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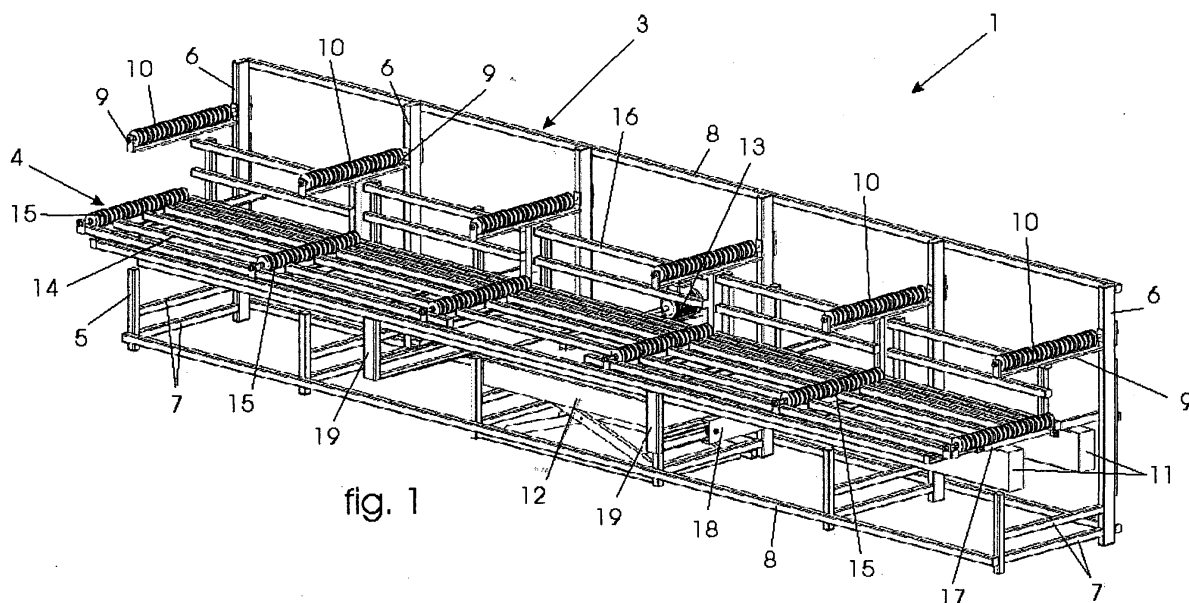
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(54) **IMPROVED MACHINE FOR FORMING CONCRETE REINFORCING ELEMENTS**

(57) A PERFECTED MACHINE FOR FORMING CONCRETE REINFORCEMENTS, consisting of an assembly table (1) and a dispensing table (2) arranged longitudinally and adjacently. The assembly table (1) is composed of a fixed support frame (3) that has protruding arms (9) equipped with sheaves (10) and of a tray (4) with elevating and translational movement, both forward and back, formed by slats (14) that have transversal rollers with sheaves (15) and the means for fastening stirrups. The dispensing table (2) is composed of a frame (21) that can be elevated, with a roller (24), sheave rail (25) and support plate (26) assembly, and that has forward and back movement and a pushing unit, solidly coupled to the end of the sheave rail (25), which unit is formed by one smooth roller (31) and one striated roller (32) arranged obliquely and driven by a motor for pushing rebar to the assembly table.

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Description

OBJECT OF THE INVENTION

[0001] The invention, as stated in the title of this specification, refers to a perfected machine for forming concrete reinforcements, which machine contributes a series of advantages and novel characteristics to the purpose for which it is designed. These advantages and characteristics will be described in detail below, and they represent a notable improvement with respect to what is known to date in this field.

[0002] Particularly, the object of the invention is a machine that, composed of a dispensing table and an assembly table, allows the automated assembly of the ribbed elements that form reinforcements designed to reinforce concrete structures, thereby specifically facilitating the placement of rebars between the stirrups that are comprised in said reinforcements so that they can then be connected by tying or welding.

FIELD OF APPLICATION OF THE INVENTION

[0003] The field of application of this invention is within the sector of the construction industry, particularly in the industry engaged in manufacturing reinforcements for reinforced concrete structures.

BACKGROUND OF THE INVENTION

[0004] Currently and as a reference to the state of the art, it should be stated that the applicant is the proprietor of a document pertaining to a machine of the type herein described, and while it adequately solves the problem of assembling the elements that are comprised in reinforcements, there are broad areas in which it can be improved. Being the object of this invention, to provide said machine with the necessary refinements to notably improve the operation and efficiency thereof.

[0005] It should therefore be pointed out that it is unknown if there is a perfected machine for forming concrete reinforcements that has technical, structural and configuration characteristics that are similar to those that are presented by the machine described here.

EXPLANATION OF THE INVENTION

[0006] Thus, and specifically, the object of the invention consists of a machine designed to produce beam reinforcements (ties) for concrete, especially reinforcements with stirrups preferably from 150 x 100 mm up to 600 x 600 mm in 6-, 8- and 10-mm gauge and rebar of any diameter. The machine is essentially configured based on two tables, an assembly table and a dispensing table, arranged longitudinally and adjacently so that ribbed rebars can be introduced into stirrups from the dispensing table, which stirrups will have been previously and adequately distributed and positioned on the assembly

bly table.

