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(54) METHOD TO FEED BARS TO A WORKING MACHINE AND RELATIVE DEVICE

VERFAHREN ZUR ZUFÜHRUNG VON STANGEN ZU EINER ARBEITSMASCHINE UND
VERWANDTE VORRICHTUNG

PROCEDE D'ALIMENTATION EN BARRES D'UNE MACHINE DE TRAVAIL ET DISPOSITIF
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Description

FIELD OF THE INVENTION

[0001] The present invention concerns a method to feed bars to a working machine as per the preamble of claim 10 and the relative feeder device as per the preamble of claim 1. The features mentioned in the preamble are disclosed in WO-A-2005/080021.

[0002] The working machine to which the invention refers is advantageously a stirrup-making machine, a bending machine, a shaping machine, a tying machine or other type of analogous or comparable machine.

[0003] The feeder device according to the invention is suitable to pick up, in a substantially automatic manner, at least one bar at a time from a bundle of bars, and to unload it into a pre-loading position so as to form a store with a desired number of bars, and then to load, substantially in a single operation, possibly comprising one or more movements, all the bars that make up the store into the drawing assembly of said working machine, so as to allow them to be sent for working, while the feeder device can start a new cycle to pick up bars from the bundle and form the store.

BACKGROUND OF THE INVENTION

[0004] Machines for working bars are known, which work one or more bars at a time, for example to achieve shaped pieces for the building trade or other type of product. The machines that use pre-sheared bars normally have one or more feed zones where a bundle is prepared, from which the bars to be sent to the machine are picked up on each occasion.

[0005] The operation to pick up and remove the individual bars from the bundle is often very difficult since the bars, which can also reach lengths of 12 meters and more, are all pell-mell, twisted and tangled with each other. To remove a bar from the bundle, taking it by one end, requires a great deal of effort for the worker, with risks to his safety and a slow-down in the operating cycle, which reduces the productivity of the machine.

[0006] The International Patent application WO 2005/080021, in the name of the Applicant, describes a feeder device comprising first magnetic means that separate an end segment of a plurality of bars from a bundle, and dispose said end segments on a plane raised with respect to said bundle, and second magnetic means which pick up, from the first magnetic means, one bar at a time from among the plurality of bars and unload it in a desired release position, to be more exact, in the drawing assembly of the working machine, so that said bar can be sent for working.

[0007] This device, although extremely efficient, has a limitation in those cases, very frequent, where the working machine is disposed to work several bars simultaneously, for example from 5 to 10, and is therefore equipped with a drawing assembly, for example with rollers or grip-

pers, configured to accommodate the plurality of bars and to send them simultaneously for working.

[0008] In these cases, the known device must sequentially perform a plurality of cycles to pick up one bar at a time and deposit it in the drawing assembly, but then it must obviously stop for the whole time while the bars are being translated by the drawing assembly towards the working machine.

[0009] This entails a reduction in the efficiency and productivity of the machine, since, when the working cycle of the machine is finished, it is necessary to wait, with the machine stopped, until the feeder device again begins its cycle of picking up one bar at a time and positioning all the bars required in the drawing assembly of the machine.

[0010] Purpose of the present invention is therefore to increase the efficiency of a feeder device of the type indicated above so as to reduce the waiting times to obtain the loading of the desired number of bars in the relative drawing assembly.

[0011] The Applicant has devised, tested and embodied the present invention to obtain this purpose and other advantages as shown hereafter.

SUMMARY OF THE INVENTION

[0012] The purpose of the invention is attained by a device as per claim 1 and a method as per claim 10. The dependent claims describe other innovative characteristics of the invention.

[0013] The feeder device according to the invention comprises first magnetic means, disposed substantially in cooperation with an end part, or near the end, of the bundle of bars from which the bar or bars are to be picked up, and second magnetic means able to cooperate with said first magnetic means in order to selectively pick up the bar or bars to be sent to the machine.

[0014] To be more exact, the first magnetic means are associated with first movement means able to move them so as to raise the end parts of a plurality of bars with respect to the bundle.

[0015] The second magnetic means are associated with second movement means able to move them in a direction parallel, slant-wise or curvilinear with respect to the bars whose ends are held raised by the first magnetic means; the second magnetic means are suitable to pick up from the first magnetic means, selectively, the end part of one or more bars, advantageously one at a time, and to displace it and then release it in the desired position, in order to prepare it to be fed to the working machine.

[0016] According to one characteristic of the invention, the second magnetic means are able to sequentially unload a plurality of bars, picked up one at a time from the first magnetic means, in a pre-loading position so as to form a store with said plurality of bars.

[0017] Advantageously, the pre-loading and store-formation position is in proximity with the loading position

defined by the space between the rollers of the drawing assembly.

[0018] The bars are then loaded, substantially with a single operation, all together inside the drawing assembly, which is then activated to remove the bars from the bundle and send them for working.

[0019] Thanks to this procedure for forming the store and the substantially simultaneous loading of several bars into the drawing assembly, we obtain the advantage that, while the drawing assembly is active and is feeding the working machine, the feeder device can restart its cycle of picking up the bars and forming the store.

[0020] In this way, when the working machine has finished its working cycle on the first bars loaded, the store can already have been formed, so that a new plurality of bars, already ready, can be immediately loaded into the drawing assembly, substantially without any waiting times.

[0021] In a preferential embodiment, the position of forming the store of bars to be loaded into the drawing assembly is substantially parallel but below the loading position into the drawing assembly.

[0022] This solution determines the advantage of a lesser reciprocal interference between the rear segments of the bars already inserted into the drawing assembly and the rear segments of the bars that form the store, since the bars inserted into the drawing assembly, at least as far as their front segments are concerned, lie on a different plane from the plane where the front segments lie of the bars that form the store.

[0023] In this case, the loading of the bars that form the store in the drawing assembly provides first a lifting movement to dispose the bars in an aligned position but external with respect to the position of insertion into the drawing assembly, and then a lateral translation to load said bars into the drawing assembly.

[0024] According to another solution, the store is formed in a position aligned and external with respect to the loading position into the drawing assembly, and the insertion of the bars into the drawing assembly provides only a lateral translation.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] These and other characteristics of the present invention will become apparent from the following description of some preferential forms of embodiment, given as a non-restrictive example with reference to the attached drawings wherein:

- figs. 1-4 show a front view of one form of embodiment of the feeder device for bars according to the present invention in a sequence of its operating cycle;
- fig. 5 shows a lateral view of the feeder device in figs. 1-4 used to remove bars from a bundle;
- fig. 6 shows a front view of another embodiment of the feeder device for bars according to the present invention;

- fig. 7 shows a lateral view of the device in fig. 6 used to remove bars from a bundle.

