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(71) Applicant: **M.E.P. Macchine Elettroniche Piegatrici S.p.A.**
33010 Reana del Rojale (UD) (IT)

(72) Inventor: **Del Fabro, Giorgio**
33019, Tricesimo (UD) (IT)

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(74) Representative: **Petraz, Gilberto Luigi et al GLP S.r.l.**
Piazzale Cavedalis 6/2
33100 Udine (IT)

(54) **Feed device for metal bars and relative method**

(57) Device (10) for feeding metal bars (11) to a work machine (13). The device (10) comprises a store (15) in which the metal bars (11) are grouped together in bundles, and pick-up members (16) which extract one or more bars (11) at a time from one of the bundles in order to feed them into the work machine (13). The device (10)

also comprises a translation unit (40) which includes a supporting plane (17) for the bars (11), disposed in an intermediate position between the store (15) and the work machine (13), and transport elements (30) able to be selectively activated in order to transfer the metal bars (11) laterally, after they have been completely extracted from the bundle, towards the work machine (13).

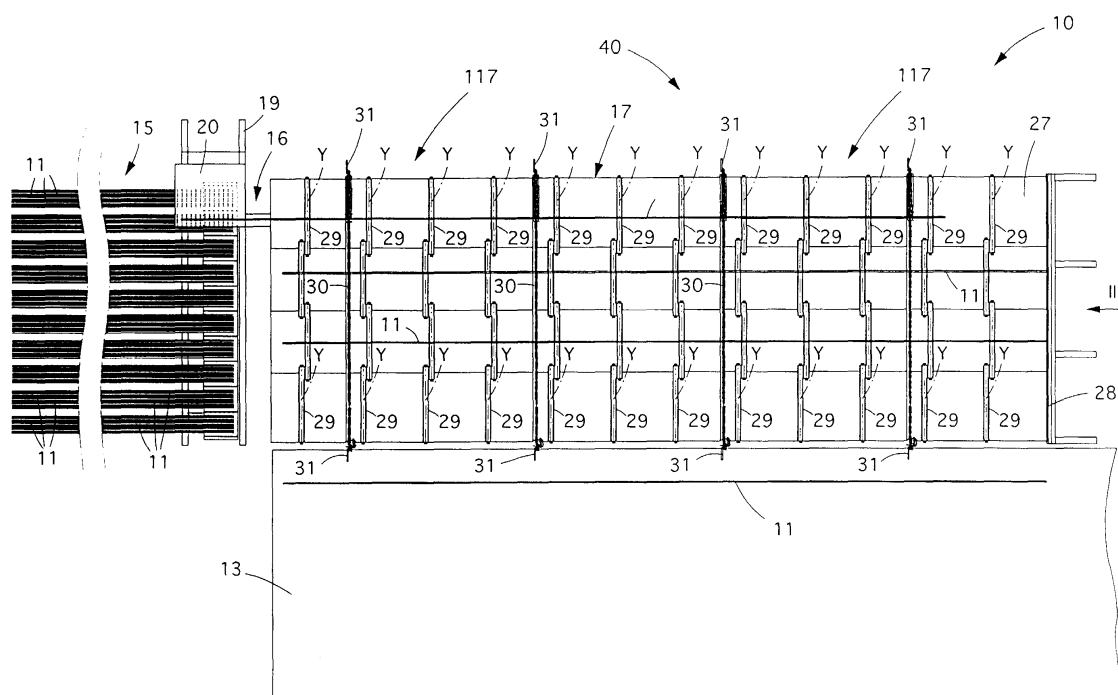


fig. 1

Description

FIELD OF THE INVENTION

[0001] The present invention concerns a feed device for metal bars, and the relative method, able to be used in association with automatic machines, such as for example stirrup-making machines, bending machines, shaping machines, binding machines, or other similar machines for working bars. To be more exact, the invention allows to feed metal bars, substantially continuously, to an automatic machine, eliminating downtimes while waiting for loading, and increasing the productivity of the machine.

BACKGROUND OF THE INVENTION

[0002] Automatic machines for working metal bars are known, such as for example, stirrup-making machines, bending machines, shaping machines, binding machines or others, which work one or more bars at a time in order to make shaped pieces for the building trade or other type of product, or simply to prepare bars cut to size.