[0007] Said assembly table can be adjusted regarding the separation, number and measurements of the stirrups required for the reinforcement to be assembled, and regarding the rebars for producing the beams, which can reach a length of up to 6000 mm. It therefore has elements that allow fastening and positioning the stirrups and elements that facilitate the movement and positioning of the bars coming from the dispensing table.

[0008] The assembly table also has an elevation and movement system that allows moving said elements in order to mutually connect them and that facilitates extraction of the reinforcement once it is assembled.

[0009] The assembly table therefore essentially consists of a metal tube structure, formed by two differentiated parts, one part which is fixed for support and another moving part. This moving part, using an elevation system that is integrated with and driven by the corresponding motor, and using an adjustable spacer system, allows fastening and lifting the stirrups. The rebars are subsequently introduced into the stirrups such that the embodiment of the reinforcement is produced by suspending the stirrups on traversal arms that are installed on the fixed part for this purpose. The arms have feed sheaves that facilitate entry by the rebar.

[0010] Longitudinally abutting the described assembly table, the machine has a feeder or dispensing table for depositing and subsequently introducing rebars inside the stirrups, which will, as previously stated, by suitable fastened to the top part of the assembly table. The rebars are introduced by a motor with rollers with which the table is equipped. Said table is likewise height-adjustable by a lift incorporated at the bottom of the same, and its length measurements are similar to those of the assembly table so that rebar of up to 6000 mm can likewise fit.

[0011] Specifically, this dispensing table consists of a metal structure that is equipped with vertical movement, as stated, thanks to the lift system that it incorporates.

[0012] The dispensing table also has a longitudinal roller equipped with radial pins and a sheave rail that abuts it, which can be moved forward and back on the corresponding guides to pick up groups of rebar to be positioned. The rebars are picked up from an adjacent support structure or frame where the rebars will have been previously positioned for this purpose and for which the roller has special lateral supports.

[0013] After positioning each rebar to be installed, by rotating said roller and moving the assembly to the desired point, a set of smooth and striated, motor-driven rollers is responsible for using a pulley to push the selected rebar towards the assembly table.

[0014] Finally, it should be pointed out that the machine has a separate control panel for operation and control, as well as the corresponding electrical panel, which is equipped with the necessary circuit breakers and safety systems for this type of installations.

[0015] Finally, it should be pointed out that the indicated measurements for both the assembly table and the

dispensing table are merely suggested, and they can be varied and adapted according to market needs.

[0016] In view the aforementioned, it can be affirmed that the machine allows reinforcements to be assembled quickly, and it also allows the operation to be performed by a single operator, which involves a subsequent cost savings.

[0017] The aforesaid machine, perfected for forming concrete reinforcements, therefore represents an innovative structure, with structural and construction characteristics that have been unknown up to now for this purpose, and these are the reasons that, together with its practical utility, give it sufficient grounds for obtaining the privilege of exclusivity that is being sought.

DESCRIPTION OF THE DRAWINGS

[0018] To complement the description that is being made and in order to help provide a better understanding of the invention's characteristics, a set of drawings is attached as an integral part hereof, in which the following has been represented for merely illustrative purposes and not as a limitation thereof:

Figures numbers 1 and 2. They respectively show perspective and side elevation views of the assembly table that is included in the machine, object of the invention, in which the general configuration can be seen, as well as the layout and shape of each of the parts and elements integrated in the same.

Figure number 3. It shows a detailed view of the front movement rails installed on the mobile tray of the assembly table.

Figures numbers 4, 5 and 6. They respectively show perspective, front elevation and ground views of the dispensing table, according to the invention, in which the configuration thereof and the parts and elements that it includes can be seen.

Figure number 7. It shows the details of the assembly of the smooth and striated feed rollers on the dispensing table for pushing rebars.

PREFERRED EMBODIMENT OF THE INVENTION

[0019] In view of the aforesaid figures, and in accordance with the adopted numbering, an example of the preferred embodiment of the machine for forming concrete reinforcements can be observed in those figures. Said machine is composed of the parts and elements that are indicated and described in detail below.

[0020] Thus, as it can be appreciated in said figures, the perfected machine for forming concrete reinforcements proposed by the invention essentially consists of an assembly table (1) and a dispensing table (2), arranged longitudinally and adjacently.

[0021] Observing figures 1, 2 and 3, it can be seen how the assembly table (1) consists of a metal tube structure of notable length, preferably about 6000 mm, in order to handle the rebar for which it is designed. The table is formed by two differentiated parts: a support frame (1), which constitutes the fixed part, and a mobile tray (9).

[0022] The support frame (3) is composed of a base structure shaped like a bench, formed by a number of short front legs (5) and long rear legs (6), distributed equidistantly along the same and connected to each other by cross bars (7) and longitudinal beams (8).