DETAILED DESCRIPTION OF SOME PREFERENTIAL FORMS OF EMBODIMENT

[0026] With reference to the attached drawings, a feeder device 10 for bars 11 according to the invention is suitable to be located upstream of a working machine such as a stirrup-making machine, shaping machine, bending machine, tying machine or any other machine of a similar type or even different.

[0027] Of said working machine the attached figures show a drawing assembly or drawer 27, which in this case consists of a pair of rollers, respectively upper roller 26a, and lower roller 26b. It comes within the scope of the invention that the drawing assembly 27 may consist of a gripper with alternating movement, or can be of any other type.

[0028] The feeder device 10 is suitable to operate on bars 11 substantially of any length and/or diameter, guaranteeing in any case to pick up the bars in an orderly and efficient manner, and to count them without mistakes.

[0029] The device 10 is suitable to pick up, from a bundle of bars 12 lying at least partly in a housing seating 30 (see fig. 7), one or more bars 11 at a time to send to the working machine. The housing seating 30 can comprise two, three or more pockets, possibly movable laterally, inside each of which bars 11 of the same size are disposed, but different from those in the other pockets.

[0030] It comes within the scope of the invention that the feeder device 10 is movable with respect to the pockets, or other housing seating for the bars 11, in order to move selectively according to the type or size of bars 11 to be picked up.

[0031] The possibility of moving the pockets with respect to the feeder device 10, or vice versa, allows to feed the machine sequentially even with bars 11 having a different diameter, if the working program so requires, substantially without interrupting the working cycle of the machine downstream.

[0032] The feeder device 10 is mounted in this case on a supporting frame 18 and comprises first magnetic means 13 consisting of a first magnetic or electromagnetic element 14 disposed advantageously during use in proximity with one end of the bars 11 of the bundle 12.

[0033] It comes within the scope of the invention that the first magnetic means 13 comprise two or more magnetic or electromagnetic elements 14, disposed at several distinct points on the length of the bars 11, advantageously near their front ends.

[0034] The first magnetic element 14 is located with a direction prevalently transverse to the longitudinal development of the bars 11 lying in the respective seating 30, and advantageously has a width such as to cover a considerable part of the width of the bundle 12. The first magnetic element 14 is mounted on an arm 31 associated with a first actuator 15, for example of the fluid-dynamic

type, which achieves a movement thereof, in this case a substantially circular movement - direction 72 (fig. 1).

[0035] Thanks to the linear actuator 15, the magnetic element 14 can be correctly positioned in correspondence with the desired bundle 12 from which the bars 11 are to be removed.

[0036] At the start of the pick-up cycle, the magnetic element 14 is lowered towards the bundle 12, by means of the first actuator 15, to take the lower face thereof, comprising the attractive surface, to a position such as to exert an effect of magnetic attraction on the ends of the bars 11 located at the highest part of the bundle 12. Subsequently, the magnetic element 14 is returned upwards, magnetically lifting the ends of one layer of bars 11 disposed adjacent to each other so as to form substantially a plane (fig. 1).

[0037] The first magnetic element 14 is mounted on the relative arm 31 by means of an articulated joint 42, which allows it a certain freedom of oscillation in order to facilitate the picking up of the bars 11 even if the pockets have a curved and/or shaped bottom, and even if only a few residual bars 11 have remained at the bottom of the pockets.

[0038] When the ends of the bars 11 have been raised by means of the upward movement of the first magnetic means 13, second magnetic means 21 are activated, which comprise a second magnetic element 22 mounted at the end of a second actuator 23 mounted, in turn, on the supporting frame 18 (fig. 2).

[0039] Here too, it comes within the scope of the invention that the second magnetic means 21 comprise two or more magnetic elements 22 able to act at two or more distinct points on the length of the bars 11.

[0040] The second actuator 23 is able to act in a direction 71, substantially perpendicular to the longitudinal development of the bars 11, so as to move, in this case horizontally, the second magnetic element 22 from a first, advanced pick-up position, wherein it moves into cooperation with the attractive surface of the first magnetic element 14 in order to pick up one or more bars 11 from it, advantageously one bar 11 at a time, to a second retracted release position. In the second position, according to the characteristic of the invention, it releases the end of the specific bar 11, which it has picked up from the first magnetic element 14, in correspondence with a supporting surface 61 of a thruster element 65 of an accumulation assembly 60.

[0041] In this case, the bar 11 is released due to the interference on the bar 11 exerted by a stop element 50 during the movement of retraction of the second magnetic element 22. The position of the stop element 50 can advantageously be regulated at least in height according to the diameter of the bars 11 being worked, so as to create a housing made to size for said bars 11.

[0042] The thruster element 65 comprises a front edge 62 facing upward, the upper end 63 of which is conformed as a lead-in slide to help the bars 11 to dispose themselves on the supporting surface 61, which in this case

is substantially horizontal.

[0043] In the embodiment shown in figs. 1-4 the supporting surface 61 of the thruster element 65 is disposed substantially parallel but lying on a plane below the position of the loading plane for the bars 11 into the drawing assembly 27, which substantially corresponds to the upper surface of the lower roller 26b.

[0044] When the first bar 11 has been released, the thruster element 65 performs a first movement towards the inside - direction 70 - to move the bar 11 to an inner waiting position, defined by the position of a substantially vertical abutment plate 64, and then returns backwards to position itself in a position to receive a new bar 11. The abutment plate 64 is substantially positioned flush with the lateral edge of the rollers 26a, 26b of the drawing assembly 27.

[0045] The stop element 50 is then moved vertically to define the housing made to size for the bars 11.

[0046] The drive of the thruster element 65 is obtained by activating a substantially horizontal actuator 66.

[0047] Simultaneously with, or immediately after, the movement of the thruster element 65, the second magnetic element 22 performs a new cycle of picking up a bar 11 and unloading it onto the supporting surface 61 of the thruster element 65 when the latter has returned to its external start-of-cycle position.

[0048] Then the thruster element 65 returns towards the inside, that is, towards the rollers 26a, 26b, so as to locate the new bar 11 in a stand-by position near the abutment plate 64 and adjacent to the first bar 11.

[0049] The cycle to pick up, unload and laterally translate the bars 11 can be repeated a desired number of times so as to form the desired store, also according to the diameter of the bars 11, the configuration of the rollers 26a, 26b, and the requirements of the machine and the working cycle.