[0003] Upstream of such machines a feed store is normally provided, as for example disclosed in EP-A-501.212, in which bars of various diameters are disposed in homogeneous bundles, from which on each occasion the bars to be sent to the machine are picked up, according to the specific requirements.

[0004] The operation to pick up and extract the individual bars from the relative bundle is often very difficult because the bars, which can reach a length of as much as 12 meters or more, are all disposed haphazardly, entangled and twisted. To extract a bar manually, taking it from one end, requires great effort on the part of the operator, with risks to his personal safety and slow-downs in the operating cycle, thus considerably reducing the productivity of the machine.

[0005] At least partly automatic devices have been proposed for feeding bars to work machines, some of which use magnetic pick-up means.

[0006] However, even using such extraction means requires keeping the machine to which the bars are provided, for example a shearing machine, inactive at least for the time needed to pick up the individual bar and prepare it for feeding to the machine itself. This inactivity entails a considerable reduction in the productivity of the machine.

[0007] A purpose of the present invention is to achieve a feed device for metal bars which allows to considerably reduce the stand-by downtimes due to picking up and extracting the individual bars from the bundle.

[0008] 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

[0009] The present invention is set forth and characterized in the main claims, while the dependent claims describe other characteristics of the invention or variants to the main inventive idea.

[0010] A feed device for metal bars according to the present invention can be associated with any automatic machine for working said metal bars, and comprises at least a store in which the metal bars are disposed in different bundles, advantageously one for each different measurement of the bars; the feed device also comprises pick-up means suitable to extract one or more metal bars at a time from one of the bundles, according to requirements, in order to feed them to the automatic machine.

[0011] According to a characteristic of the present invention, the feed device also comprises a translation unit comprising at least a supporting plane, disposed in an intermediate position between the store and the work machine, and transport means.

[0012] The translation unit allows to transfer the metal bars on each occasion, after they have been completely extracted from the bundle, towards the automatic machine, thus in practice achieving a dynamic unit for feeding the metal bars to the machine.

[0013] During the progressive transfer of the metal bars disposed on the supporting plane towards the machine, the pick-up means is free to operate substantially without ever stopping its functioning, so that a continuous extraction of the bars is achieved from the bundles, combined with a continuous feed of the bars to the work machine.

[0014] In a preferential form of embodiment, the automatic machine consists of a shearing machine suitable for cutting to size the bars extracted from the bundle.

[0015] According to a variant, two shearing machines are disposed at the two sides of the supporting plane in order to be fed alternately with bars by means of a movement with an opposite direction of the transport means.

[0016] According to a preferential embodiment, the supporting plane comprises a plurality of supporting benches at intervals from each other, and the transport means comprises chains or belts disposed substantially orthogonal to the development of the supporting plane and in an intermediate position between the supporting benches.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] These and other characteristics of the present invention will become apparent from the following description of a preferential form of embodiment, given as a non-restrictive example with reference to the attached drawings wherein:

- fig. 1 is a schematic plane view of the feed device for metal bars according to the present invention;
- fig. 2 is an enlarged lateral view of a detail of the feed

device in fig. 1;

- fig. 3 shows a view from III of the device in fig. 1;
- fig. 4 shows a variant of the feed device in fig. 1.

DESCRIPTION OF A PREFERENTIAL FORM OF EMBODIMENT

[0018] With reference to the attached figures, a feed device 10 according to the present invention is configured to feed, substantially continuously, a plurality of metal bars 11 to an automatic machine 13, shown only schematically in fig. 1, for example a shearing machine, a stirrup-making machine or other analogous or comparable machine.

[0019] To be more exact, the feed device 10 according to the invention is suitable to pick up metal bars 11 from a store 15 where they are grouped together, according to their diameter, in a plurality of homogeneous bundles, in this case disposed adjacent to each other.

[0020] The store 15 is of a substantially known type, for example with adjacent pockets, and therefore will not be described in detail here.

[0021] The device 10 comprises a pick-up member 16 disposed in cooperation with the terminal part of the metal bars 11, and a translation unit 40. The translation unit 40 comprises a supporting plane 17, on which the pick-up member 16 deposits the metal bars 11 on each occasion picked up from the store 15, and transport means, for example a belt 30, associated with a base 27.

[0022] The pick-up member 16 comprises a frame 19 which develops in a direction substantially transverse to the longitudinal development of the store 15, and hence of the bars 11, on which a trolley 20 may slide, supporting a drawing assembly 21 and a magnetic loader 22.

