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(54) **GUIDE ASSEMBLY FOR METAL PRODUCTS AND CORRESPONDING METHOD**

(57) Guide assembly comprising a support frame (12) and a guide unit (11) installed cantilevered on said support frame (12) and configured to guide the introduction and/or discharge of a metal product, into or from a

rolling unit (41). Between the guide unit (11) and the support frame (12) one detection device (25) is installed, configured to detect a flexion of the guide unit (11) with respect to the support frame (12).

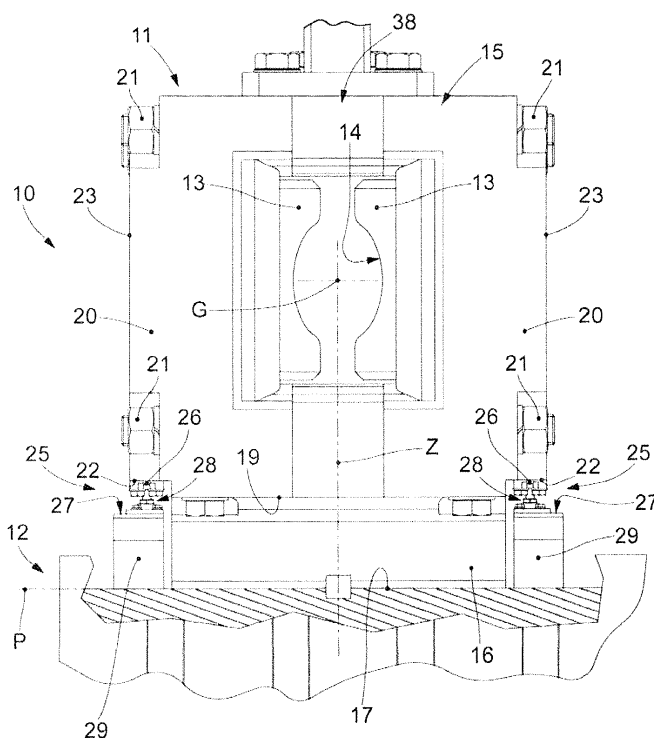


fig. 1

Description

FIELD OF THE INVENTION

[0001] The present invention concerns a guide assembly applicable in the field of rolling long metal products comprising at least one guide unit to guide and support the metal products entering into or exiting from a rolling unit for metal products.

[0002] In particular, long metal products such as bars, round pieces, or profiles of very large sizes, for example greater than 100mm, can be processed with the guide assembly.

[0003] The present invention also concerns a rolling assembly comprising at least one guide assembly and a rolling unit.

[0004] The present invention also concerns the corresponding method for guiding metal products.

BACKGROUND OF THE INVENTION

[0005] The rolling of long metal products provides a progressive reduction of the thickness of the metal products by means of rolls, rollers or rotating rings of rolling units or stands along which the metal product is fed and rolled.

[0006] For example, in the final stages of the rolling process, it is known to use one or more guide units, also called roller guides, each configured to guide and support the metal products entering into or exiting from the rolling unit, for example a finishing stand.

[0007] Known guide units each comprise at least one pair of guide rolls mounted idle on a support body and having axes of rotation orthogonal to said rolling axis.

[0008] The guide rolls are distanced to define between them a passage gap through which the metal product is made to pass in a guided manner.

[0009] It is also known that the guide unit must be installed so that the passage gap between the guide rolls is aligned with the rolling axis, that is, the channel, of the rolling unit. This allows the correct feed and guide of the metal product to the rolling unit.

[0010] A non-aligned feed of the metal products with respect to the rolling unit causes an incorrect rolling of the metal product and hence the dimensional and/or geometrical tolerances of the rolled product are not respected; moreover, nonlinear rolled products are produced which, due to their bent shape, must be discarded.

[0011] The misalignment of the guide unit with respect to the rolling unit also causes differentiated stresses to occur on the guide rolls, resulting in uneven wear of one guide roll with respect to the other.

[0012] Differentiated stresses between the two guide rolls are also transferred to the components connected to them, for example on the support bearings of the guide rolls, with a consequent reduction in their working life.

[0013] Document JP-A-H06.15334 discloses a guide assembly that comprises two guide rolls installed on sup-

port arms disposed facing each other. The guide rolls define a guide gap for the passage of the profile to be rolled.

[0014] The support arms are pivoted on a support body of the guide assembly and in correspondence with an intermediate position of their length. By adjusting the inclination of the support arms with respect to the support body, it is possible to adjust the guide gap between the guide rolls.

[0015] Each support arm is also associated with a load cell to detect the stresses acting on each guide roll and to detect possible misalignments in the introduction of the metal product into the guide gap.

[0016] Movement devices are also associated with the support body, provided to move the support body with respect to a support frame and in this way to obtain an alignment between the guide gap and the rolling gap defined by the rolling units disposed downstream of the guide unit.

[0017] However, this solution is particularly complex to manage and, in particular, for large-sized rolled products can be particularly inaccurate.

[0018] In the case of large-sized metal products, the mechanical stresses acting on the arms are particularly high and require the use of load cells with the capacity to detect high nominal loads. Load cells with high nominal loads are, however, not very sensitive and therefore provide inaccurate information. To this we must also add the fact that load cells with high nominal loads are much more expensive.

[0019] One purpose of the present invention is to obtain a guide assembly which allows to feed the metal products in a precise and aligned manner into a rolling unit.

[0020] Another purpose of the present invention is to provide a guide assembly which allows to obtain high quality metal products, that is, which satisfy at least the desired requirements of size and/or geometric tolerance.

[0021] Another purpose of the present invention to obtain a guide assembly that increases the working life of the components, or parts of them, by reducing maintenance interventions.

[0022] 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

[0023] 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.