[0023] Arms (9) have been equipped in the high part of each one of said rear legs (6), and they protrude perpendicularly towards the front of the table and are laid out transversely to the same. These arms are equipped with a number of sheaves (10) to facilitate the movement of the rebar during the process of feeding the assembly table from the dispensing table.

[0024] The tray (4) is formed by matching longitudinal beams (11) that have a rectangular cross section. These beams have dimensions that are larger than the rest of the structure and are suitable for supporting the weight of the completed reinforcements. The beams are arranged on a lift table (12) that allows the tray to be lifted.

[0025] This tray also includes a number of longitudinal slats (14) arranged on the horizontal plane. Between the slats and coinciding with the aforementioned arms (9), there are a number of transversal rollers with sheaves (15) to facilitate the process of feeding the rebar into the bottom of the stirrups of the reinforcement to be assembled.

[0026] Said slats (14), as well as other slats (16) arranged on a vertical plane at the top of the tray (4), hold the hoops that form the stirrups of the reinforcement in the required position, wherefore they incorporate fastening elements (which can consist, for example, of magnetised plates). Furthermore, it has been equipped for the installation of a regulated bar to facilitate the measurement of stirrup positions.

[0027] Finally, it is important to highlight that said assembly of horizontal slats (14), including the sheave rollers (15) and the slats (16) on the vertical plane, can be moved horizontally forward and back, pushed by an adequately equipped motor (13). To facilitate said movement, there are matching sets of rails (17) at the ends and at the centre (18) of the tray (4), shown in the detail in figure 3.

[0028] Thus, as it can be seen in said figure 3, the rails (17) at the ends of the tray (4) are connected directly to the ends of the same, while the central rails are connected to respective brackets (19), which have notably larger dimensions, as well as bearings (20). The purpose of the aforementioned is to give this part of the structure the sufficient strength to support the loads for which it is designed, given that the complete reinforcement, once assembled, will rest on said tray, as it will be explained below.

[0029] As previously stated, longitudinally abutting

said assembly table (1) the machine has a dispensing table (2) for collecting rebars and subsequently introducing them into the stirrups that will be adequately fastened on said assembly table, as described.

[0030] As it can be seen in figures 4 to 7, this dispensing table (2), just like the assembly table (1), is constructed of a metal tube structure, with similar length measurements in order to likewise allow rebar of up to 6000 mm. It essentially consists of a rectangular frame (21) that sits on matching beams (22), arranged transversally in the central zone, under which it is connected to a lift table (23) to give the assembly the necessary vertical movement in order to adjust to the various installation needs of the rebars on the assembly table.

[0031] Longitudinally on said rectangular frame (21), the dispensing table (2) incorporates an assembly formed by a long roller (24), a rail of sheaves (25) and a series of lateral support plates (26), whose purpose will be explained below. This assembly is coupled to four guides (27), two positioned at the ends and two in the centre. They run, respectively, on the sides of the frame (21) and on similar cross beams (28) installed in the central zone for this purpose. These elements allow said roller (24), sheave rail (25) and support plate (26) assembly to move forward and back on the frame (21).

[0032] It should be pointed out that said movement is driven by a motor (29) that is installed in the central zone of the frame (21), underneath said assembly, and that is coupled by respective axles to the aforesaid central guides (27).

[0033] This movement, in addition to allowing the assembly to be placed in the required position for introducing rebars, allows the rebars to be collected on a metal frame (not represented) where they will have been laid out for collection. The aforementioned support plates (26) take part in said collection, which plates, rising laterally, obliquely and upwards from the roller assembly (24) when the roller assembly is positioned underneath said frame and is lifted, make the rebars to slide over said supports. The rebars are collected in groups and are kept aligned next to the roller (24), waiting to be individually collected by the same.

[0034] It is important to highlight that, in order to pick up each rebar, said roller (24) has a number of pins (30) that are aligned and arranged radially at two diametrically opposed points around the perimeter, whereby, when the roller (24) is rotated, the rebars are moved from one side of the same to the other, thereby positioning them on the sheave rail (25), ready to be pushed towards the assembly table.

[0035] Finally, and for pushing the rebars once they have been adequately positioned in front of the assembly table (1), the dispensing table (2) has a pushing unit (shown in figure 7), which is bolted to one of the ends of the sheave rail (25). This pushing unit is formed by a set of at least one smooth roller (31) and one striated roller (32), which are arranged obliquely and which, when driven by a motor (33) and using a pulley (34), are responsible

for pushing the selected rebar towards the assembly table (1).

[0036] Finally, it should be pointed out that the machine has a separate control panel for operation and control, as well as the corresponding electrical panel, which is equipped with the necessary circuit breakers and safety systems for this type of installation.

[0037] In view of the aforementioned and in order to assemble the shaped reinforcement based on a number of stirrups and another number of ribbed rebars, the operation of the conceive machine consists of the following steps:

[0038] First of all, the appropriate number of stirrups is positioned on the tray (4) of the assembly table, fastened to the slats (14) and slats (16) at the desired distance between the stirrups. Subsequently, the tray is elevated so that the stirrups are at the necessary height for introducing the rebars in the interior.