[0023] The trolley 20 moves to position the drawing assembly 21, and the magnetic loader 22 in correspondence with the specific bundle of metal bars 11 according to the diameter required on each occasion.

[0024] The drawing assembly 21 is the type with rollers 23 and is suitable to receive one or more bars 11 at a time from the magnetic loader 22. When the front end of the bar 11 extracted is gripped between the rollers 23, the assembly 21 is activated to completely extract the bar 11 from the relative bundle of the store 15 and deposit it on the supporting plane 17, as will be explained in detail hereafter.

[0025] The magnetic loader 22 comprises, in this case, two magnets, one vertical 25 and one horizontal 26, which allow to pick up one or more metal bars 11 from the bundle, and to position them between the rollers 23 of the drawing assembly 21. To be more exact, with reference to fig. 2, the vertical magnet 25 moves in the direction of the arrow F and lifts the terminal part of a plurality of bars 11 from the relative bundle, substantially taking them to the same level as a horizontal median axis X that passes through the rollers 23, but distanced horizontally from the latter by some tens of centimetres. At this point, the horizontal magnet 26, which is normally

stationed on the horizontal median axis X of the rollers 23, moves towards the bars 11 in order to contact the outermost one of those held by the vertical magnet 25, and then inverts its direction and draws the bar 11 to be gripped between the rollers 23.

[0026] If it is desired to extract from the bundle two or more bars 11 at a time, the sequence of movement of the horizontal magnet 26 can be repeated.

[0027] The supporting plane 17 comprises a plurality of benches 117 separated at intervals longitudinally from each other and disposed transversely to the development of the bars 11. Each bench 117 consists in this case of a succession of cylindrical elements 29, free to rotate with respect to the relative axis Y, in order to promote the sliding of the bars 11 when they are extracted and progressively deposited on the supporting plane 17.

[0028] In an intermediate position between at least some of the benches 117 there are transport chains 30, in this case four, disposed substantially orthogonal to the development of the supporting plane 17.

[0029] The transport chains 30 allow the lateral translation of the metal bars 11, once they have been completely extracted from the relative bundle, towards the machine 13.

[0030] The base 27 also supports, on the opposite side with respect to the pick-up member 16, an abutment element 28 which functions as a header for the bars 11 and stops their movement of inertia when they are released by the rollers 23.

[0031] A plurality of blades 31, protruding from the plane defined by the benches 117, are associated with each of the transport chains 30.

[0032] The transport chains 30 are associated with toothed crowns (fig. 3), respectively, a drive crown 32 and a driven crown 33. Each drive crown 32 is keyed to a common drive shaft 34, in turn made to rotate by means of a drive member 35, so that all the transport chains 30 can be moved with a single drive member 35.

[0033] The feed device 10 as described heretofore functions as follows.

[0034] When it is necessary to feed metal bars 11 of a determinate diameter to the machine 13, the relative bundle is identified, and the trolley 20 is moved transversely to the store 15 so as to dispose the vertical magnet 25 of the magnetic loader 22 in correspondence with said bundle. At this point, the vertical magnet 25 lifts a plurality of bars 11 from the bundle so that the horizontal magnet 26 can pick up, as we said, at least one of the bars 11 and position it between the rollers 23. When the bar 11 is gripped, the rollers 23 are activated to extract it completely from the bundle and unload it onto the supporting plane 17.

[0035] The metal bar 11 translates on the cylindrical transport elements 29 until it is released by the rollers 23 and stops against the abutment 28.

[0036] As soon as the rollers 23 release the bar 11, the trolley 20 can move to pick up a new bar 11 of the same or different diameter according to requirements.

[0037] In the meantime, the chains 30 can be driven to start to translate, orthogonally to their axis, the bars 11 already disposed on the supporting plane 17 towards the work machine 13. For this purpose, the thrust blades 31 contact the relative bar 11 and draw it progressively towards the machine 13.

[0038] Therefore, we have total independence of the movement of the pick-up member 16, which can perform its cycles to extract the bars 11 without any break in continuity, and the movement of feeding the bars 11 to the machine 13, performed by the cooperation between the supporting plane 17, which acts as a dynamic accumulation unit, and the transport chains 30.