[0024] In accordance with the above purposes, a guide assembly, according to the present invention, comprises a support frame, also called bar bearing equipment in the sector, and a guide unit, or roller guide, installed cantilevered on the support frame and configured to guide

the introduction and/or discharge of a metal product, into or from a rolling unit.

[0025] In accordance with one aspect of the present invention, between the guide unit and the support frame detection devices are installed, configured to detect a flexion or deviation of the guide unit with respect to the support frame.

[0026] The metal product that transits through the guide unit induces stresses on the latter that bend the guide unit with respect to the support frame on which it is installed.

[0027] The flexion or deviation of the guide unit in one direction rather than another is indicative of the misalignment of the metal product with respect to the rolling unit with which the guide unit is associated.

[0028] By detecting data relating to the flexion of the guide unit it is therefore possible to make corrections to the reciprocal position between the guide unit and the rolling unit to obtain an alignment of the metal product in these two units.

[0029] This allows to increase the quality of the final metal product obtained from rolling, limit the wear of the guide rolls, control the rolling process and reduce the problems of wear of the components of the guide unit.

BRIEF DESCRIPTION OF THE DRAWINGS

[0030] These and other characteristics of the present invention will become apparent from the following description of some embodiments, given as a non-restrictive example with reference to the attached drawings wherein:

- fig. 1 is a front view of a guide assembly in accordance with the present invention;
- fig. 2 is a lateral view of fig. 1;
- fig. 3 is an enlarged detail of fig. 2;
- fig. 4 is a perspective view of a rolling unit in accordance with a possible embodiment of the present invention;
- fig. 5 is a front view of a rolling unit according to an embodiment of the invention;
- fig. 6 is a view from above of fig. 5.

[0031] To facilitate comprehension, the same reference numbers have been used, where possible, to identify identical common elements in the drawings. It is understood that elements and characteristics of one embodiment can conveniently be incorporated into other embodiments without further clarifications.

DETAILED DESCRIPTION OF SOME EMBODIMENTS

[0032] With reference to figs. 1 and 2, a guide assembly according to the present invention is indicated by the reference number 10 and comprises at least one guide unit 11, or guide or rollers, and a support frame 12 on which the guide unit 11 is installed cantilevered.

[0033] According to a possible solution, the guide unit 11 is wedged in a fixed position to the support frame 12. This operating condition allows to confer on the guide unit 11 greater stability and a rigid installation on the support frame 12.

[0034] According to the present invention, the guide unit 11 comprises at least two guide rolls 13 located distanced from each other and defining between them a guide gap 14 through which, during use, a metal product passes and is guided.

[0035] According to possible embodiments of the present invention, as shown in fig. 6 for example, the guide unit 11 can comprise more than two guide rolls 13, for example two or more pairs of guide rolls 13 disposed so as to position the guide gaps aligned with each other along a common axis.

[0036] The guide gap 14 between the guide rolls 13 in turn defines a guide axis G, along which, during use, the metal product is guided and made to advance.

[0037] The guide rolls 13 are installed rotating idly around respective axes of rotation X.

[0038] The axes of rotation X of the guide rolls 13 are parallel to each other and are positioned on opposite sides of the guide axis G and are inclined, for example, orthogonal, with respect to the latter.

[0039] The guide unit 11 comprises a support body 15 attached to the support frame 12 and with which the guide rolls 13 are associated.

[0040] The support body 15 is installed cantilevered with respect to the support frame 12 and at least two of said guide rolls 13 are associated with it.

[0041] In particular, the support frame 12 defines a support plane P on which the support body 15 is connected. The support body 15 extends with respect to the support plane P on a centering plane Z which is orthogonal to the support plane P and on which the guide axis G lies.

[0042] According to a possible solution, the support body 15 is provided with a connection flank 19 or abutment in this case, disposed in the lower part and which, during use, is connected to the support frame 12.

[0043] According to some embodiments, the support body 15 comprises an attachment base 16, provided in correspondence with the connection flank 19 of the support body 15, in this case on the lower flank, and which is secured to the support frame 12.

[0044] The attachment base 16 can be attached to the support frame 12 by means of same-shape couplings and/or by removable mechanical connections.

[0045] The connection flank 19 of the support body 15 protrudes laterally with respect to the attachment base 16 with at least one lateral edge, in this case with two lateral edges 22 located on one side and the other of the attachment base 16.

[0046] The lateral edges 22 are disposed above the support frame 12 and distanced from the latter. Between the lateral edges 22 and the support frame 12 an interspace 27 is defined.

[0047] In the solution shown in fig. 2, the support frame 12 is provided with an attachment seating 17 having an oblong development and in which the attachment base 16 is fixed.

[0048] The attachment seating 17 has a mainly oblong development so as to allow to position and/or adjust the support body 15 at any position along the longitudinal extension of the attachment seating 17.

[0049] The support frame 12 can comprise at least one holding element 18 attached in the attachment seating 17 and configured to clamp the attachment base 16 in the latter, for example by means of threaded connections. According to the solution shown in the drawings, the holding element 18 can have a wedge conformation.

[0050] The support body 15 can comprise two support elements 20 on each of which at least one guide roll 13 is installed.

[0051] According to possible embodiments, adjustment devices, such as eccentric pins, can be associated with the support elements 20, suitable to adjust the interaxis between the guide rolls 13.

[0052] The support elements 20 are facing each other and disposed on one side and the other of the guide axis G.

[0053] The support elements 20 each define a lateral flank 23 of the support body 15.

[0054] The lateral flanks 23 of the support body 15 can be disposed substantially parallel to each other and orthogonal to the connection flank 19.

[0055] The support elements 20 can be solidly attached to the support body 15, for example by threaded connections 21.