[0039] The rebars are subsequently introduced by operating the dispensing table. To do so, the support plates (26) will pick up a group of rebars from the frame provided in front of the feed table for such purpose, and by rotating the roller (29) the first rebar will be positioned on the sheave rail (25), after which the frame (21) is moved in order to position the assembly at the required point in front of the assembly table.

[0040] By operating the motor (33), the smooth rollers (31) and striated rollers (32) push the rebars one by one, sending them between the stirrups prepared on the assembly table. The upper rebars run along the sheaves (10) of the arms (9) installed on the support frame (3), and the rebars of the bottom part run along the sheaves (15) of the rollers on the tray (4).

[0041] To position the bottom rebars, the lifting table (23) will have caused the frame (21) of the dispensing table (2) to descend to the right height.

[0042] Once all the rebars are positioned, the tray (4) of the assembly table (1) is lowered, thus leaving the reinforcement hanging by the upper rebars, which are suspended on the arms (9). They can then be fastened to the stirrups, either by tying or welding.

[0043] Once the reinforcement is assembled, the tray (4) is raised again, causing the reinforcement to come off the arms (9) and rest on the tray. Finally, the tray (9) is moved forward so that the now-assembled frame can be lifted off with the help of a crane.

[0044] Having sufficiently described the nature of this invention, as well as the way to put it into practice, it is not deemed necessary to further explain the same so that any expert on the subject can understand the scope and advantages that are derived therefrom. Moreover, it is hereby stated that, within the essence of the invention, it could be put into practice in other forms of embodiment that differ in detail from what is indicated as an example, which embodiment will likewise provide the protection that is claimed, as long as the fundamental principle is not altered, changed or modified.

Claims

1. A PERFECTED MACHINE FOR FORMING CONCRETE REINFORCEMENTS, of the type consisting of an assembly table (1) and a dispensing table (2), arranged longitudinally and adjacently, both of which are formed by similar metal structures of considerable length. It has a separate control panel for operation and control, as well as the corresponding electrical panel equipped with the necessary circuit breakers, and it is **characterised by** the fact that the assembly table (1) is composed of a support frame (3), which constitutes the fixed part, and of a tray (4), which can be elevated and has translational movement forward and back; and **characterised** because the dispensing table (2) is composed of a frame (21) with elevating movement, on which there is a roller (24), sheave rail (25) and support plate (26) assembly for collecting and positioning the rebars. Said assembly is equipped with translational movement forward and back over the frame (21).

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2. A PERFECTED MACHINE FOR FORMING CONCRETE REINFORCEMENTS, according to claim 1, **characterised by** the fact that the support frame (3) is composed of a base structure in the shape of a bench, which, at the top part of each of its rear legs (6), has an arm (9) equipped with sheaves (10) to facilitate sliding of the rebar during the feeding process.

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3. A PERFECTED MACHINE FOR FORMING CONCRETE REINFORCEMENTS, according to claims 1 and 2, **characterised by** the fact that the tray (4) is formed by matching longitudinal beams (11) with a rectangular cross section and dimensions that are larger than the rest of the structure, arranged on a lifting table (12) that allows the tray to be lifted by a motor (13).

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4. A PERFECTED MACHINE FOR FORMING CONCRETE REINFORCEMENTS, according to claims 1 to 3, **characterised by** the fact that the tray (4) is composed of a number of longitudinal slats (14) arranged on a horizontal plane, and between which there are, coinciding with the aforementioned arms (9), a number of transversal rollers with sheaves (15).

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5. A PERFECTED MACHINE FOR FORMING CONCRETE REINFORCEMENTS, according to claims 1 to 4, **characterised by** the fact that the slats (14) and the other slats (16) arranged on a vertical plane at the back of the tray (4) hold the hoops that form the stirrups of the reinforcement in the required position through the use of fastening elements, which can consist of magnetised plates, for example.

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6. A PERFECTED MACHINE FOR FORMING CONCRETE REINFORCEMENTS, according to claims 1 to 5, **characterised by** the fact that the set of horizontal slats (14), with their sheave rollers (15), and the slats (16) on the vertical plane of the tray (4) have horizontal movement forward and back, driven by a motor (13). To facilitate said movement, there are matching sets of rails (17) at the ends and (18) at the centre of the tray (4).

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7. A PERFECTED MACHINE FOR FORMING CONCRETE REINFORCEMENTS, according to claims 1 to 6, **characterised by** the fact that the rails (17) at the ends of the tray (4) are coupled directly to the ends of the same; and because the central rails (18) are coupled to respective brackets (19), which have dimensions that are notably larger, in addition to bearings (20).

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8. A PERFECTED MACHINE FOR FORMING CONCRETE REINFORCEMENTS, according to claims 1 to 7, **characterised by** the fact that the roller (24), sheave rail (25) and support plate (26) assembly installed on the frame (21) of the dispensing table (2) is coupled to four guides (27), two located at the ends and two central ones, which respectively run along the sides of the frame (21) and on matching cross beams (28) installed in the central zone to allow the assembly to move forward and back; and **characterised** because said movement is driven by a motor (29) installed at the central zone of the frame (21) underneath the assembly, which is coupled by respective axles to the central guides (27).