[0039] In the embodiment shown in fig. 4, the machine 13 can comprise, or be served by, a shearing assembly 36 which develops substantially alongside the supporting plane 17. The shearing assembly 36 can comprise a roller-way on which the bars 11, progressively translated laterally, are unloaded by the movement of the chains 30. In this case, the shearing assembly 36 comprises a drawing assembly with rollers 37 and shears 39, by means of which segments 12 of a desired length are formed, for example to be supplied in turn to a work machine 13, or to be used in any other way.

[0040] It comes within the scope of the invention that a shearing assembly 36, and/or a work machine 13, are provided on both sides of the supporting plane 17, so as to be able to be both served alternately by inverting the direction of movement of the transport chains 30.

[0041] It also comes within the scope of the present invention to provide that instead of the transport chains 30 any other known transport mechanism may be provided, such as for example a step-by-step mechanism, with actuators, or vibratory, cascade, or other suitable to guarantee the formation of a feed unit for the automatic machine 13.

[0042] In other, equivalent solutions, instead of the magnetic loader 22 a gripper loader may be provided, or a mechanical arm, rollers or other known type suitable for the purpose.

[0043] It is also clear that, although the present invention has been described with reference to specific examples, a person of skill in the art shall certainly be able to achieve many other equivalent forms of feed device for metal bars and relative method, having the characteristics as set forth in the claims and hence all coming within the field of protection defined thereby.

Claims

1. Feed device for feeding metal bars (11) to a work machine (13), said device (10) comprising at least a store (15) in which said metal bars (11) are grouped together in at least one bundle, and pick-up means (16) able to extract one or more bars (11) at a time from one of said bundles in order to feed them to said work machine (13), said feed device also com-

prising a translation unit (40) including at least a supporting plane (17) for said bars (11), disposed in an intermediate position between said store (15) and said work machine (13), and transport means (30) able to be selectively activated in order to transfer the metal bars (11) laterally, after they have been completely extracted from the bundle, towards said work machine (13), **characterized in that** said supporting plane (17) comprises a plurality of benches (117) separated longitudinally at intervals from each other, said transport means (30) being disposed between at least two of said adjacent benches (117).

2. Device as in claim 1, **characterized in that** said benches (117) are disposed substantially transverse to the longitudinal development of the supporting plane (17).

3. Device as in claim 1, **characterized in that** each of said benches (117) comprises one or more cylindrical elements free to rotate with respect to an axis (Y) substantially orthogonal to the longitudinal development of the supporting plane (17).

4. Device as in any claim hereinbefore, **characterized in that** said transport means comprises at least a motorized chain (30) disposed transversely to the longitudinal development of said supporting plane (17).

5. Device as in claim 1, **characterized in that** said supporting plane (17), at an opposite end with respect to that facing towards said store (15), has an abutment element (28) for heading and stopping said metal bars (11).

6. Device as in claim 4, **characterized in that** said chain (30) supports at least a thrust blade (31) protruding from said supporting plane (17).

7. Device as in any claim hereinbefore, **characterized in that** the direction of movement of said transport means (30) can be selectively inverted in order to translate the metal bars (11) on one side or the other of said supporting plane (17).

8. Device as in any claim hereinbefore, **characterized in that** said work machine (13) comprises or cooperates with an assembly (36) to shear said metal bars (11) to size.

9. Device as in any claim hereinbefore, **characterized in that** said pick-up means (16) comprises a trolley (20) able to slide transversely to the longitudinal development of the store (15) and comprising at least a drawing assembly (21) and a loading assembly (22).

10. Device as in claim 9, **characterized in that** said loading assembly (22) comprises extraction means of the magnetic type (25, 26).

11. Method to feed metal bars (11), disposed in at least a bundle in a store (15), to a work machine (13), **characterized in that** it comprises the following steps:

- at least one bar (11) is completely extracted from said bundle by means of a pick-up member (16) and disposed on a supporting plane (17) disposed in an intermediate position between said store (15) and said work machine (13);
- transport means (30) are activated, cooperating with said supporting plane (17) in order to transfer the metal bar (11) laterally over a plurality of benches (117) separated longitudinally at intervals from each other, said transport means (30) being disposed between at least two of said adjacent benches (117), after it has been completely extracted from the bundle, towards said work machine (13);
- simultaneously with said lateral transfer step of the extracted bar (11), the pick-up member (16) is driven to perform a new cycle of extracting a second metal bar (11) and unloading it onto said supporting plane (17).