[0050] When the formation of the store is complete, the whole accumulation assembly 60 first performs a movement upwards - direction 73 - so as to locate the bars 11 in a position aligned with the upper surface of the lower roller 26b, immediately above the upper end of the abutment plate 64.

[0051] The upper roller 26a is then positioned in the correct position to create a guide channel according to the diameter of the bars 11. Alternatively, a mobile abutment is provided, able to create said guide channel.

[0052] The accumulation assembly 60 then performs a movement of lateral translation towards the rollers 26a, 26b, so as to thrust the bars 11 all together between the rollers 26a, 26b.

[0053] On the opposite side of the rollers 26a, 26b, with respect to the position of the accumulation assembly 60, an abutment roller 67 is advantageously present, which prevents the bars 11 from sliding beyond the loading position between the rollers 26a, 26b.

[0054] When the accumulation assembly 60 has returned to its inactive external position, the upper roller 26a closes on the lower roller 26b and the operation to

remove the loaded bars 11 is started, and they are sent for working.

[0055] While the bars 11 are removed from the bundle and worked, the accumulation assembly 60 returns to its lowered, end-of-cycle position (fig. 1) and the feeder device 10 can start a new cycle to form the store, as previously described.

[0056] Thanks to the lower position where the store is formed compared with the position where the bars are fed to the working machine by the drawing assembly 27, the relative rear segments of the bars 11 interfere with each other less, creating fewer problems of reciprocal friction during the removal of the bars 11 from the relative bundle.

[0057] Thanks to this procedure, when the working of the bars 11 fed by the drawing assembly 27 finishes, the store having the desired number of bars 11 is already substantially ready for immediate loading between the rollers 26a, 26b of the drawing assembly 27.

[0058] The form of embodiment shown in figs. 6 and 7, where the same reference numbers are given to elements equal or equivalent to those already described with reference to figs. 1-5, which therefore will not be described again, provides that the store of bars 11 is formed in a position aligned and external with respect to the loading position defined by the upper surface of the lower roller 26a.

[0059] In this embodiment, when the formation of the store is terminated with the desired number of bars 11, the accumulation assembly 60 performs only a movement of lateral translation to insert the bars 11 between the rollers 26a, 26b, and then returns to its external position so as to allow on the one hand the drawing assembly 27 to be activated so as to feed the bars 11 to the working machine, and on the other hand to prepare a new store-forming cycle to start.

[0060] In this embodiment, a guide roller 39 is shown, in this case solid with the stop element 50 and disposed immediately above the lower roller 26a of the drawing assembly, the function of which is to guide the movement of the bars 11 when they are translated by the accumulation assembly 60 to the loading position between the rollers 26a, 26b.

[0061] The position of the guide roller 39 can be regulated at least in height according to the diameter of the bars 11 being worked.

[0062] In this embodiment, the abutment plate 164 is associated with a positioning actuator, and remains stationary during the whole cycle to form the store of bars 11, so as to define the stop position thereof near the gap between the rollers 26a, 26b of the drawing assembly 27; during the loading step, the abutment plate 164 is raised, or lowered, allowing the bars 11 to be inserted in a removal position between the rollers 26a, 26b.

[0063] In figs. 5 and 7 a header element 37 can be seen, associated with a movement actuator 38. The function of the header element 37 is to align the bars 11 with respect to each other, by acting repeatedly against the

relative ends, after they have been picked up by the first magnetic element 14 and are kept raised with respect to the bundle.

[0064] The header element 37, by selective activation of the movement actuator 38, performs some beating cycles against the ends of the bars 11, equalizing their longitudinal disposition so as to facilitate the subsequent step of loading into the drawing assembly 27 and the working to be carried out afterwards.

[0065] The heading operation can be performed both when the bars 11 are held raised by the first magnetic means 13, and also on bars 11 which have already been unloaded onto the accumulation assembly 60.

[0066] It is clear, however, that modifications and/or additions of parts or steps may be made to the method to feed bars to a working machine and relative feeder device 10 as described heretofore, without departing from the scope of the present invention as defined in the attached claims.

[0067] For example, a sensor may be provided which signals the fact that the second magnetic element 22 is performing a purposeless travel without meeting bars 11, giving consent for a new descent of the first magnetic element 14 towards the bundle of bars 11 to perform a new pick-up.

[0068] Another variant may provide that there are fixed stop elements present above the first magnetic element 14, which allow to discharge the bars 11, and make them fall back into the relative bundle, that have remained gripped on said first magnetic element 14 once the working cycle of the machine has been stopped. This discharge is obtained by rising the first magnetic element 14 by an extra travel beyond said stop elements. The discharge of the bars 11 can also be obtained, in the event of electromagnetic elements being used, by temporarily deactivating electric feed to said first magnetic element 14.

Claims

1. Feeder device for bars, able to selectively pick up and remove from a bundle (12) at least one bar (11) to prepare it for use in a working machine comprising at least a drawing assembly (27), said device comprising first magnetic means (13) able to separate from said bundle (12) at least an end segment of a plurality of bars (11) and to dispose at least the end segments of said plurality of bars (11) on a plane distanced with respect to said bundle (12), and second magnetic means (21) able to pick up from said first magnetic means (13) at least one bar (11) at a time from said plurality of bars (11) and to unload said at least one bar (11) in a desired release position, **characterized in that** it comprises an accumulation assembly (60) able to receive in sequence from said second magnetic means (21) a desired number of bars (11) so as to form a store, and to

transfer said desired number of bars (11) simultaneously to the drawing assembly (27).

2. Device as in claim 1, **characterized in that** said accumulation assembly (60) comprises at least a thruster element (65) defining a supporting surface (61) substantially parallel to the loading plane of said drawing assembly (27). 5
3. Device as in claim 2, **characterized in that** said supporting surface (61) has a start-of-cycle position substantially parallel and lowered with respect to the loading plane of the drawing assembly (27). 10
4. Device as in claim 2, **characterized in that** said supporting surface (61) has a start-of-cycle position substantially parallel and as an extension to the loading plane of the drawing assembly (27). 15
5. Device as in any claim from 2 to 4, **characterized in that** said thruster element (65) comprises a front edge (62) facing upwards, the upper end of which is conformed as a lead-in slide to help said bars (11) to dispose themselves on said supporting surface (61). 20 25
6. Device as in any claim from 2 to 5, **characterized in that** said accumulation assembly (60) comprises an abutment plate (64) disposed substantially between said supporting surface (61) and said drawing assembly (27), able to define the stand-by position of the bars (11) forming the store before they are loaded into the drawing assembly (27). 30
7. Device as in claim 6, **characterized in that** said abutment plate (64) is mobile so as not to interfere with said thruster element (65) at least during the loading step of said bars (11) into the drawing assembly (27). 35
8. Device as in any claim from 2 to 7, **characterized in that** it comprises at least a guide element (39) cooperating with said drawing assembly (27) and cooperating with said thruster element (65) in positioning said bars (11) inside said drawing assembly (27). 40 45
9. Device as in any claim hereinbefore, **characterized in that** it comprises at least a header element (37) able to be selectively activated at least when a plurality of bars (11) have been picked up by said first magnetic means (13) and/or are disposed on said supporting surface (61). 50
10. Method to feed bars (11), used to selectively pick up and remove from a bundle (12) at least one bar (11) to prepare it for use in a working machine comprising at least a drawing assembly (27), comprising a first step in which first magnetic means (13) are brought 55