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9. A PERFECTED MACHINE FOR FORMING CONCRETE REINFORCEMENTS, according to claims 1 to 8, **characterised by** the fact that the support plates (26) protrude laterally, obliquely and upwards from the roller assembly (24).

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10. A PERFECTED MACHINE FOR FORMING CONCRETE REINFORCEMENTS, according to claims 1 to 9, **characterised by** the fact that the roller (24) has a number of pins (30) arranged in line and radially at two diametrically opposed points of its perimeter, whereby, when the roller (24) is rotated, the rebars are moved from one side of the same to the other, thereby positioning them on the sheave rail (25), ready to be pushed towards the assembly table.

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11. A PERFECTED MACHINE FOR FORMING CONCRETE REINFORCEMENTS, according to claims 1 to 9, **characterised by** the fact that, in order to push each rebar, the dispensing table (2) has a pushing unit bolted to one of the ends of the sheave rail (25), formed by an assembly of at least one smooth roller (31) and a striated roller (32) arranged obliquely, which are driven by a motor (33) and a pulley (34).

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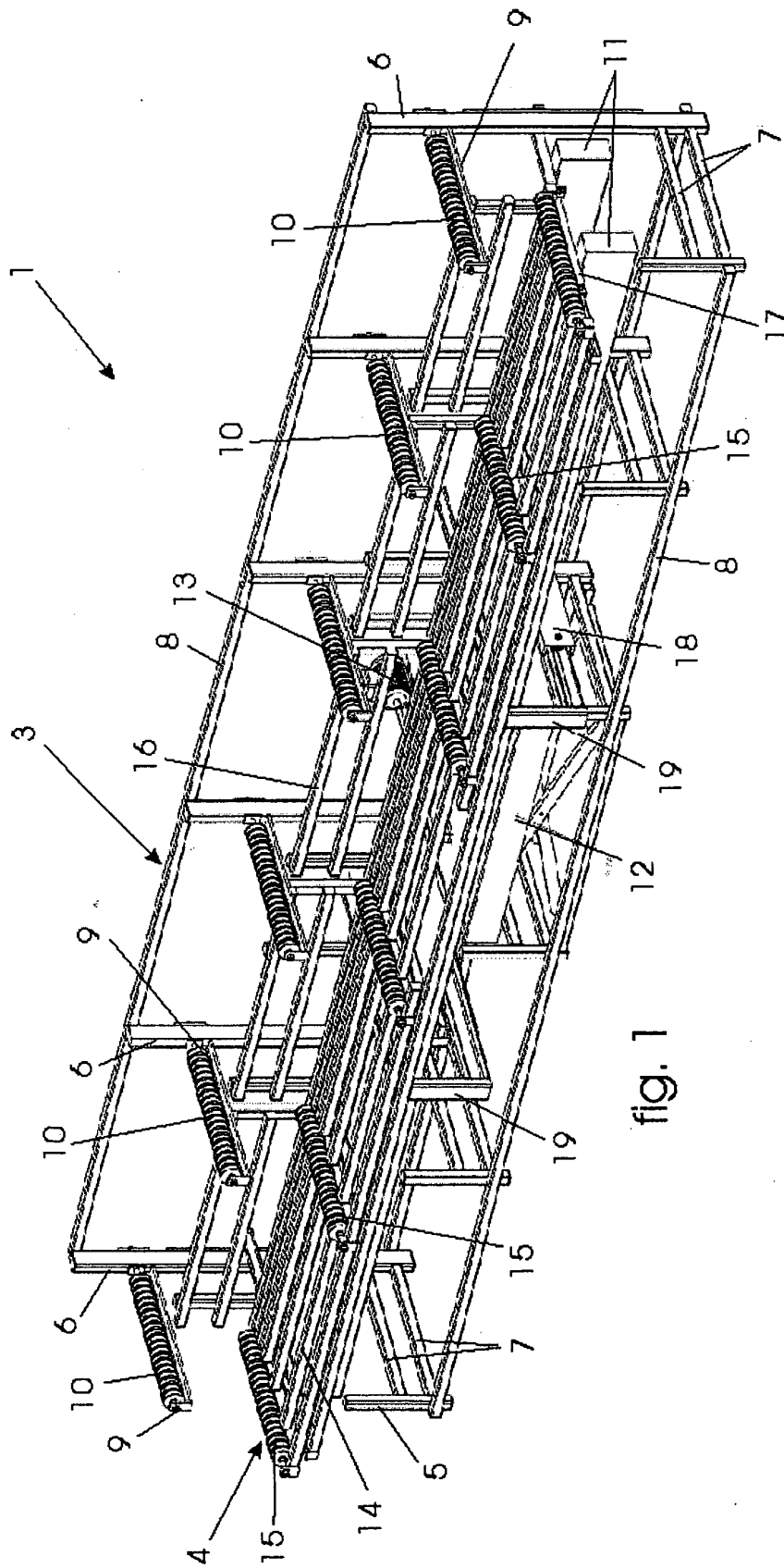