[0056] According to variant embodiments not shown, the support elements 20 can be pivoted to the support body 15 in correspondence with a pivoting portion thereof, made in an intermediate position of the length of the support element 20.

[0057] According to this solution, it is possible to provide that adjustment members are associated with the support elements 20, in order to adjust the angular position of the support elements 20 and therefore to adjust the sizes of the guide gap 14 defined between the guide rolls 13.

[0058] The support elements 20 are configured to support at least some of the guide rolls 13 in a position protruding cantilevered with respect to a front flank 24 or front part.

[0059] According to one aspect of the present invention, at least one detection device 25 is installed between the guide unit 11 and the support frame 12, configured to detect a bending of the guide unit 11 with respect to the support frame 12.

[0060] According to a possible solution, the detection device 25 comprises at least one load cell 26 suitable to detect an inflection of the support body 15 with respect to the support frame 12.

[0061] Merely by way of example, the load cell 26 can be configured to detect a variation in the reciprocal an-

gulation between the centering plane Z and the support plane P, that is, an inflection of the support body 15 with respect to the support frame 12.

[0062] According to a variant embodiment, the detection device 25 comprises a piezoelectric sensor.

[0063] The use of a load cell 26 and/or a piezoelectric sensor, which provide a reciprocal contact between the components that bend, ensures a certain detection of the inflection, even under particularly heavy work conditions such as those of a steel mill.

[0064] According to further variant embodiments, the detection device 25 can be selected from a group comprising at least a capacitive sensor, an inductive sensor, or a similar and comparable sensor suitable for the purpose. This solution allows to control the inflection even without reciprocal contact between the components that bend.

[0065] According to a further variant embodiment, the detection device 25 can comprise an extensometer.

[0066] According to possible solutions of the present invention, the at least one detection device 25 is installed between the support body 15 and the support frame 12 in a laterally offset position with respect to a median plane passing through the support body 15. This laterally offset positioning allows to determine possible flexions of the support body 15 on one side rather than on the other of the support body 15.

[0067] In this case it can be provided that the detection device 25 is put, during use, in a preloaded condition, so that an increase and/or a decrease in the load can be indicative of an inflection.

[0068] According to the solution shown in figs. 2-4, the at least one detection device 25 is positioned offset laterally toward the front flank 24 of the support body 15, that is, toward the flank which, during use, is facing toward a rolling unit, as described hereafter.

[0069] According to a variant embodiment, shown for example in figs. 1 and 2, two detection devices 25 are installed between the guide unit 11 and the support frame 12, each positioned in correspondence with one of the two lateral flanks 23 of the support body 15.

[0070] The positioning on the lateral flanks 23 of the detection device 25 ensures a correct detection of the bending stresses of the support body 15.

[0071] In particular, with reference to fig. 1 in the case where the left detection device 25 detects an increase in the load, this means that the guide unit 11 is misaligned with respect to a rolling unit 41 toward the right, and therefore an action to correct the alignment will be required. Similarly, if a load increase is detected on the right detection device 25, this is an indication that the guide unit 11 is misaligned with respect to the rolling unit 41 toward the left.

[0072] According to a possible solution, it is provided that the detection devices 25 are each installed between the interspaces 27 of the support body 15. This allows to put the detection devices 25 in a protected position.

[0073] According to a further solution, the detection de-

vices 25 are preloaded between the lateral edges 22 of the support body 15 and the support frame 12.

[0074] According to a possible solution shown in figs. 1-4, the detection devices 25 can be installed in a fixed position each on one of the lateral edges 22 of the support body 15. Furthermore, one or more contrast devices 28 are installed on the support frame 12, on which the detection device 25 or detection devices 25 rests/rests.

[0075] According to an alternative solution, not shown in the drawings, each detection device 25 is installed on the support frame 12 while the contrast device 28 is attached to one of the lateral edges 22 of the support body 15 and rests on the detection device 25.

[0076] In particular, the detection device 25 is installed, during use, facing toward the interspace 27.

[0077] According to the solutions shown in figs. 1 and 2, the contrast devices 28 are installed on support blocks 29 attached to the support frame 12, laterally to the support body 15, and in correspondence with the interspace 27.

[0078] According to the solution shown in figs. 1 and 2, the support blocks 29 are attached in the attachment seating 17 of the support frame 12 and below at least part of the lateral edges 22.

[0079] According to a possible solution, the at least one contrast device 28 can be provided with elastic damping elements 30 configured to elastically absorb at least part of the load acting on the detection device 25 and to prevent damage to the latter.

[0080] According to this embodiment, the detection devices 25 do not necessarily have to detect the actual force acting on the support body 15, but it is sufficient to indicate the orientation in which the flexion of the guide unit 11 occurs.

[0081] Thanks to this solution, it is possible to preserve the detection devices 25 from peak loads by cushioning the impact forces at the inlet of the metal product.

[0082] In fact, when the support body 15 is subjected to inflection, the lateral load which is discharged from the support body 15 to the supporting frame 12, through the contrast devices 28, is partly absorbed elastically by the elastic elements 30.

[0083] This allows to use detection devices 25 with maximum permissible loads lower than those actually acting on the detection device 25 if an elastic element were not interposed. Detection devices 25 with lower maximum permissible loads have greater sensitivity and precision of detection than detection devices 25 with higher maximum permissible loads.

[0084] According to the solution shown in fig. 3, the contrast device 28 is associated with the support block 29 and comprises a sliding body 31 installed in a guide seating 32 made in the support block 29.

[0085] The elastic elements 30 are installed between the guide seating 32 and the sliding body 31.

[0086] The support block 29 can also comprise closing elements 33 attached in correspondence with the guide seating 32 and configured to constrain the positioning of

the sliding body 31 in the latter.