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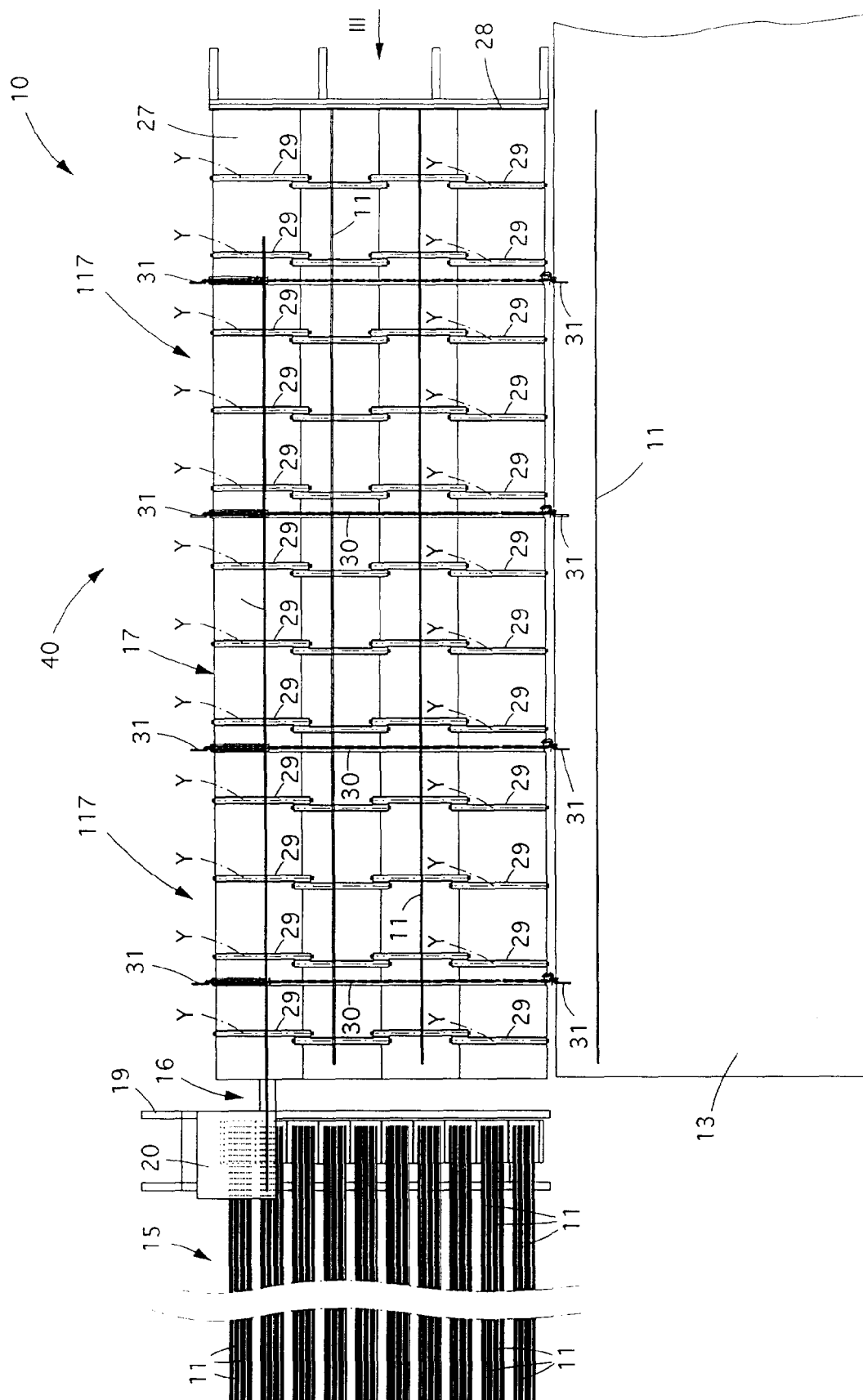


