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(54) **Automatic assembler of concrete reinforcement**

(57) The invention refers to an **Automatic Assembler of Concrete Reinforcement**, which assembles by method of welding the formed iron rods with straightened ones.

It consists of the frame (1) on which the immovable base (2) of the movable iron rod guides (3) is adjusted.

On the upper part is adjusted the mobile base (6) having the ability to move upwards-downwards. The base (6) has guides for the rod (3) that open and close. Also it has supporting bars of the formed shapes (9) as well as a system for automatic propulsion of the formed shape to the assembling point.

The assembling is accomplished by means of two mobile columns (10), which are adjusted on guides (11) in order to open and close and the whole system of the columns glides on the guides (12) forwards and backwards.

On the upper and lower part of each column (10) is adjusted the system of holding-welding and propulsion of the concrete reinforcement and it has the ability to move upwards and downwards.

The -ready for placement- concrete reinforcement is based on a corresponding bench (33).

All parts of the assembler are adjusted to the size of the concrete reinforcement.

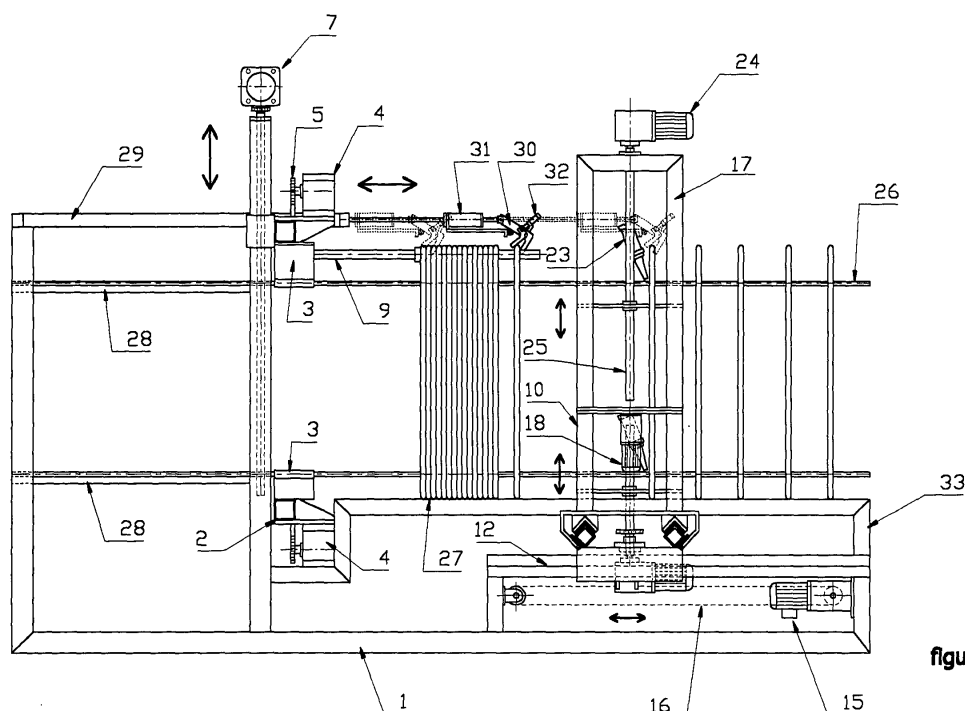


figure 5

Description

[0001] The invention refers to a machine that assembles automatically -by method of welding- the shaped iron rods with straightened ones, thus creating concrete reinforcement, which is essential for the construction of buildings.

[0002] It has the ability to assemble different types of concrete reinforcement of various shapes and sizes which may be either of closed or opened type, such as straightened iron rods with square, rectangular, polygon, multi-sectional etc shapes known as stirrups.

[0003] Until today, the common technique for the assembling of concrete reinforcement was that of forming the iron rods into various shapes (stirrups), their setting in definite -between them- distances and then tying them by use of wire or by manual welding at the points where they intersect with the straightened iron rods, creating the concrete reinforcement.

[0004] This way of assembling and constructing concrete reinforcement leads to the requirement of considerable time and to small production.

[0005] Another way of concrete reinforcement assembly concerns an invention of our conception, Patent No: 980100509, regarding Automatic Assembling Machine of shaped iron concrete rods with straightened ones. It concerns a machine that functions entirely automatically via computer, yet with a different structure and design than those described at the present invention.

[0006] The **Automatic Assembler of Concrete Reinforcement** consists of an immovable metal frame upon which all those mechanisms and components that compose it are installed.

[0007] On the frame is adjusted the immovable base with the movable guides of the iron rod and the movable base with the movable guides of the iron rod, which has the ability of accession-descent of the entire system as well as its adjustment according to the size of the concrete reinforcement to be assembled. Moreover, the movable base has the mechanism for the automatic propulsion of the shape (stirrup) at the assembling point and the supporting bars of the formed shapes that are -simultaneously- used as guides, in case of assembling the straightened rod at the corners of the shape.