[0087] The sliding body 31 can also be provided with at least one holding element 34 or end-of-travel element, configured to define the maximum and minimum travel of the sliding body 31 in the guide seating 32.

[0088] The sliding body 31 is provided with a guide element 35 slidably inserted in the guide seating 32 and a contact terminal 36, associated with the guide element 35, protruding from the guide seating 32 and with respect to the support block 29 and which, during use, contacts the detection device 25, or its sensitive part.

[0089] According to a possible solution of the present invention, the sliding body 31 is provided with adjustment elements 37 configured to adjust the length of the contact terminal 36 with respect to the sliding body 31.

[0090] Adjusting the length of the contact terminal 36 allows to ensure the reciprocal contact with the detection device 25 and to adjust a preload that acts on the detection device 25.

[0091] According to the solution shown in fig. 3, the contact terminal 36 comprises a screw screwable into a threaded hole made in the guide element 35.

[0092] According to possible embodiments, the support body 15 can be provided with a guide channel 38 (fig. 1), defined by guide elements also referred to as guide strips, or "static guides". The guide channel 38 is located upstream of the guide rolls 13 and is configured to guide the movement of the metal product along the guide axis G.

[0093] Embodiments of the present invention also concern a rolling assembly 40 that comprises at least one guide assembly 10 as described above, and the rolling unit 41.

[0094] The rolling unit 41 comprises at least one pair of rolling rolls 42 having their axes of rotation substantially parallel to each other and together defining at least one rolling gap 43 through which the metal product arriving from the guide unit 11 is rolled.

[0095] According to the embodiment shown in figs. 4-6, the rolling unit 41 is the reversing type, that is, it is provided with a plurality of rolling gaps 43 in which, on each occasion, the metal product is made to pass to perform subsequent rolling passes.

[0096] According to the solution in figs. 4-6, the guide unit 11 is associated in correspondence with one of the rolling gaps 43, preferably in correspondence with the rolling gap 43 in which the last rolling step of the metal product takes place before it is discharged from the rolling assembly 40.

[0097] In order to ensure the production of high quality metal products P, that is, which respect geometric, dimensional and rectilinear tolerances, it is necessary to ensure a precise alignment between the guide gap 14 and the rolling gap 43. In particular, it can be provided that in the aligned condition between the guide gap 14 and the rolling gap 43, both of their respective axes lie on the Z centering plane.

[0098] According to possible embodiments of the

present invention, the rolling assembly 40 comprises at least one movement device 44 associated with the rolling rolls 42 and/or the guide unit 11, in order to move at least one of the latter and align the guide gap 14 of the guide unit 11 to the rolling gap 43 between the rolling rolls 42.

[0099] According to the solution shown in figs. 5 and 6, the movement device 44 is associated with the rolling rolls 42 and is configured to determine an axial movement of the rolling rolls 42. The guide unit 11 is installed in a fixed position with respect to the support frame 12.

[0100] The installation in a fixed position of the guide unit 11 increases the positioning rigidity of the latter, and allows to limit the flexions to which it is subjected during use.

[0101] The movement device 44 can be chosen from a group comprising at least one of either a worm screw, a rack mechanism, a ball recirculation mechanism, an electric jack, a kinematic mechanism, a threaded element, a motor, a hydraulic device, a pneumatic device, or possible combinations of the above.

[0102] According to a possible solution, the rolling assembly 40 comprises a control and command unit 45 connected at least to the detection devices 25 and to the movement devices 44 to detect data from the detection devices 25, to process them to determine any possible misalignment of the guide gap 14 with respect to the rolling gap 43 and to transmit a command signal to the detection devices 25 to cancel said misalignment.

[0103] According to a variant embodiment not shown in the drawings, the movement device 44 can be connected to the support body 15 and allows the movement thereof to determine the alignment between the guide gap 14 and the rolling gap 43.

[0104] With the present invention it is possible to indirectly determine a misalignment of the guide gap 14 with respect to the rolling gap 43 by detecting the stresses that a non-aligned metallic product induces on the guide unit.

[0105] By managing the positioning of the detection devices 25 with respect to the support body 15 of each guide unit 11, it is possible to determine both possible lateral misalignments of the guide unit 11 and also possible vertical misalignments.

[0106] A vertical misalignment of the metal product can be detected by the detection devices 25 by an increase or decrease in the values detected on both detection devices 25 disposed on one side or the other of the support body 15. A misalignment of the guide unit 11 upward and with respect to the rolling gap 43 generates a compression of the detection device 25, because the metal product being rolled in the rolling unit 41 tends to compress the guide unit 11 while a misalignment of the guide unit 11 downward and with respect to the rolling gap 43 generates a lightening of the detection device 25, since the metal product being rolled in the rolling unit 41 tends to lift the guide unit 11.

[0107] In particular, the vertical misalignments of the guide unit 11 can be advantageously detected by posi-

tioning the detection devices 25 in a staggered position toward the front flank 24 and/or toward a rear flank of the support body 15, opposite the front flank 24.

[0108] According to possible solutions of the present invention, possible vertical misalignments of the guide unit 11 can be canceled by a vertical movement of the support frame 12. According to this solution (fig. 5), the support frame 12 comprises lateral support elements 46 and a tool bar 47 associated with the lateral support elements 46.

[0109] The guide unit 11 is installed, in the manner described above, on the tool bar 47.

[0110] The tool bar 47 is connected to the lateral support elements 46 by means of connection elements 48 which are configured to allow to adjust the position of the tool bar in the vertical direction.

[0111] By acting on the connection elements 48 it is possible to change the position of the tool bar 47 and therefore also to obtain a vertical alignment of the guide gap 14 with respect to the rolling gap 43.

[0112] Between the tool bar 47 and the lateral support elements 46 guide elements can be present, positioned substantially vertical.

