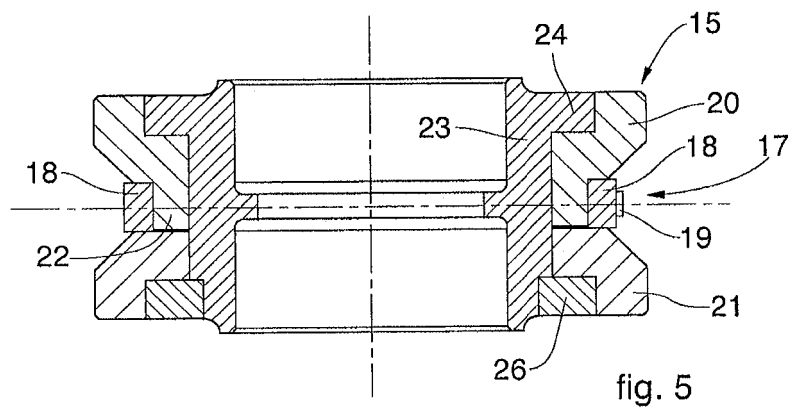


fig. 5

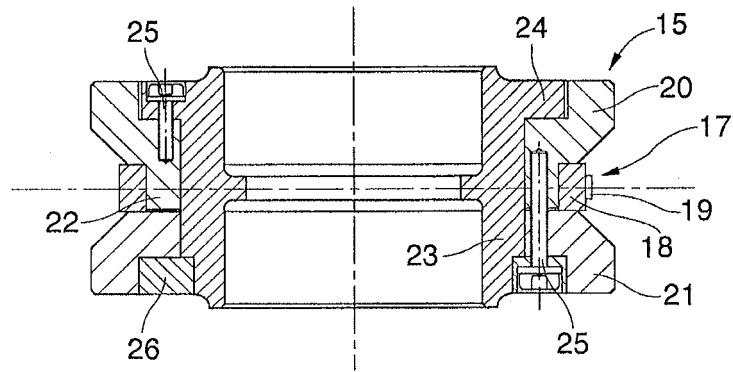


fig. 6

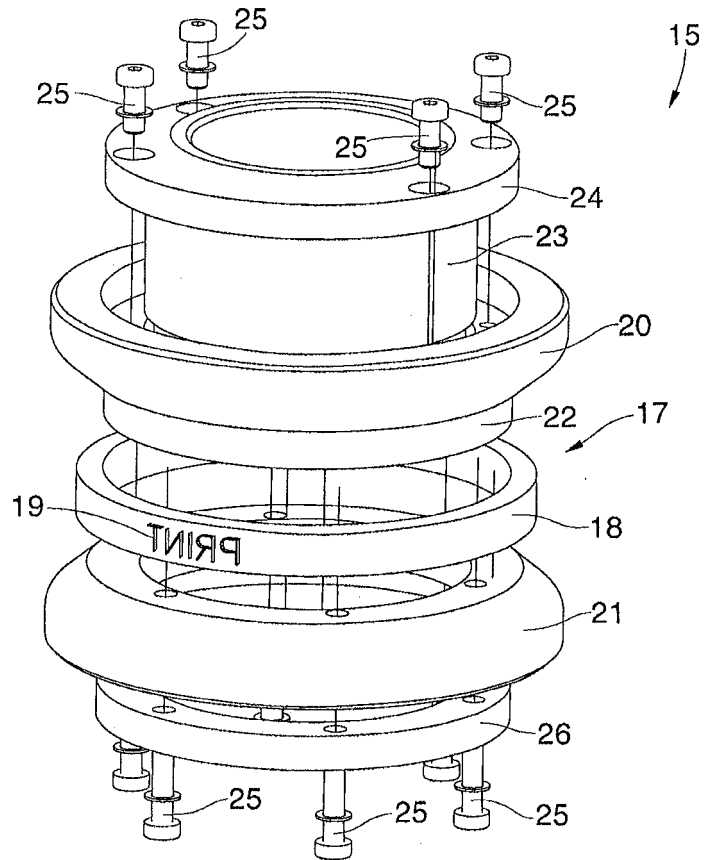


fig. 7

REFERENCES CITED IN THE DESCRIPTION

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