[0008] The assembling of the reinforcement is achieved via the two mobile columns adjusted on to glide-guides and they have the ability to open-close as well as to move forwards-backwards; in addition the upper part of every column can move independently (opening-closing).

[0009] On the upper and lower part of every column, the system of holding-welding and propulsion of the concrete reinforcement is adjusted, which has the ability to move upwards-downwards and to adjust depending on the size of the concrete reinforcement.

[0010] The assembled concrete reinforcement is based on a corresponding bench.

[0011] The advantage of this invention is that for the assembling of the concrete reinforcement (main or auxiliary) the automatic procedure is followed by use of minimum mechanisms and components, which achieve the result.

[0012] It has the ability to accept all the gathered -to-be-assembled- formed shapes of closed or opened type (square, circular, polygon, multi-sectional etc of different sizes) in a -self-contained from the assembling- space, which one by one are propelled to be assembled automatically or manually.

[0013] Via the guides of the iron rod the straightened rods are propelled simultaneously with the propulsion of the assembled concrete reinforcement.

[0014] The system of holding-welding and propulsion of the concrete reinforcement assembles the concrete reinforcement thus fulfilling the assembling procedure (welding) in less time compared to the previous technique, with high quality productive results and small concrete reinforcement construction cost.

[0015] The invention can be well comprehended by right of the following figures:

On sheet 1 (figure 1) is shown the front side of the **Automatic Assembler of Concrete Reinforcement** at a phase that a simple rectangular shape is assembled with straightened iron rods for the construction of auxiliary concrete reinforcement.

On sheet 2 (figure 2) is shown the front side of the invention at an assembling phase of a complex shape and at a production phase of an auxiliary concrete reinforcement, which demands a dissimilar opening of the upper part of the assembling columns.

On sheet 3 (figure 3) is shown the front side of the invention at the phase that a rectangular shape as well as a corresponding continuous inner shape (core) is assembled with straightened iron rods for the construction of main concrete reinforcement.

On sheet 4 (figure 4) is shown the front side of the invention at a phase that an open broken shape is assembled with straightened iron rods and also is shown the construction of main concrete reinforcement.

On sheet 5 (figure 5) is shown the side view of the invention at an assembling phase.

On sheet 6 (figure 6) is shown the side view of the invention at a phase that the assembling columns move.

During the phase of the forward movement, the -already assembled- shape and the straightened rods move.

On sheet 7 (figure 7) is shown in side view and in enlargement the system of holding-welding and propulsion of the concrete reinforcement during the assembling phase.

On sheet 7 (figure 8) is shown in top view and in enlargement the system of holding-welding and propulsion of the concrete reinforcement at the assembling phase.

On sheet 7 (figure 9) is shown in top view and in enlargement the system of holding-welding and propulsion of the concrete reinforcement during the completion of the assembling and the transfer of the whole system backwards, so as to follow the next phase of assembling.

On sheet 8 is shown a series of indicative schemes that the **Automatic Assembler of Concrete Reinforcement** can assemble for auxiliary concrete reinforcement.

On sheet 9 is shown a series of indicative shapes that the **Automatic Assembler of Concrete Reinforcement** can assemble for the main concrete reinforcement.

On sheets 10, 11 and 12 are indicatively shown 3 types of assembled concrete reinforcement in a three-dimensional view.

DETAILED DESCRIPTION

[0016] The **Automatic Assembler of Concrete Reinforcement** consists of an immovable metal frame (1) on which all those mechanisms and components that compose it are installed.

[0017] On the frame (1) is adjusted the immovable base (2) of the movable guides of the iron concrete rod (3). The guides can open and close via motor (4) and chain (5) according to the size of the concrete reinforcement that is to be assembled. At the rear side of the guides are adjusted the assisting guides for the holding of the iron rod (28).

[0018] At the upper part, is adjusted the mobile base (6) that has the ability to move upwards-downwards via motor (7), chain (5) and bolts (8). At the rear side of the guides are adjusted the assisting guides for the holding of the iron rod (28).

[0019] The mobile base has iron concrete rod guides (3) which open and close via motor (4) and chain (5). These movements adjust the assembler to the size of concrete reinforcement that is to be assembled.

[0020] Also, it has supporting bars for the formed shapes (9) to which they are stored and either automatically or manually propelled one by one the shapes to be assembled.

[0021] The supporting bars are also used as guides

of the straightened iron rod in case of main concrete reinforcement assembly.

[0022] Finally, on the mobile base (6) the mechanism of the automatic propulsion of the formed shape (27) is adjusted, which consists of the propulsive piston (29) and of the hook for the holding of the shape (30) which functions via pistons (31) and (32).

[0023] The assembling phase is carried out by two mobile assembling columns (10) that are adjusted on glide-guides (11) and the whole system of the two columns glides forwards-backwards on the glide-guides (12).