[0113] Furthermore, embodiments of the present invention can provide that by means of the data detected by the detection devices 25, it is possible to carry out an evaluation of the rolling process performed on the metal products. For example, by analyzing the data detected by the detection devices 25, it is possible to assess whether, at least before the last rolling pass, the metal product has surface defects due, for example, to handling members of the metal products.

[0114] It is clear that modifications and/or additions of parts can be made to the guide assembly 10 for metal products, the rolling assembly 40 and the rolling method as described heretofore, without departing from the field and scope of the present invention.

[0115] 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 guide assembly 10 for metal products, the rolling assembly 40 and the rolling method, having the characteristics as set forth in the claims and hence all coming within the field of protection defined thereby.

Claims

1. Guide assembly comprising a support frame (12) and a guide unit (11) installed cantilevered on said support frame (12) and configured to guide the introduction and/or discharge of a metal product, into or from a rolling unit (41), **characterized in that** between said guide unit (11) and said support frame (12) at least one detection device (25) is installed, configured to detect a flexion of said guide unit (11) with respect to said support frame (12).

2. Guide assembly as in claim 1, **characterized in that** said guide unit (11) comprises a support body (15) installed cantilevered with respect to said support frame (12), and at least two guide rolls (13) associated with said support body (15) and between which, during use, said metal product is made to transit. 5
3. Guide assembly as in claim 2, **characterized in that** said at least one detection device (25) is installed between said support body (15) and said support frame (12) in a laterally offset position with respect to a median plane passing through said support body (15). 10
4. Guide assembly as in claim 2 or 3, **characterized in that** said support body (15) comprises two lateral flanks (23) and between said guide unit (11) and said support frame (12) two detection devices (25) are installed, each positioned in correspondence to one of the two lateral flanks (23) of said support body (15). 15 20
5. Guide assembly as in claim 2, 3 or 4, **characterized in that** said support body (15) comprises an attachment base (16) provided in correspondence to a connection flank (19) of said support body (15) and attached to said support frame (12), **in that** said connection flank (19) of said support body (15) protrudes laterally with respect to said attachment base (16) with its lateral edges (22), **and in that** said lateral edges (22) are located above said support frame (12) and distanced therefrom. 25 30
6. Guide assembly as in claim 4 and 5, **characterized in that** said detection devices (25) are installed in a fixed position each on one of the lateral edges (22) of the support body (15). 35
7. Guide assembly as in claim 6, **characterized in that** on said support frame (12) a contrast device (28) is installed, on which said detection device (25) is located resting. 40
8. Guide assembly as in claim 7, **characterized in that** the at least one contrast device (28) can be provided with elastic elements (30) for elastic cushioning, configured to absorb elastically at least part of the load acting on said detection device (25). 45
9. Rolling assembly comprising a rolling unit (41) and at least a guide assembly (10) as in any claim hereinbefore. 50
10. Rolling assembly as in claim 9, **characterized in that** said rolling unit (41) comprises at least a pair of rolling rolls (42) with their axes of rotation substantially parallel to each other and together defining at least a rolling gap (43) through which a metal product arriving from said guide unit (11) is rolled, **and in that** said guide unit (11) comprises at least two guide rolls (13) located distanced and defining a guide gap (14) between them through which, during use, said metal product passes and is guided. 55
11. Rolling assembly as in claim 9 or 10, **characterized in that** said rolling assembly (40) comprises at least a movement device (44) associated with said rolling rolls (42), and/or with said guide unit (11), in order to move at least one of the latter and to align the guide gap (14) of said guide unit (11) to said rolling gap (43), between said rolling rolls (42).
12. Rolling assembly as in claim 11, **characterized in that** said movement device (44) is associated with said rolling rolls (42) and is configured to determine an axial movement of said rolling rolls (42), **and in that** said guide unit (11) is installed in a fixed position with respect to said support frame (12).
13. Rolling assembly as in claim 11 or 12, **characterized in that** it comprises a control and command unit (45) connected at least to said detection devices (25) and to said movement devices (44) in order to detect data from said detection device (25), to process said data to determine a possible misalignment of the guide gap (14) with respect to the rolling gap (43) and to transmit a command signal to the movement devices (44) to cancel said misalignment.
14. Method to guide a metal product that provides to guide the introduction and/or discharge of a metal product into or from a rolling unit (41), by means of the passage of said metal product through a guide unit (11) installed cantilevered on said support frame (12), **characterized in that**, during said passage of said metal product through said guide unit (11), it provides to detect a flexion of said guide unit (11) with respect to said support frame (12), with at least one detection device (25).