fig. 1

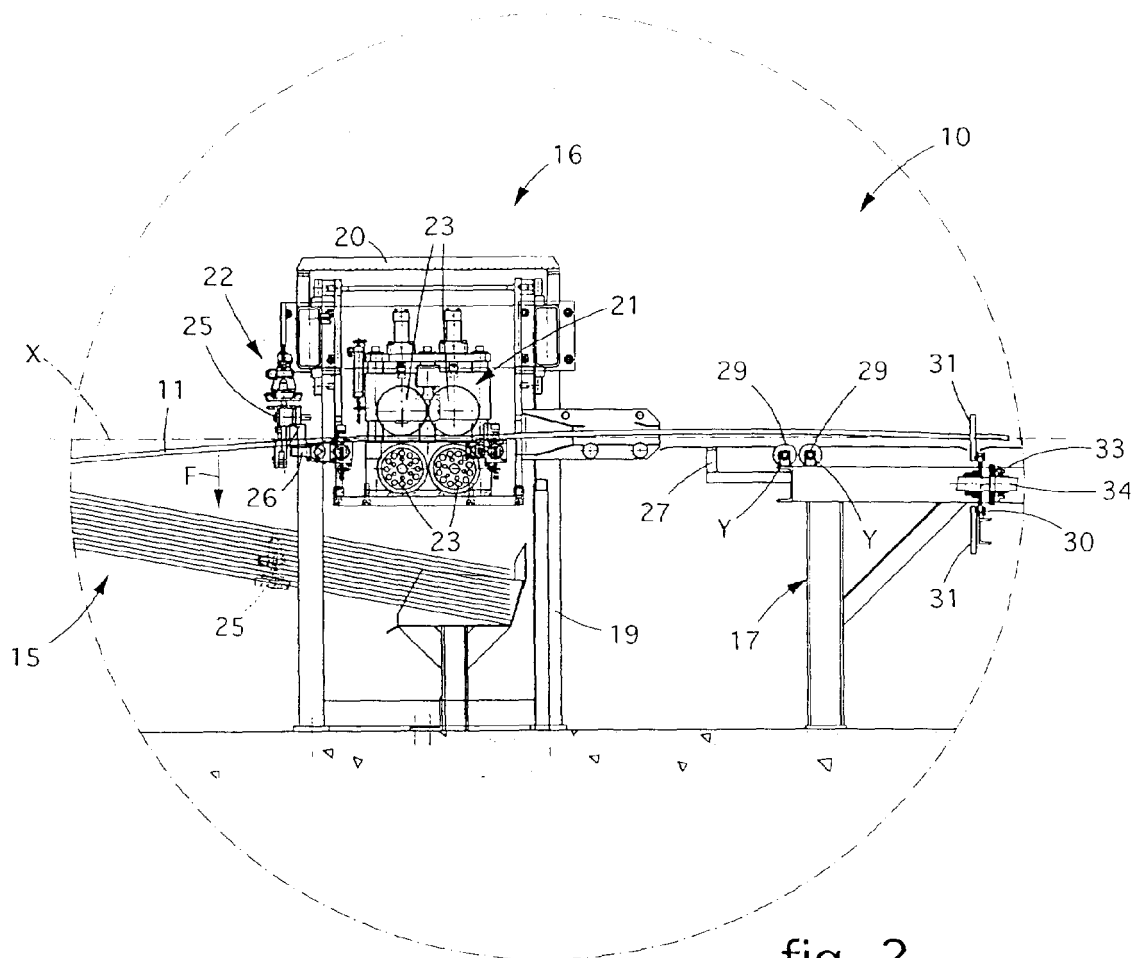


fig. 2

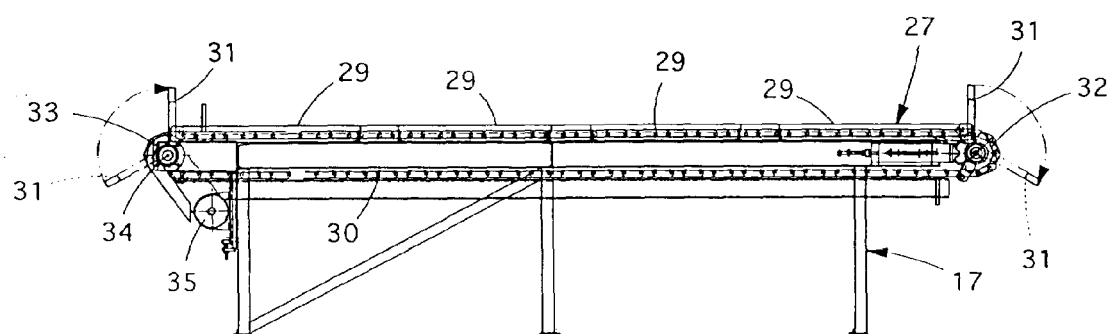


fig. 3

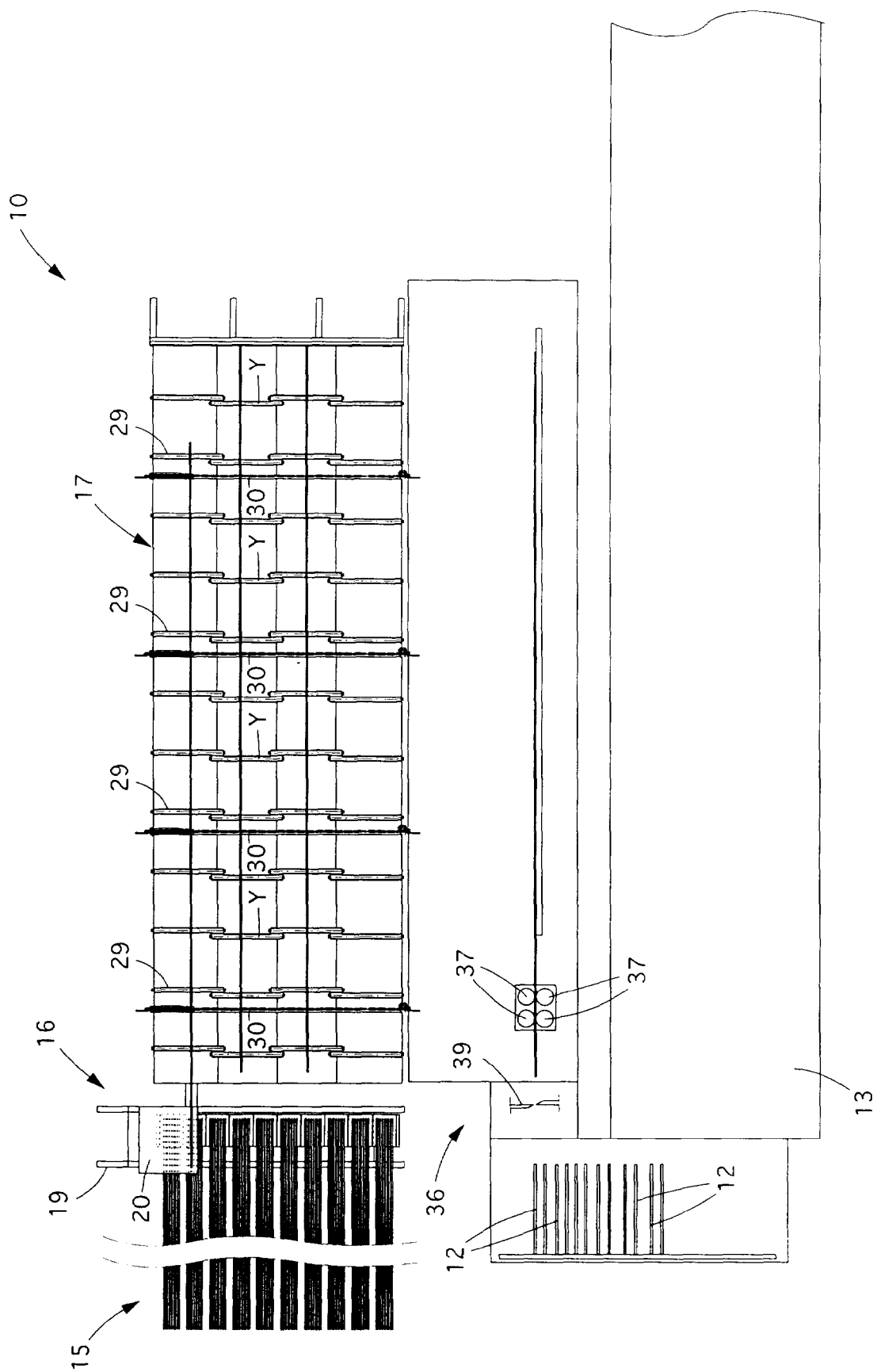


fig. 4



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Application Number
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Place of search The Hague		Date of completion of the search 2 October 2006	Examiner Ris, Matthijs
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