[0024] The gliding (opening-closing) of the columns (10) is carried out via motor (13) and chain (14), while the forwards-backwards movement of the assembling columns is carried out via motor (15) and chain (16).

[0025] The upper part (17) of each column (10) has the ability to independently open and close, by gliding on prisms by means of a motor provided with bolt (18).

[0026] On the lower and upper part of each column (10) are adjusted the systems of holding-welding and propulsion of the concrete reinforcement.

[0027] The system of holding-welding and propulsion of the concrete reinforcement (sheet 9, figures 7-8 and 9) consists of the hook (19) for the holding of the reinforced iron rod (26), which executes the opening-closing movement by means of piston (20) and of the clamp (21) that executes the holding or non-holding of the formed shape (27) by means of piston (22). The welding is carried out at the selected time by the electric welding head (23), which is adjusted to the system.

[0028] The entire system moves forwards-backwards via piston (24) by shutting in or by releasing the already formed concrete reinforcement and it has the ability to ascend-descend via motor (24) and bolt (25).

[0029] These movements enable the **Automatic Assembler of Concrete Reinforcement** to accomplish a great number of actions having as aim the adjustment of its mechanisms at the size and welding positions of the concrete reinforcement to be assembled. All movements, commands and programming are executed by use of a control panel, placed in such a position that is accessible to the operator.

[0030] The -ready for placement- concrete reinforcement (main or auxiliary) is based on a corresponding bench (33) the size of which may vary depending on the sizes of the concrete reinforcements being assembled.

DESCRIPTION OF OPERATION

[0031] The operation of the **Automatic Assembler of Concrete Reinforcement** is simple, since it is not consisted of complicated and inaccessible mechanisms and it is provided with a handy and legible control panel.

[0032] After the selection of the formed shapes (27) (size and diameter) is done, the selected number of shapes is put on the supporting bars of the formed shapes (9). Afterwards, the length and the size of the

diameter of the straightened iron rods (26) is selected and they are passed through the corresponding guides (3) selecting the position accordingly, whether it regards the main concrete reinforcement assembly (angular position) or auxiliary concrete reinforcement (at a straightened part of the shape).

[0033] All mobile parts of the Assembler are regulated by the control panel, at the size of the concrete reinforcement to be assembled, as well as the forward-backward movement of the columns that will be of such a distance as the one there is between the assembled shapes (step) of concrete reinforcement.

[0034] Also, the periods of time and the commands for propulsion and for assembly are programmed.

[0035] After giving start command, the first shape (27) is propelled at the assembling point via the propulsion mechanism (29), (30), (31) & (32), and then, through the hook the holding of the straightened rod (19) and through the clamp (21) the holding of the shape (27) follows. At this phase, the electric welding heads (23) are activated which weld the shape with the straightened rods and afterwards, as the reinforcement is held, the columns (10) move forward (figure 6) carrying away the assembled concrete reinforcement as far as the selected distance that is between the shapes (step).

[0036] With the completion of this motion, the hook (19) and the clamp (21) release the concrete reinforcement, the holding-welding and propulsion systems of the concrete reinforcement move backwards and the columns (10) return to the initial position. By the propulsion mechanism, the next shape is propelled to the assembling position, so that the commands for forward movement of the holding-welding and propulsion systems, the stabilization of the part to be assembled and the activation of the electric welding heads to follow.

[0037] After the welding, the command for forward motion follows, with the assembled shape held together with the straightened rod and we have the repetition of the procedures until the completion of the assembling of the concrete reinforcement.

[0038] The same operation steps are followed, whether we produce main concrete reinforcement or auxiliary.

Claims

1. The Automatic Assembler of Concrete Reinforcement is a machine that assembles by use of the welding method the shaped iron rods with straightened ones and creates the main or auxiliary concrete reinforcement, which is essential for the construction of buildings. It consists of an immovable metal frame (1) upon which is adjusted the immovable base (2) of the movable guides of the straightened iron rod (3). The guides can open and close according to the size of the concrete reinforcement to be assembled.

On the upper part the mobile base (6) that has the

ability of an upward-downward movement is adjusted. The mobile base (6) has guides for the straightened iron rods (3), which can open and close according to the size of the concrete reinforcement to be assembled. Moreover, it has supporting bars for the formed shapes (9), which at the same time may also be used as guides for the straightened iron rods. On the mobile base (6) the mechanism for automatic propulsion of the formed shape (29), (30), (31) and (32) is adjusted.

The assembling is accomplished by two mobile assembling columns (10) which are adjusted on glide-guides (11) for the opening-closing and the whole system of both two columns glides forwards and backwards on the glide-guides (12).

On the upper and lower part of each column (10) the system for holding-welding and propulsion of the concrete reinforcement is adjusted. The -ready for placement- concrete reinforcement is based on a corresponding bench (33) the size of which may vary depending on the sizes of the concrete reinforcements being assembled.