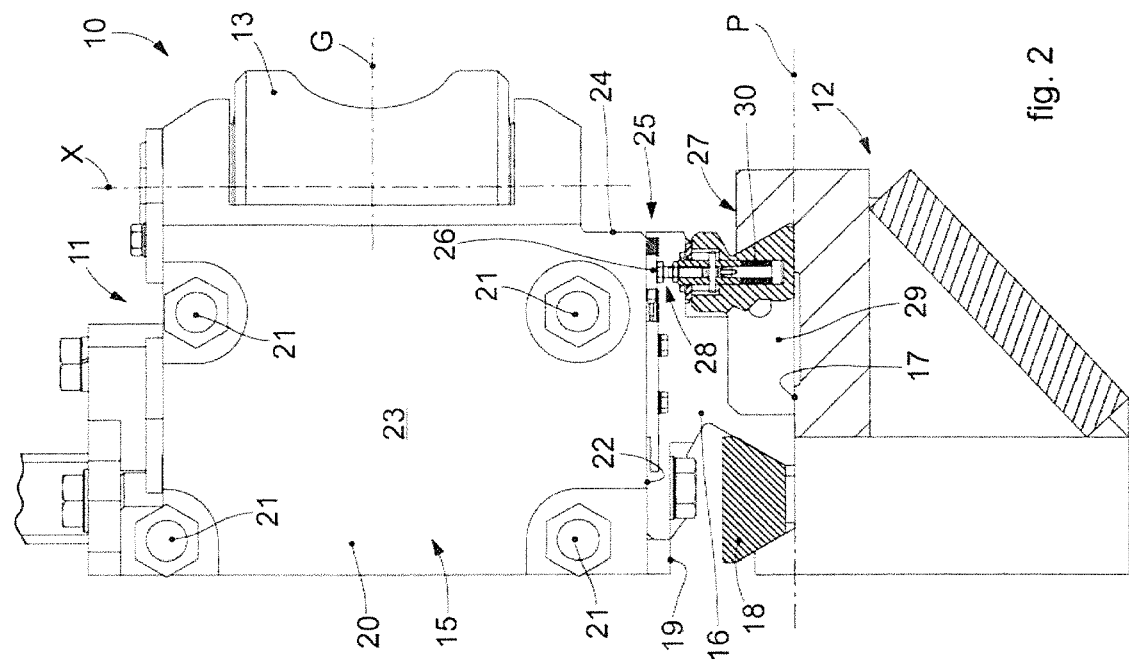


fig. 1

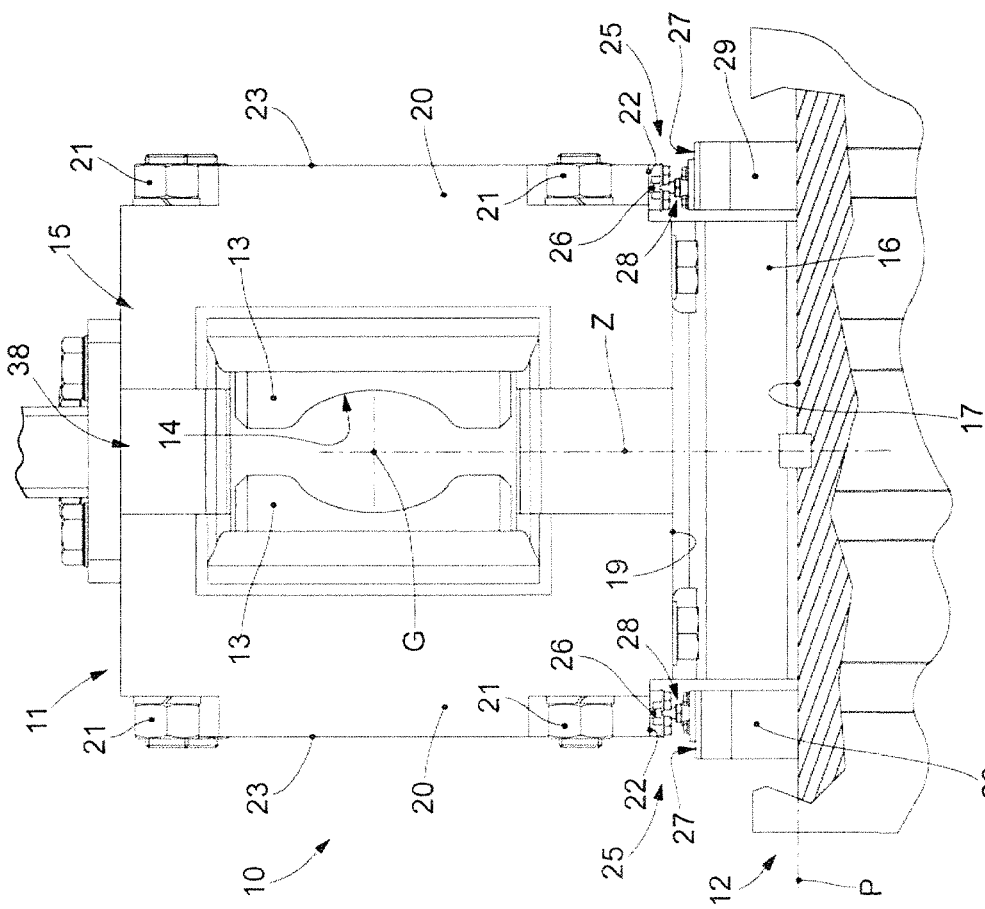


fig. 2

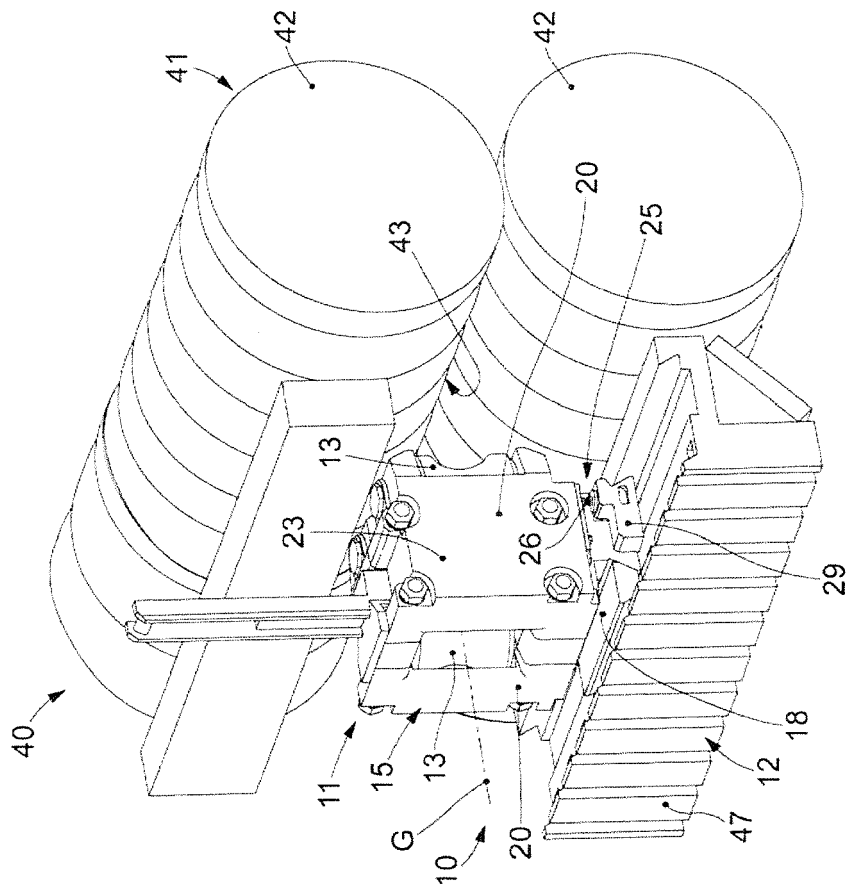


fig. 4

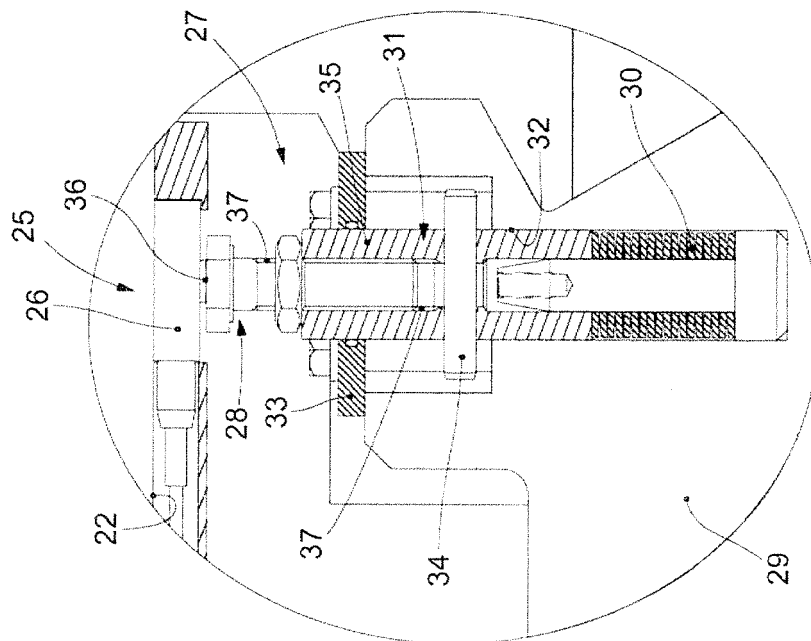


fig. 3

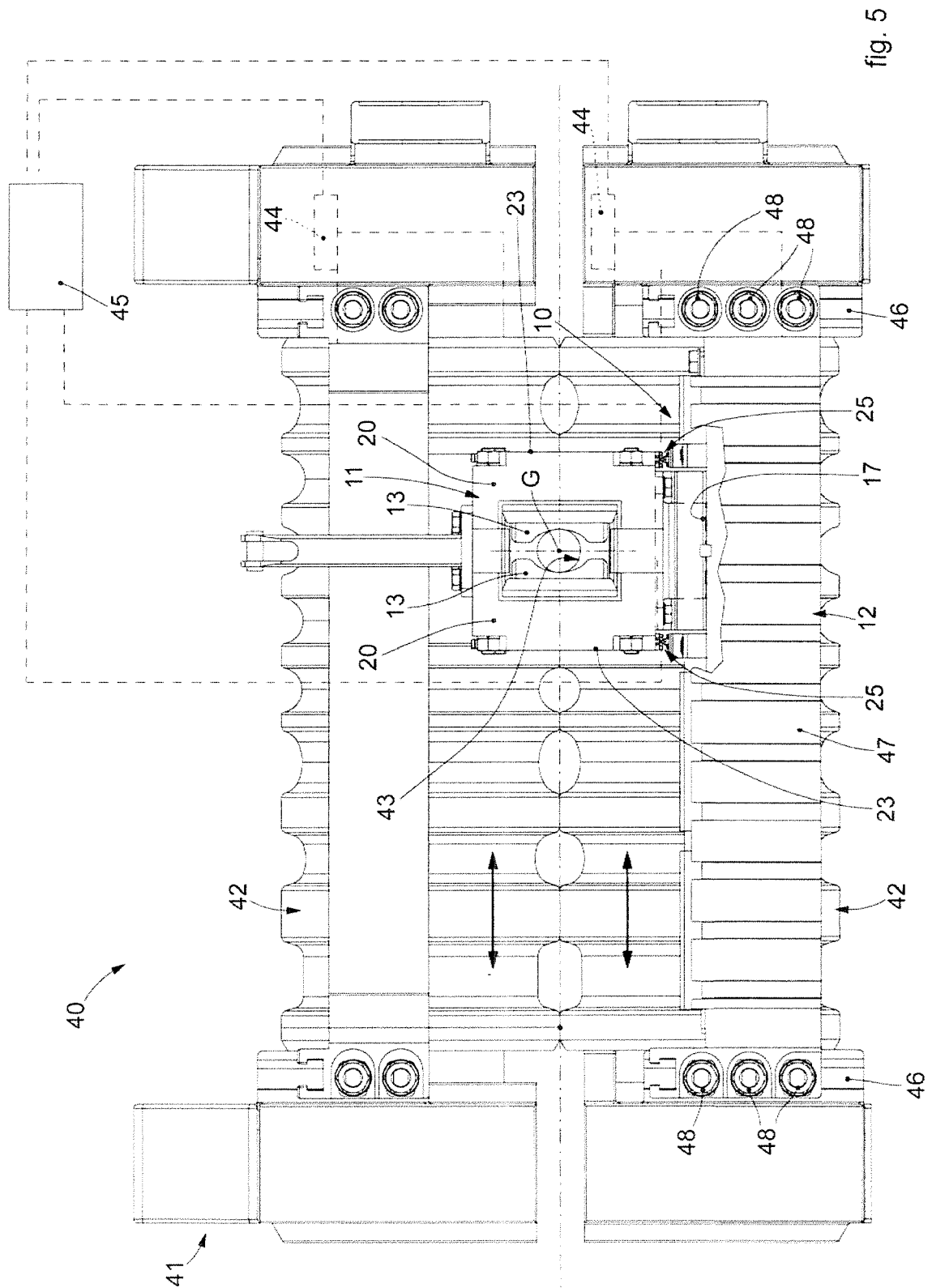


fig. 5

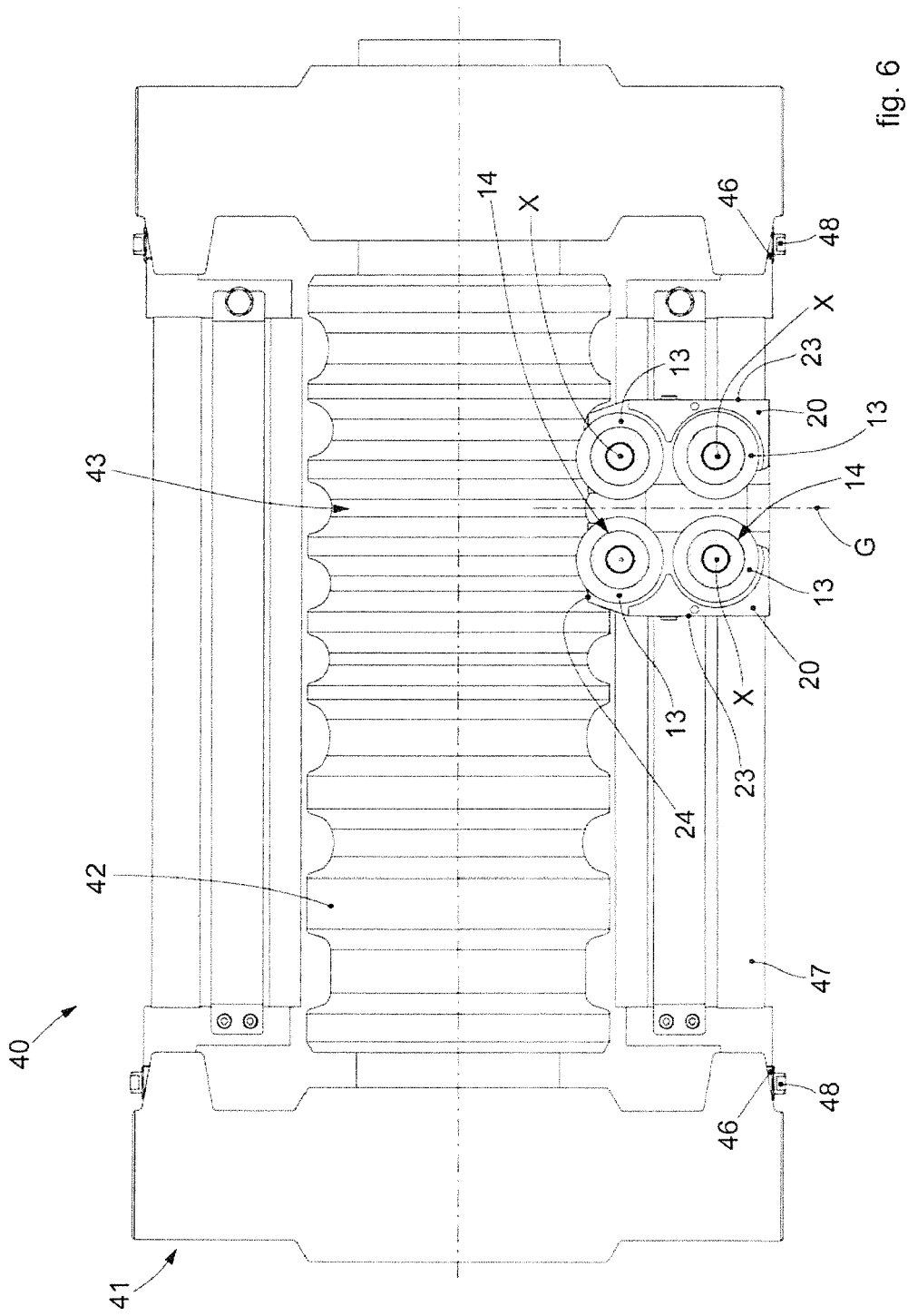


fig. 6



EUROPEAN SEARCH REPORT

Application Number
EP 17 17 4746

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	JP H06 15334 A (KAWASAKI STEEL CO) 25 January 1994 (1994-01-25) * abstract; figures 1a-1c,4 *	1-14	INV. B21B39/16
A	US 2015/298187 A1 (STANARD JR RICHARD W [US]) 22 October 2015 (2015-10-22) * abstract; figures 1-7 *	1-14	
A	DE 31 16 278 A1 (BETR FORSCH INST ANGEW FORSCH [DE]) 11 November 1982 (1982-11-11) * page 4, line 11 - page 5, line 3; figures 1-4 *	1-14	
			TECHNICAL FIELDS SEARCHED (IPC)
			B21B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 28 August 2017	Examiner Forciniti, Marco
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

**ANNEX TO THE EUROPEAN SEARCH REPORT
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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28-08-2017

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