fig. 1

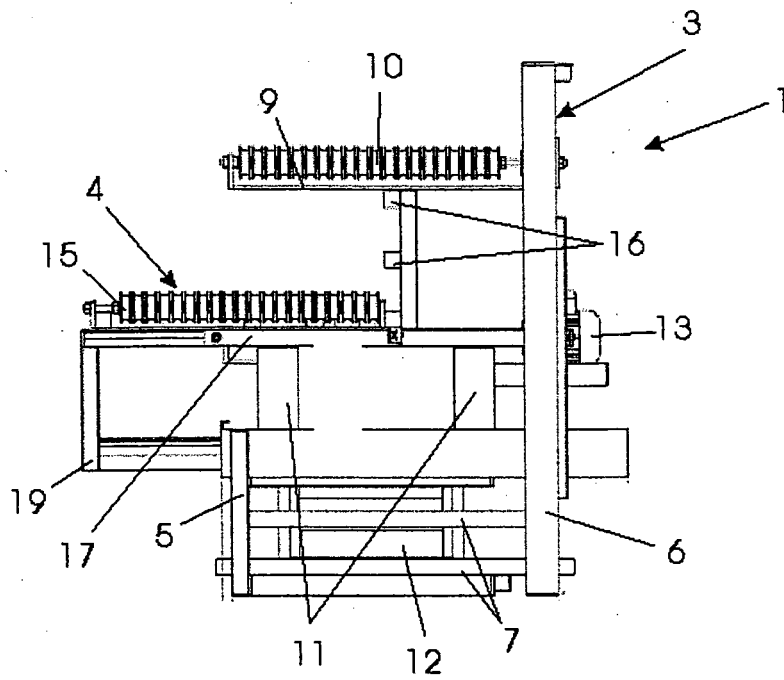


fig. 2

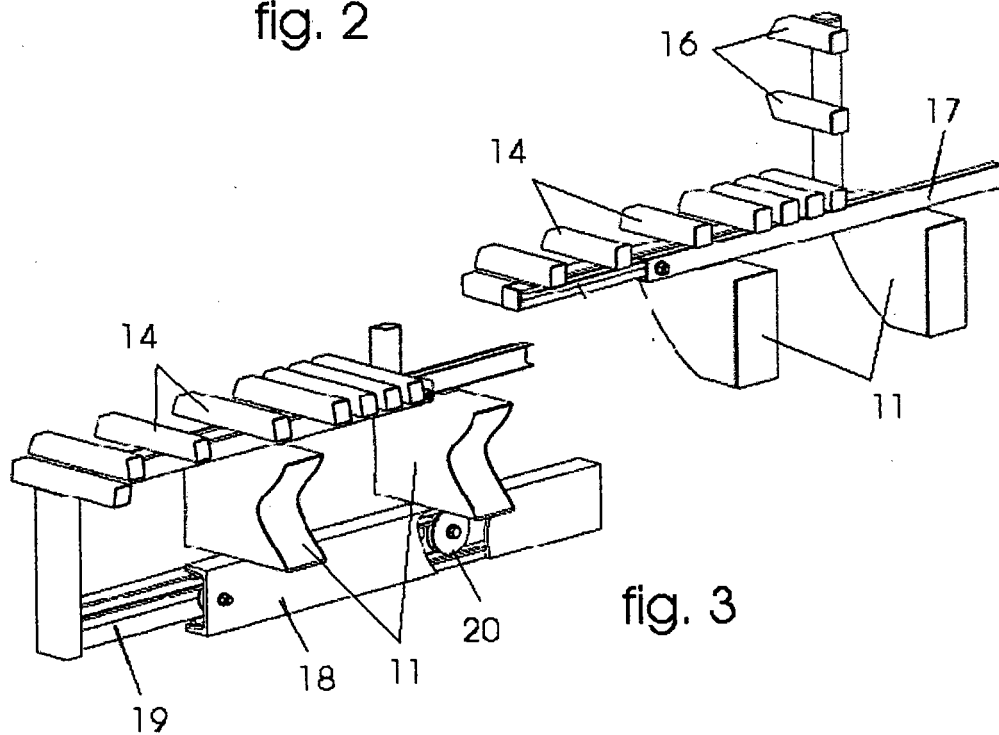


fig. 3

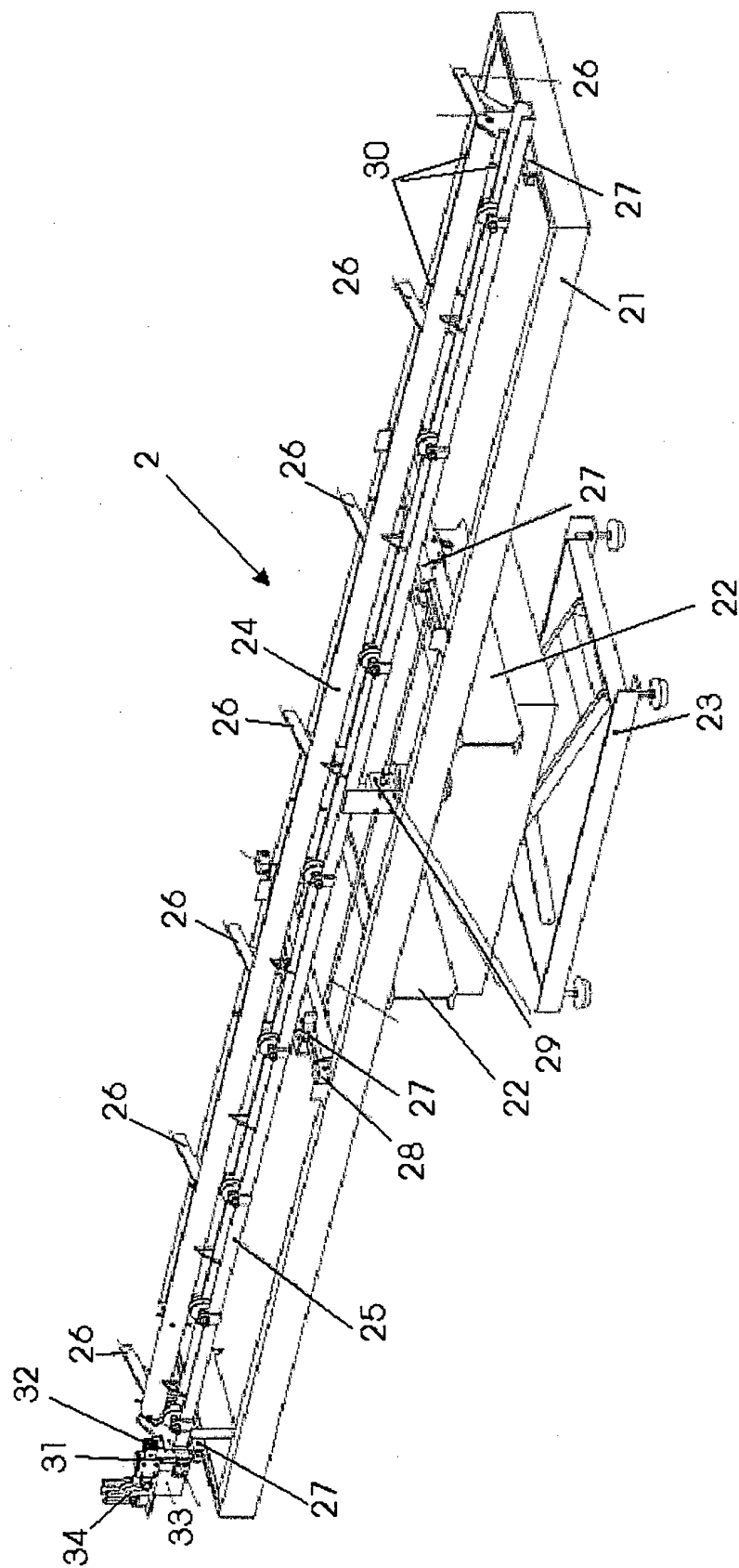


fig. 4

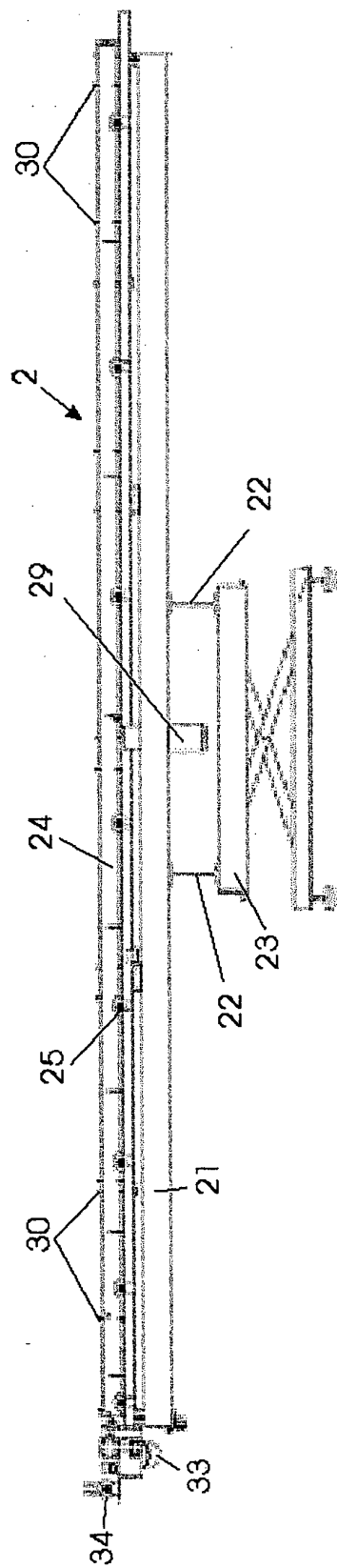


fig. 5

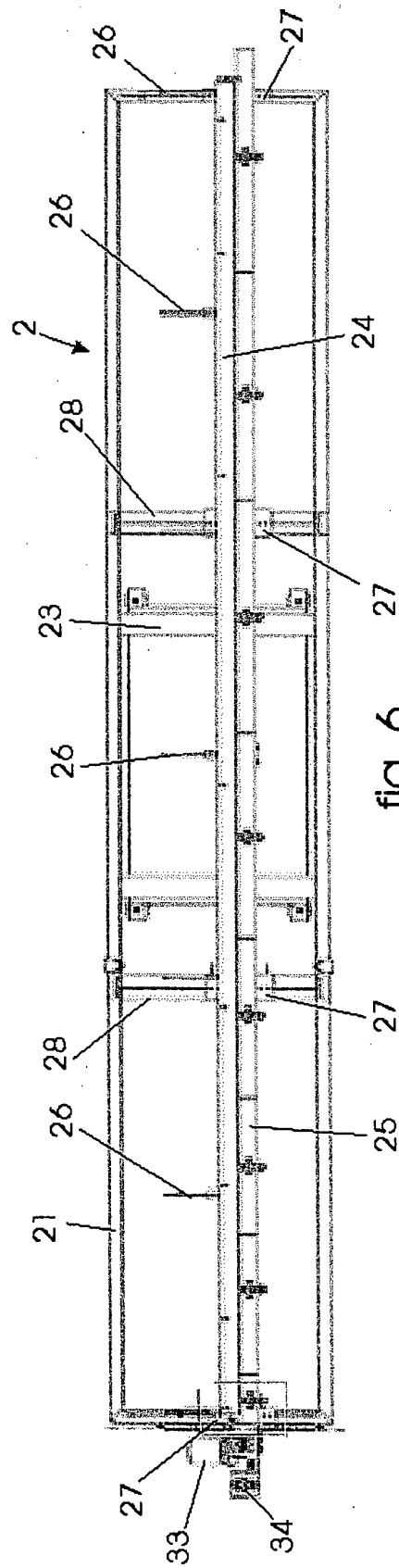


fig. 6

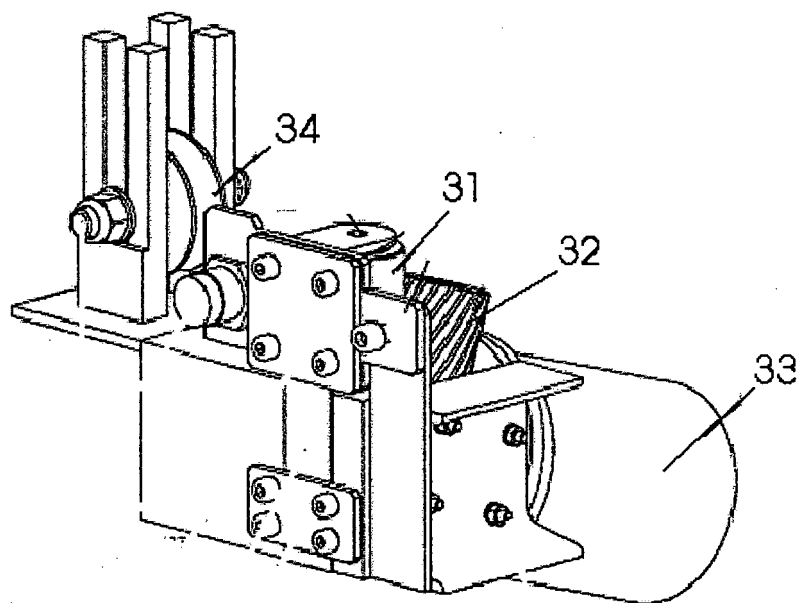


fig. 7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ ES 2009/000528

A. CLASSIFICATION OF SUBJECT MATTER

B21F 27/10 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

INVENES, EPODOC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0297201 A1 (EVG ENTWICKLUNG VERWERT GES) 04.01.1989, the whole document.	1
A	DE 3243418 A1 (EVG ENTWICKLUNG VERWERT GES) 24.05.1984, the whole document.	1
A	DE 3249620 A1 (STAPELMANN & CO) 06.12.1984.	

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:	"I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance.	
"E" earlier document but published on or after the international filing date	
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"O" document referring to an oral disclosure use, exhibition, or other means	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other documents, such combination being obvious to a person skilled in the art
"P" document published prior to the international filing date but later than the priority date claimed	"&" document member of the same patent family

Date of the actual completion of the international search

08 March 2010 (08.03.2010)

Date of mailing of the international search report

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EP 2 425 908 A1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/ ES 2009/000528

Patent document cited in the search report	Publication date	Patent family member(s)	Publication date
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DE 3249620 AC	06.12.1984	BE 898387 A DE 3245179 AC SE 8306732 A SE 8306732 L NL 8304171 A GB 2132541 AB DE 3325932 AC ES 8501659 A FR 2553692 AB US 4539457 A AT 383971 B AT 420283 A IT 1169359 B	30.03.1984 07.06.1984 08.06.1984 08.06.1984 02.07.1984 11.07.1984 07.02.1985 01.03.1985 26.04.1985 03.09.1985 10.09.1987 15.02.1987 27.05.1987
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Form PCT/ISA/210 (patent family annex) (July 2009)