close to said bundle (12) in order to magnetically attract an end segment of a plurality of bars (11) and distance them from said bundle (12), a second step in which second magnetic means (21) are brought close to said first magnetic means (13) in order to pick up from them at least a first from among said plurality of bars (11) and are then distanced from them so as to dispose said at least one bar (11) in a desired release position, **characterized in that** said second magnetic means (21) sequentially perform a plurality of pick-up cycles in order to unload a desired number of bars (11) in a pre-loading position so as to form a store in a position adjacent said drawing assembly (27).

11. Method as in claim 10, **characterized in that** it comprises at least a step in which the bars (11) that form said store are displaced simultaneously to the position of loading into said drawing assembly (27).
12. Method as in claim 11, **characterized in that** said simultaneous loading provides an upward movement of alignment between the pre-loading position and the position of loading into the drawing assembly (27), and then a movement of lateral translation so as to insert the bars (11) into the drawing assembly (27).
13. Method as in claim 11, **characterized in that** the simultaneous loading provides a movement of lateral translation so as to insert the bars (11) into the drawing assembly (27).
14. Method as in any claim from 10 to 13, **characterized in that** it provides at least a step of heading the ends of the bars (11) held raised by the first magnetic means (13) and/or disposed in the pre-loading position.
15. Method as in any claim from 10 to 14, **characterized in that** during the pre-loading step of said bars (11) into said pre-loading position, said drawing assembly (27) feeds the bars (11) loaded in the previous cycle to the working machine.

Patentansprüche

1. Zuführvorrichtung für Stangen, die zum selektiven Aufnehmen und Herausnehmen mindestens einer Stange (11) aus einem Bündel (12) zum Vorbereiten derselben für die Verwendung in einer Bearbeitungsmaschine geeignet ist, die mindestens eine Zug-Anordnung (27) aufweist, wobei die Vorrichtung aufweist: erste Magnet-Mittel (13), die zum Trennen mindestens eines Endabschnitts einer Mehrzahl von Stangen (11) von dem Bündel (12) und zum Anordnen mindestens der Endabschnitte der Mehrzahl

- von Stangen (11) auf einer Fläche, die relativ zu dem Bündel (12) im Abstand positioniert ist, geeignet sind, und zweite Magnet-Mittel (21), die zum Aufnehmen von jeweils mindestens einer Stange (11) aus der Mehrzahl von Stangen (11) aus den ersten Magnet-Mitteln (13) und zum Abladen der mindestens einen Stange (11) in einer gewünschten Freigabe-Position geeignet sind, **dadurch gekennzeichnet, dass** sie eine Sammel-Anordnung (60) aufweist, die zum Empfangen einer gewünschten Anzahl von Stangen (11) in Folge von den zweiten Magnet-Mitteln (21) zum Bilden eines Lagers und zum gleichzeitigen Übertragen der gewünschten Anzahl von Stangen (11) an die Zug-Anordnung (27) geeignet ist.
2. Vorrichtung gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die Sammel-Anordnung (60) mindestens ein Schub-Element (65) aufweist, das eine Stützfläche (61) definiert, die im Wesentlichen parallel zu der Lade-Fläche der Zug-Anordnung (27) ist.
3. Vorrichtung gemäß Anspruch 2, **dadurch gekennzeichnet, dass** die Stützfläche (61) eine Arbeitszyklus-Start-Position aufweist, die im Wesentlichen parallel und relativ zu der Lade-Fläche der Zugvorrichtung (27) abgesenkt ist.
4. Vorrichtung gemäß Anspruch 2, **dadurch gekennzeichnet, dass** die Stützfläche (61) eine Arbeitszyklus-Start-Position aufweist, die im Wesentlichen parallel und als Verlängerung der Lade-Fläche der Zug-Anordnung (27) ist.
5. Vorrichtung gemäß einem der Ansprüche 2 bis 4, **dadurch gekennzeichnet, dass** das Schub-Element (65) einen vorderen Rand (62) aufweist, der nach oben gewandt ist, dessen oberes Ende als Einführ-Gleitfläche zum Unterstützen der Stangen (11) beim sich-Anordnen auf der Stütz-Fläche (61) eingerichtet ist.
6. Vorrichtung gemäß einem der Ansprüche 2 bis 5, **dadurch gekennzeichnet, dass** die Sammel-Anordnung (60) eine Anstoßplatte (64) aufweist, die im Wesentlichen zwischen der Stützfläche (61) und der Zug-Anordnung (27) angeordnet ist, die zum Definieren der Warteposition der Stangen (11), die das Lager bilden, bevor sie in die Zug-Anordnung (27) geladen werden, geeignet ist.
7. Vorrichtung gemäß Anspruch 6, **dadurch gekennzeichnet, dass** die Anstoßplatte (64) derart bewegbar ist, dass sie zumindest während des Ladeschritts der Stangen (11) in die Zug-Anordnung (27) das Schub-Element (65) nicht stört.
8. Vorrichtung gemäß einem der Ansprüche 2 bis 7, **dadurch gekennzeichnet, dass** sie mindestens ein Führungselement (39) aufweist, das mit der Zug-Anordnung (27) zusammenwirkt und mit dem Schub-Element (65) beim Positionieren der Stangen (11) innerhalb der Zug-Anordnung (27) zusammenwirkt.
9. Vorrichtung gemäß einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** sie mindestens ein Kopf-Element (37) aufweist, das zumindest, wenn eine Mehrzahl von Stangen (11) von den ersten Magnet-Mitteln (13) aufgenommen wurde und/oder auf der Stützfläche (61) positioniert wird, selektiv aktivierbar ist.
10. Verfahren zum Zuführen von Stangen (11), das zum selektiven Aufnehmen und Herausnehmen mindestens einer Stange (11) aus einem Bündel (12) zum Vorbereiten derselben für die Verwendung in einer Bearbeitungsmaschine verwendet wird, die mindestens eine Zug-Anordnung (27) aufweist, aufweisend einen ersten Schritt, bei dem erste Magnet-Mittel (13) in die Nähe des Bündels (12) gebracht werden, so dass ein Endabschnitt einer Mehrzahl von Stangen (11) magnetisch angezogen wird und diese von dem Bündel (12) entfernt angeordnet werden, einen zweiten Schritt, bei dem zweite Magnet-Mittel (21) in die Nähe der ersten Magnet-Mittel (13) gebracht werden zum Aufnehmen aus diesen mindestens einer ersten aus der Mehrzahl von Stangen (11), und dann von diesen entfernt angeordnet werden, so dass zumindest eine Stange (11) in einer gewünschten Freigabe-Position angeordnet wird, **dadurch gekennzeichnet, dass** die zweiten Magnet-Mittel (21) in Folge eine Mehrzahl von Aufnahme-Zyklen zum Abladen von einer gewünschten Anzahl von Stangen (11) in einer Vor-Lade-Position zum Bilden eines Lagers in einer Position benachbart zu der Zug-Anordnung (27) durchführen.
11. Verfahren gemäß Anspruch 10, **dadurch gekennzeichnet, dass** es mindestens einen Schritt aufweist, bei dem die Stangen (11), die das Lager bilden, gleichzeitig in die Position des Ladens in die Zug-Anordnung (27) bewegt werden.
12. Verfahren gemäß Anspruch 11, **dadurch gekennzeichnet, dass** das gleichzeitige Laden eine Ausrichtungsbewegung nach oben zwischen der Vor-Lade-Position und der Position des Ladens in die Zug-Anordnung (27) und anschließend eine seitliche Translationsbewegung zum Einsetzen der Stangen (11) in die Zug-Anordnung (27) vorsieht.
13. Verfahren gemäß Anspruch 11, **dadurch gekennzeichnet, dass** das gleichzeitige Laden eine seitliche Translationsbewegung zum Einsetzen der Stangen (11) in die Zug-Anordnung (27) vorsieht.

14. Verfahren gemäß einem der Ansprüche 10 bis 13, **dadurch gekennzeichnet, dass** es mindestens einen Schritt des Vorschubs der Enden der Stangen (11), die von den ersten Magnet-Mitteln (13) angehoben gehalten werden und/oder in der Vor-Lade-Position angeordnet werden, bereitstellt.

15. Verfahren gemäß einem der Ansprüche 10 bis 14, **dadurch gekennzeichnet, dass** während des Schrittes des Vor-Ladens der Stangen (11) in die Vor-Lade-Position die Zug-Anordnung (27) die in dem vorherigen Zyklus geladenen Stangen (11) der Bearbeitungsmaschine zuführt.

Revendications

1. Dispositif d'alimentation en barres, capable de saisir sélectivement et de retirer d'un groupe (12) au moins une barre (11) afin de la préparer pour une utilisation dans une machine de travail comprenant au moins un ensemble extracteur (27), ledit dispositif comprenant des premiers moyens aimantés (13) capables de séparer dudit groupe (12) au moins un segment d'extrémité d'une pluralité de barres (11) et de disposer au moins les segments d'extrémité de ladite pluralité de barres (11) sur un plan éloigné dudit groupe (12), et des seconds moyens aimantés (21) capables de saisir à partir desdits premiers moyens aimantés (13) au moins une barre (11) à la fois dans ladite pluralité de barres (11) et de décharger ladite au moins une barre (11) dans une position de libération souhaitée, **caractérisé en ce qu'il** comprend un dispositif d'accumulation (60) capable de recevoir successivement de la part desdits seconds moyens aimantés (21) un nombre souhaité de barres (11) de manière à former une réserve, et de transférer ledit nombre souhaité de barres (11) simultanément vers l'ensemble extracteur (27).

2. Dispositif selon la revendication 1, **caractérisé en ce que** ledit dispositif d'accumulation (60) comprend au moins un élément pousseur (65) définissant une surface de support (61) sensiblement parallèle au plan de chargement dudit ensemble extracteur (27).

3. Dispositif selon la revendication 2, **caractérisé en ce que** ladite surface de support (61) présente une position de début de cycle sensiblement parallèle et abaissée par rapport au plan de chargement de l'ensemble extracteur (27).

4. Dispositif selon la revendication 2, **caractérisé en ce que** ladite surface de support (61) présente une position de début de cycle sensiblement parallèle et en extension du plan de chargement de l'ensemble extracteur (27).

5. Dispositif selon l'une quelconque des revendications 2 à 4, **caractérisé en ce que** ledit élément pousseur (65) comprend un bord frontal (62) tourné vers l'avant, dont l'extrémité supérieure est formée comme une glissière de guidage pour aider lesdites barres (11) à se disposer elles-mêmes sur ladite surface de support (61).

6. Dispositif selon l'une quelconque des revendications 2 à 5, **caractérisé en ce que** ledit dispositif d'accumulation (60) comprend une plaque de butée (64) disposée sensiblement entre ladite surface de support (61) et ledit ensemble extracteur (27), capable de définir la position d'attente des barres (11) formant la réserve avant leur chargement dans l'ensemble extracteur (27).

7. Dispositif selon la revendication 6, **caractérisé en ce que** ladite plaque de butée (64) est mobile de façon à ne pas interférer avec ledit élément pousseur (65) au moins pendant l'étape de chargement desdites barres (11) dans l'ensemble extracteur (27).

8. Dispositif selon l'une quelconque des revendications 2 à 7, **caractérisé en ce qu'il** comprend au moins un élément de guidage (39) coopérant avec ledit ensemble extracteur (27) et coopérant avec ledit élément pousseur (65) dans le positionnement desdites barres (11) à l'intérieur dudit ensemble extracteur (27).

9. Dispositif selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'il** comprend au moins un élément connecteur (37) capable d'être activé sélectivement au moins lorsqu'une pluralité de barres (11) a été saisie par lesdits premiers moyens aimantés (13) et/ou est disposée sur ladite surface de support (61).

10. Procédé d'alimentation en barres (11), utilisé pour saisir et retirer sélectivement d'un groupe (12) au moins une barre (11) afin de la préparer pour une utilisation dans une machine de travail comprenant au moins un ensemble extracteur (27), comprenant une première étape au cours de laquelle des premiers moyens aimantés (13) sont approchés dudit groupe (12) afin d'attirer par aimantation un segment d'extrémité d'une pluralité de barres (11) et de l'éloigner dudit groupe (12), une deuxième étape au cours de laquelle des seconds moyens aimantés (21) sont approchés desdits premiers moyens aimantés (13) afin de saisir auprès de ceux-ci au moins une première barre dans ladite pluralité de barres (11), puis sont éloignés de ceux-ci de manière à disposer ladite au moins une barre (11) dans une position de libération souhaitée, **caractérisé en ce que** lesdits seconds moyens aimantés (21) effectuent séquentiellement une pluralité de cycles de saisie afin de dé-

charger un nombre souhaité de barres (11) dans une position de préchargement de manière à former une réserve dans une position adjacente audit ensemble extracteur (27).

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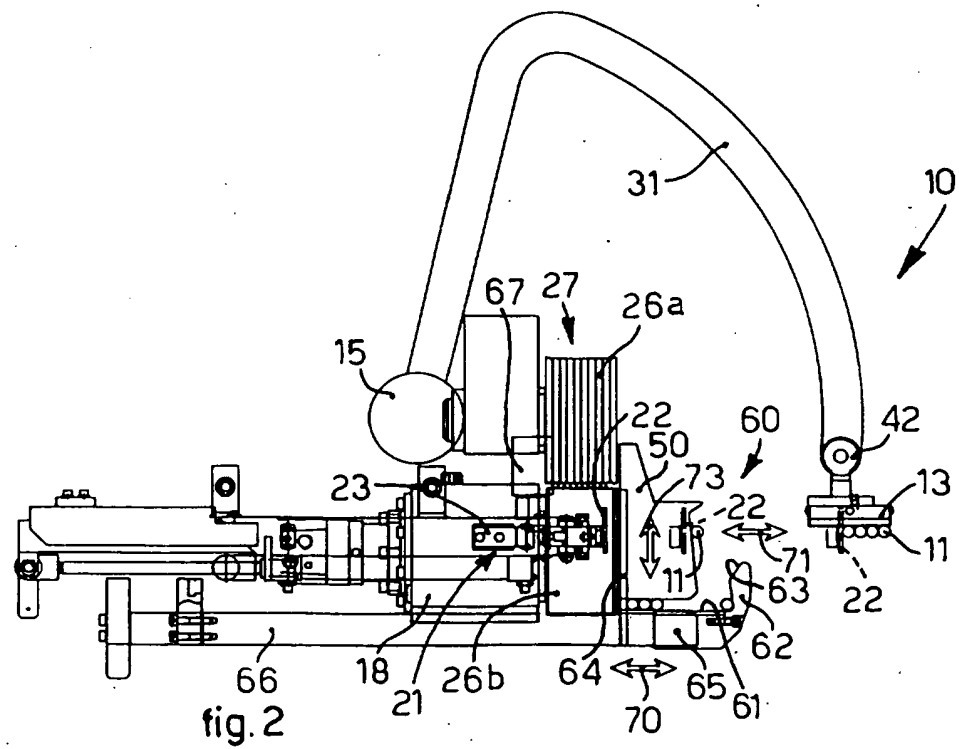
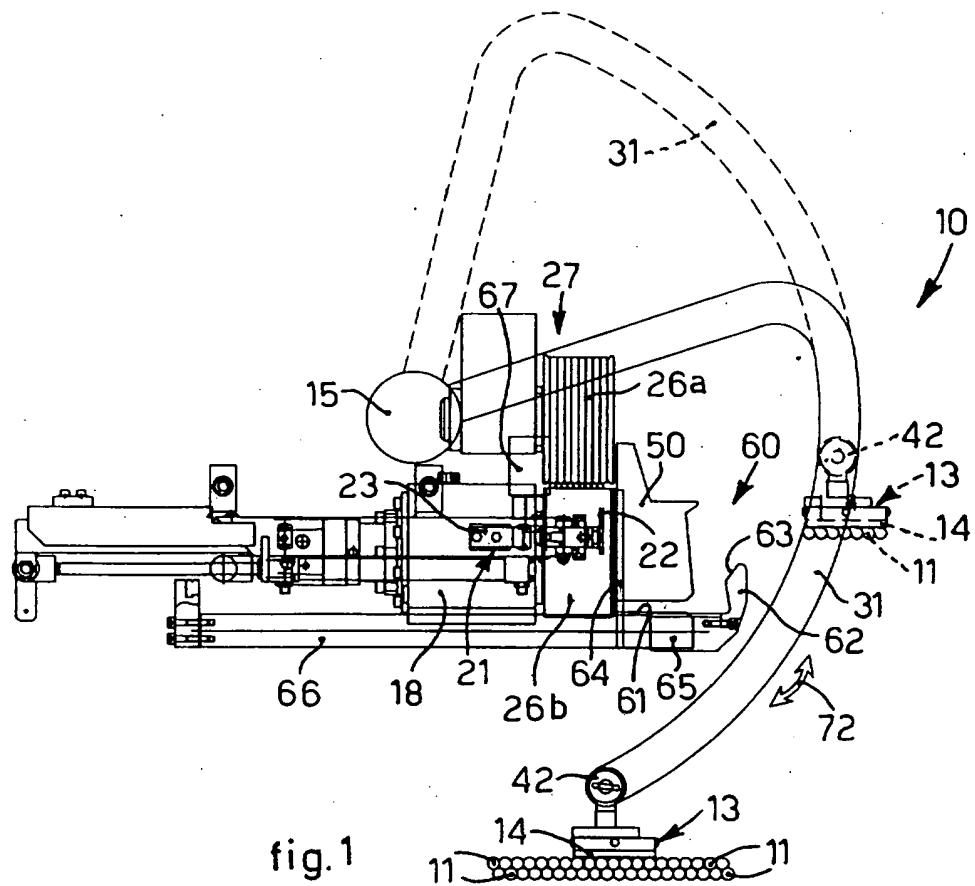
11. Procédé selon la revendication 10, **caractérisé en ce qu'il** comprend au moins une étape au cours de laquelle les barres (11) qui forment ladite réserve sont déplacées simultanément vers la position de chargement dans ledit ensemble extracteur (27). 10
12. Procédé selon la revendication 11, **caractérisé en ce que** ledit chargement simultané prévoit un mouvement d'alignement vers le haut entre la position de préchargement et la position de chargement dans l'ensemble extracteur (27), puis un mouvement de translation latérale de façon à insérer les barres (11) dans l'ensemble extracteur (27). 15
13. Procédé selon la revendication 11, **caractérisé en ce que** le chargement simultané prévoit un mouvement de translation latérale de façon à insérer les barres (11) dans l'ensemble extracteur (27). 20
14. Procédé selon l'une quelconque des revendications 10 à 13, **caractérisé en ce qu'il** prévoit au moins une étape d'avancement des extrémités des barres (11) maintenues surélevées par les premiers moyens aimantés (13) et/ou disposées dans la position de préchargement. 25 30
15. Procédé selon l'une quelconque des revendications 10 à 14, **caractérisé en ce qu'au** cours de l'étape de préchargement desdites barres (11) dans ladite position de préchargement, ledit ensemble extracteur (27) alimente la machine de travail en barres (11) chargées au cours du cycle précédent. 35

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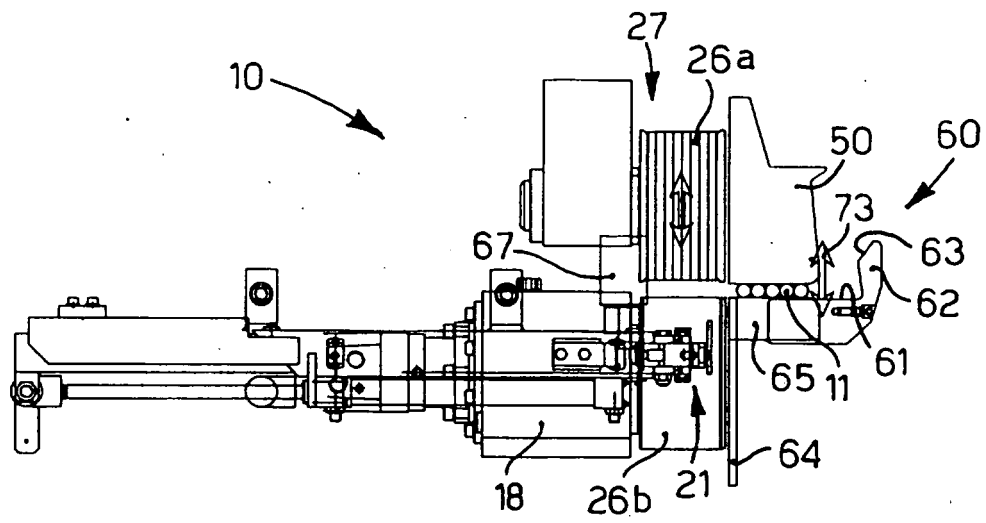


fig. 3

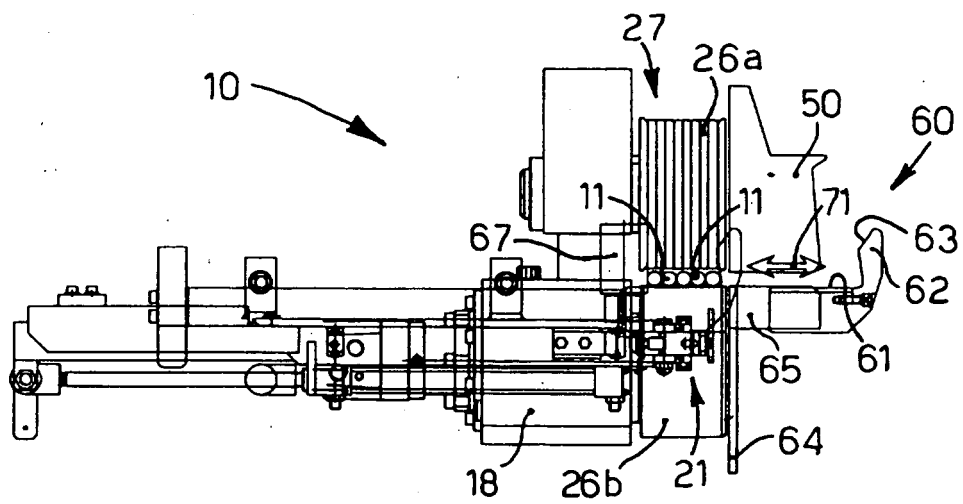
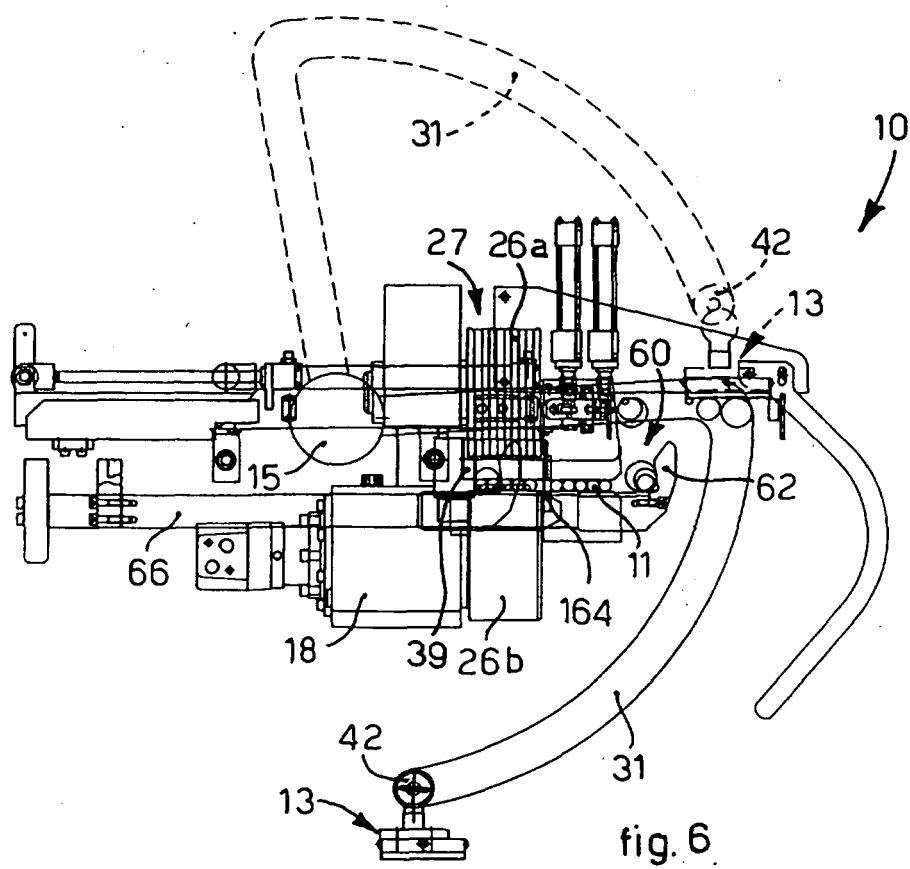
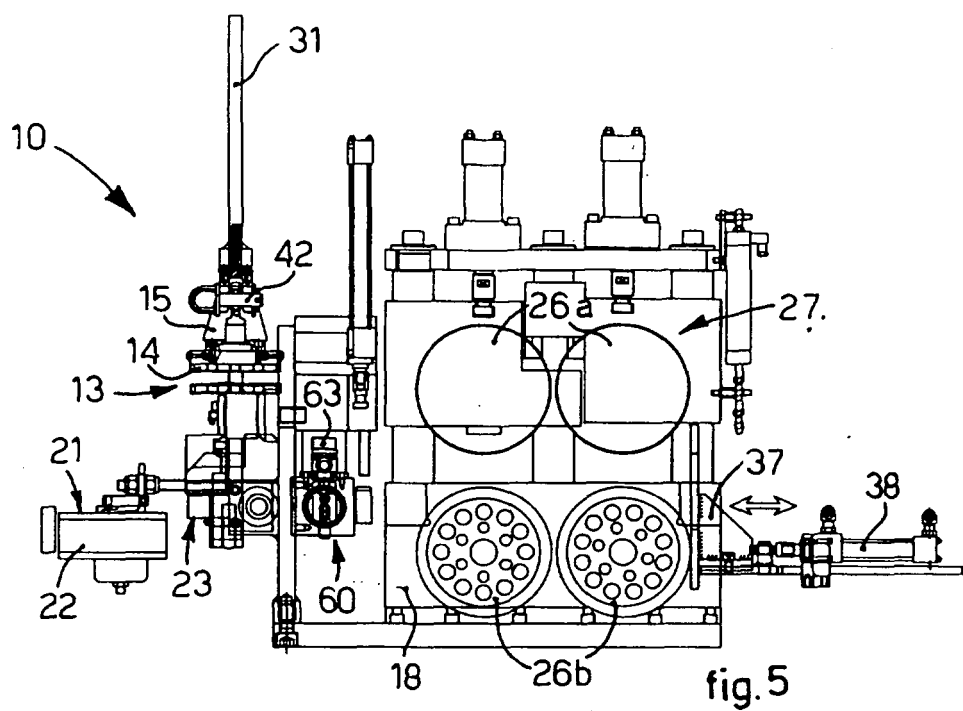


fig. 4



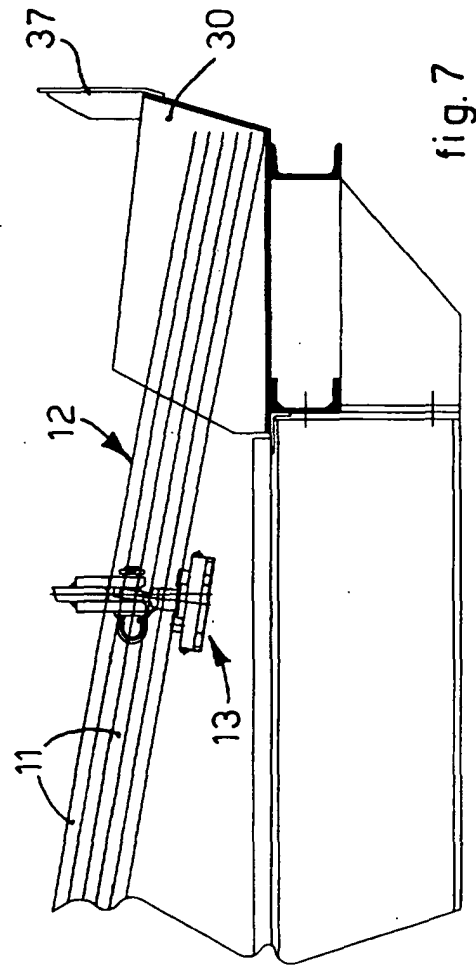
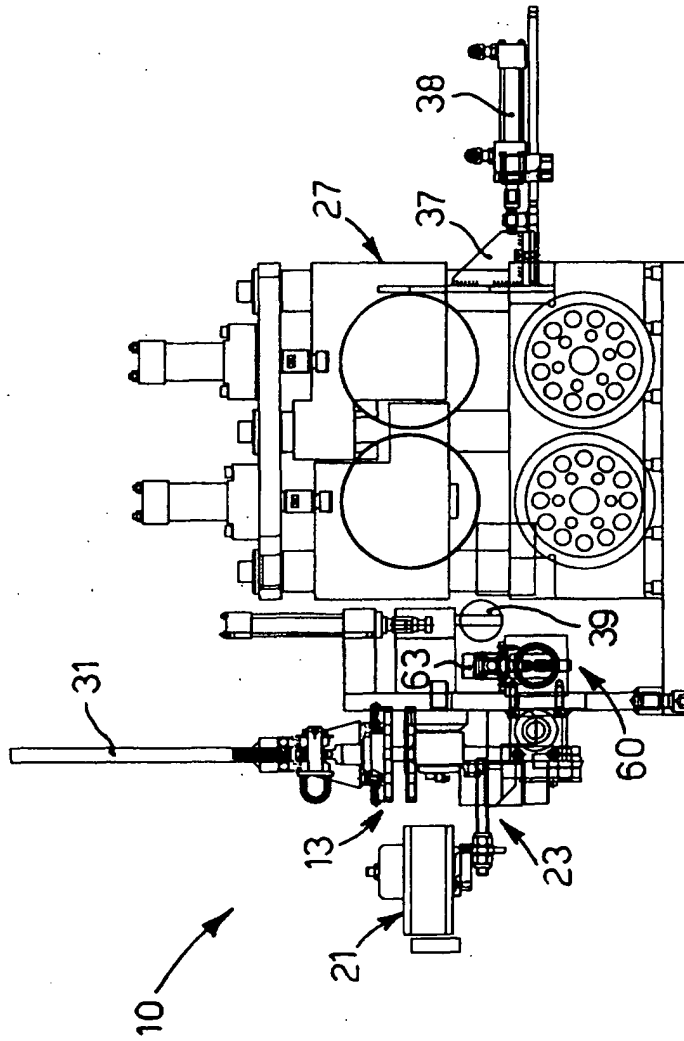


fig. 7

REFERENCES CITED IN THE DESCRIPTION

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