2. The Automatic Assembler of Concrete Reinforcement, according to Claim 1, is **characterized** by the fact that the upper part (17) of each assembling column (10) has the ability to move by opening and closing independently.

3. The Automatic Assembler of Concrete Reinforcement, according to Claim 1 is **characterized** by the fact that on the upper and lower part of each assembling column (10) is adjusted the system for holding-welding and propulsion of concrete reinforcement. This system consists of the hook (19) for the holding of the straightened iron rod (26), which executes an opening-closing movement and the clamp (21) which carries out the holding or non-holding of the formed shape (27). The welding is accomplished by means of the electric welding head (23), which is adjusted to the system. The entire system moves forwards-backwards, thus releasing or shutting in the concrete reinforcement already formed.

4. The Automatic Assembler of Concrete Reinforcement, according to Claims 1 & 3 is **characterized** by the fact that on the upper and lower part of each assembling column (17) is adjusted the system for holding-welding and propulsion of the concrete reinforcement, that moves upwards-downwards according to demand.

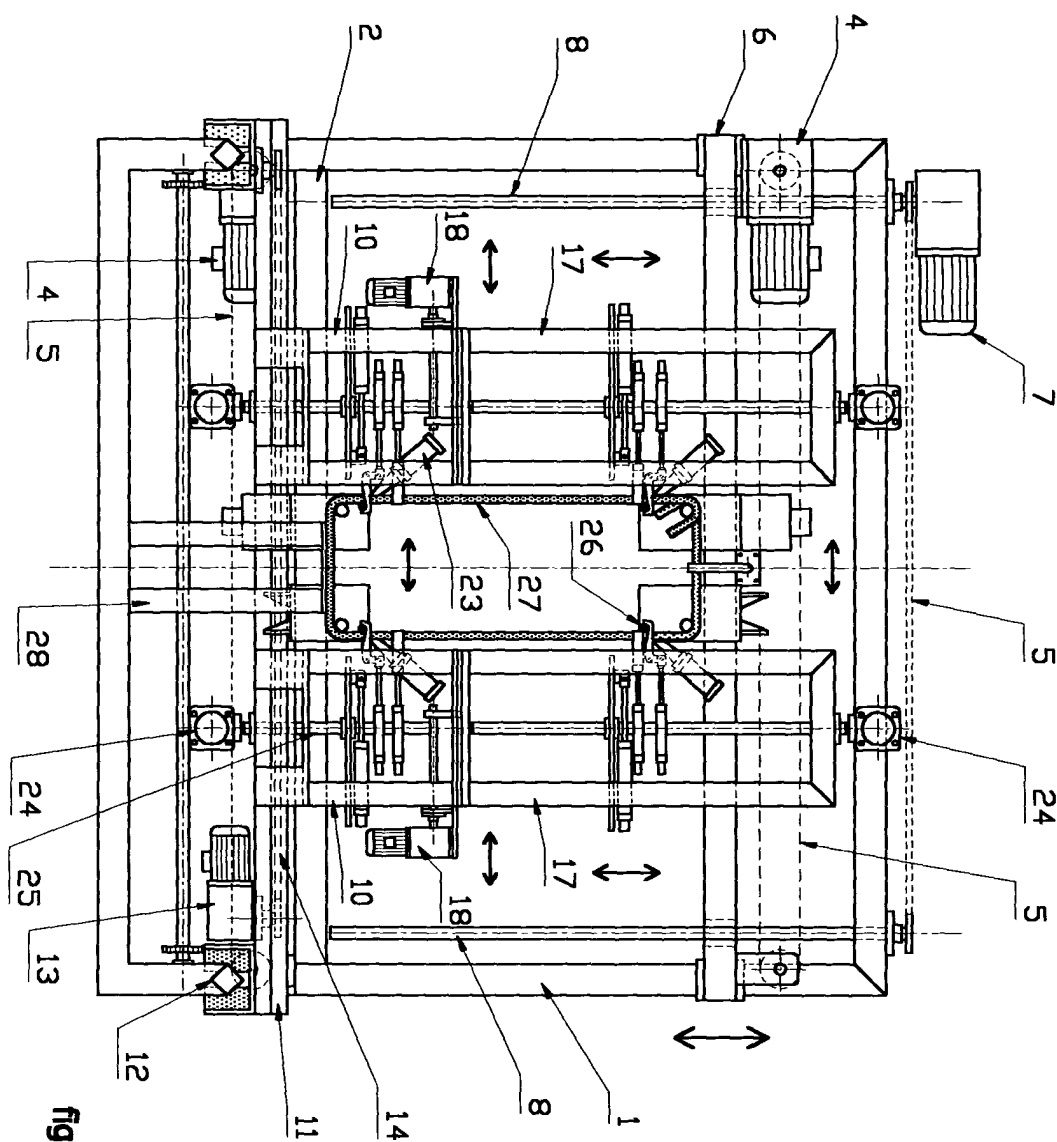


figure 1

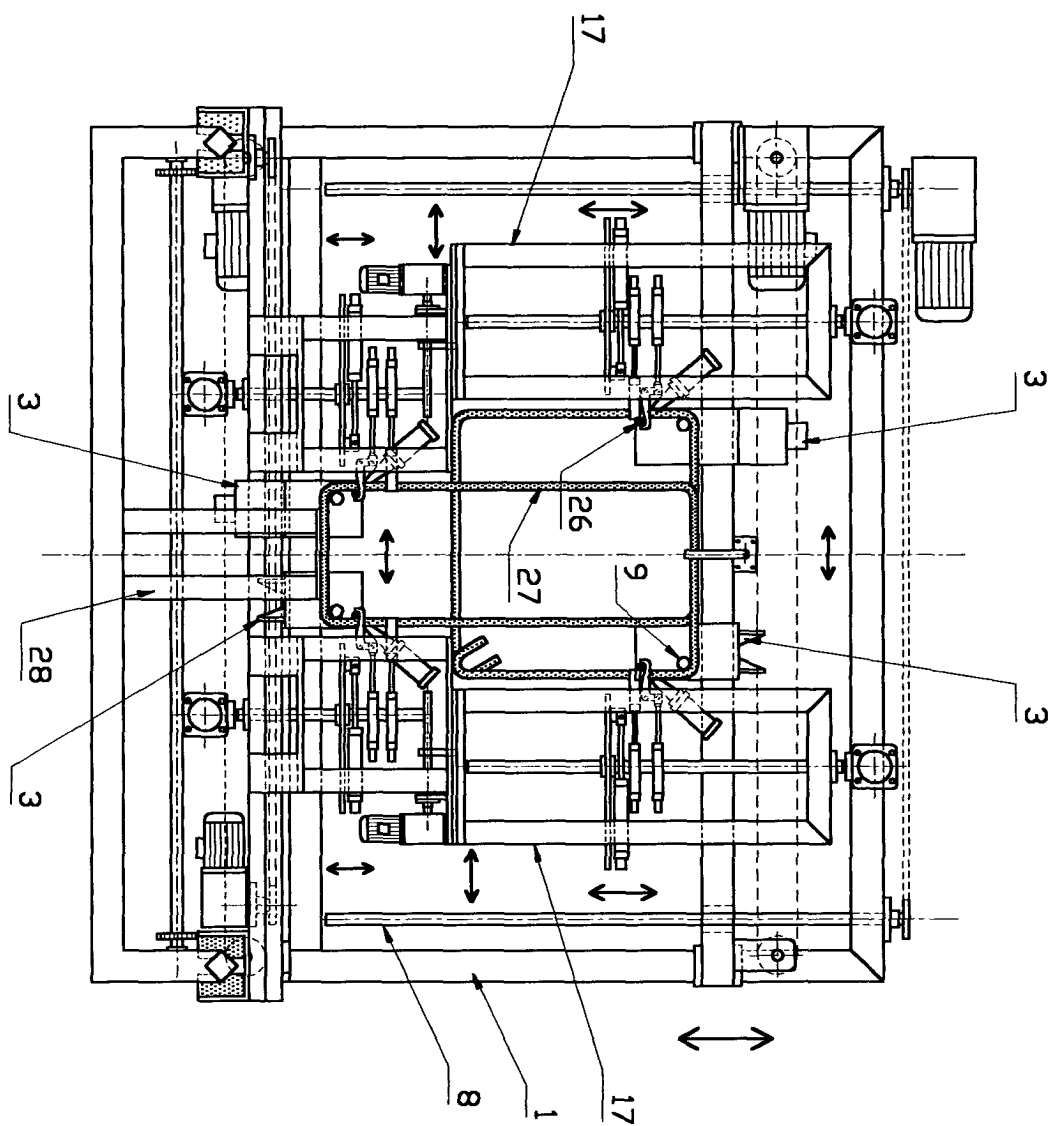


figure 2

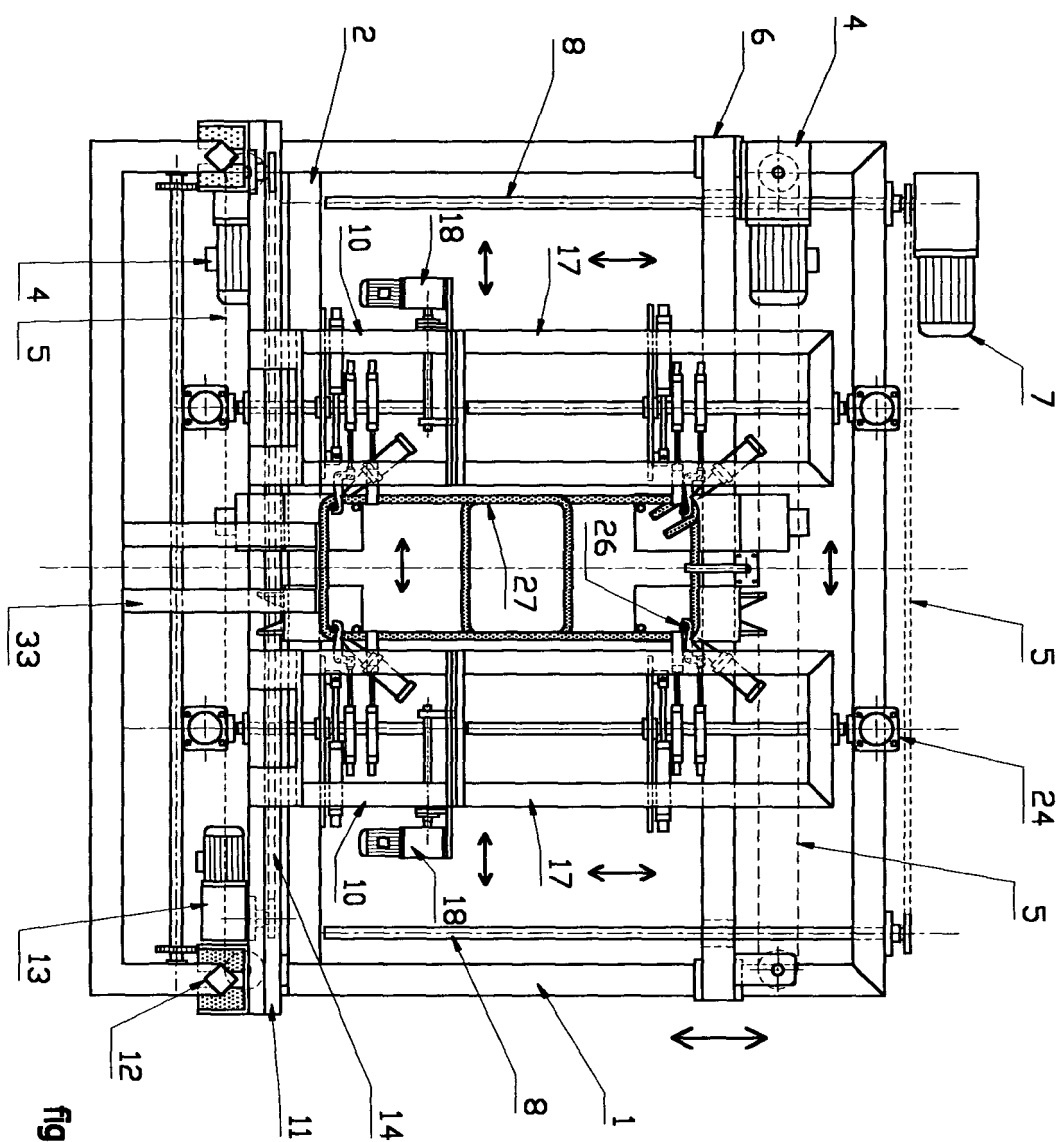


figure 3

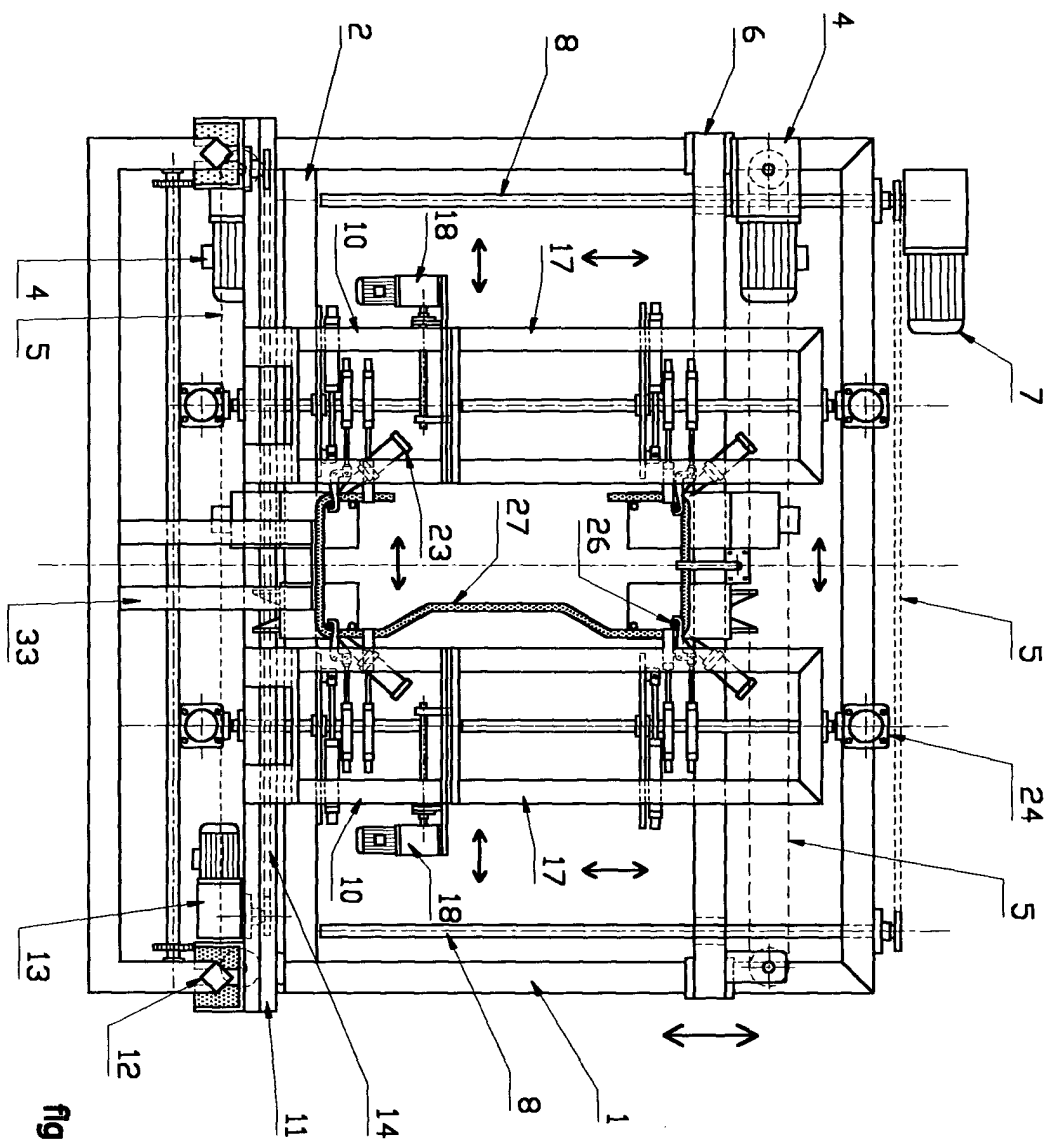


figure 4

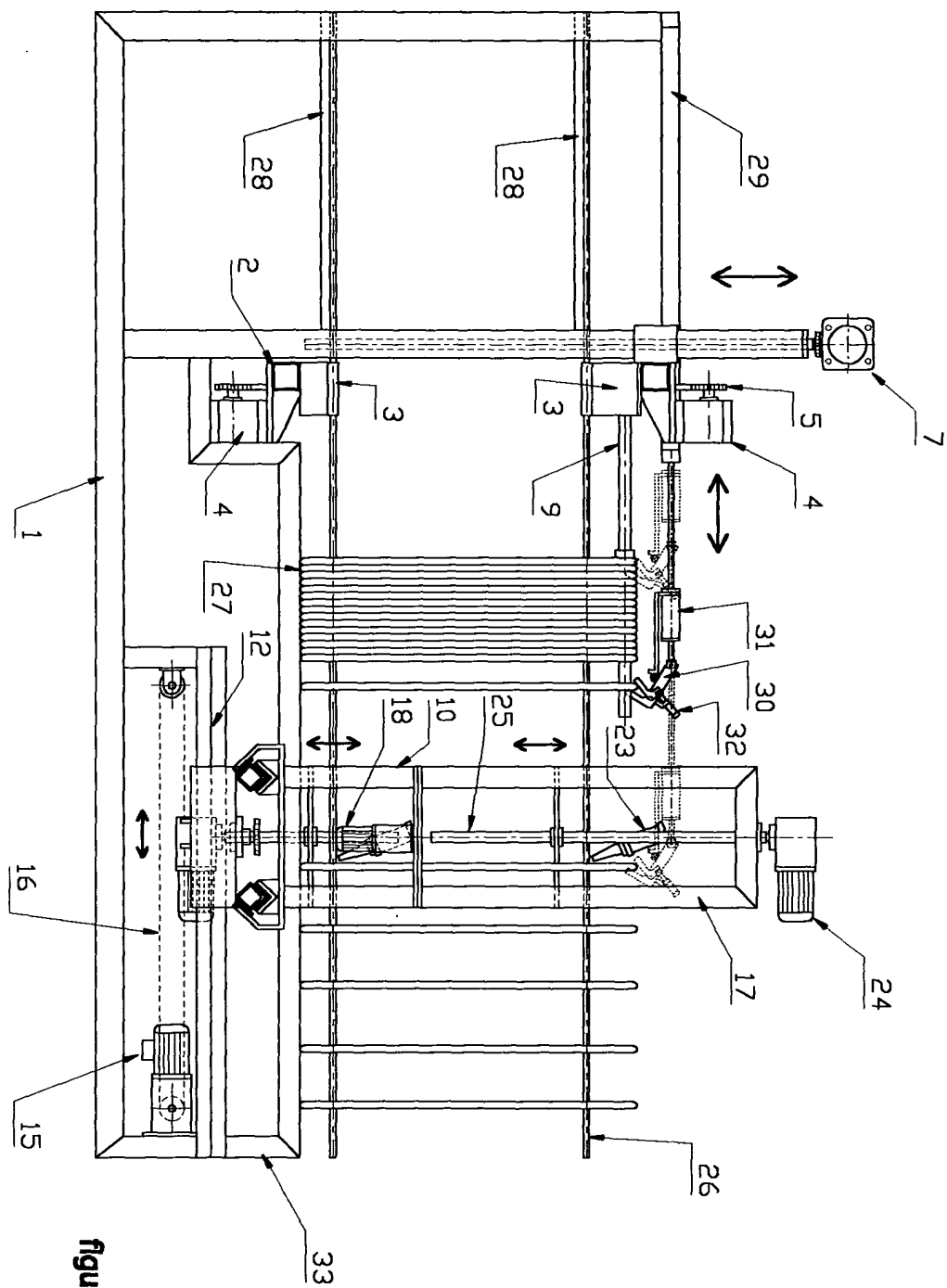


figure 5

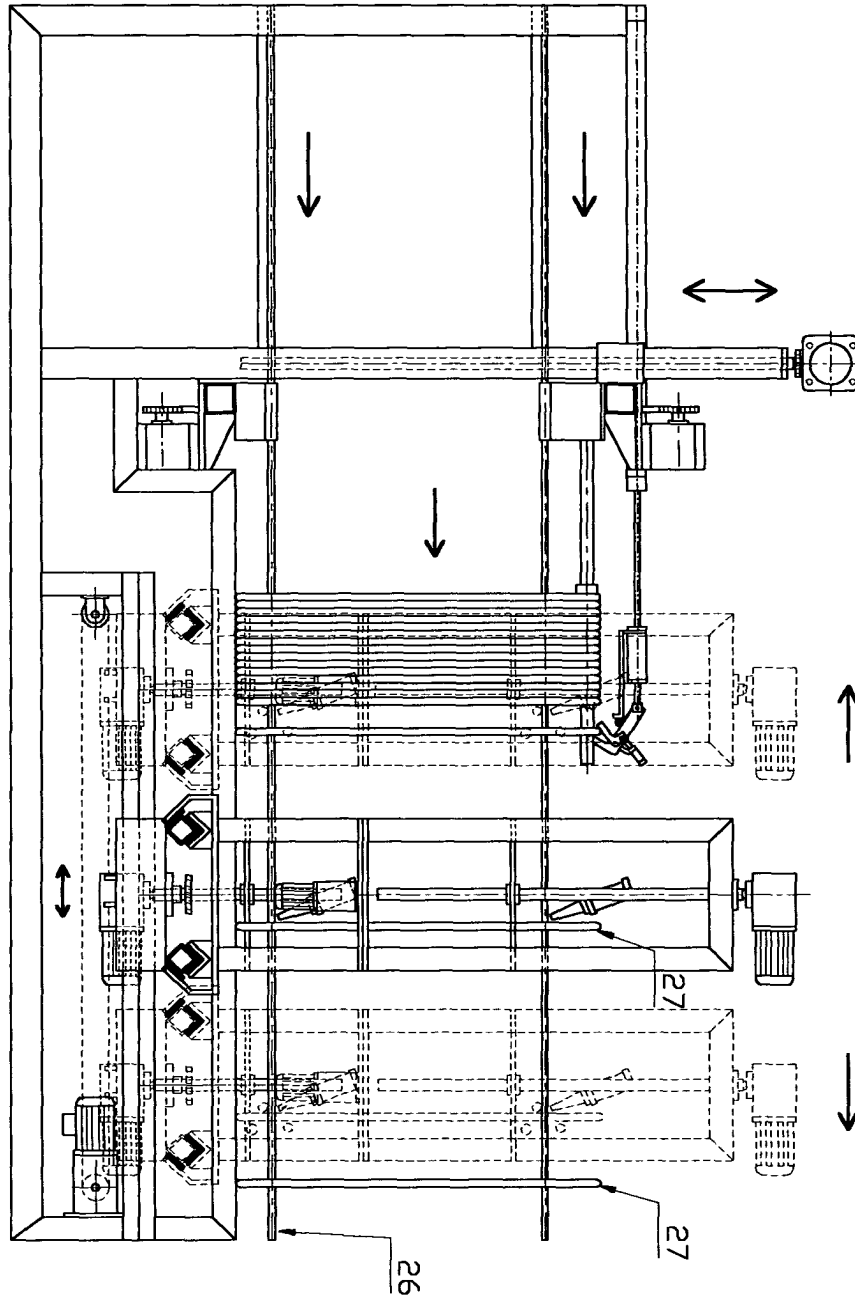


figure 6

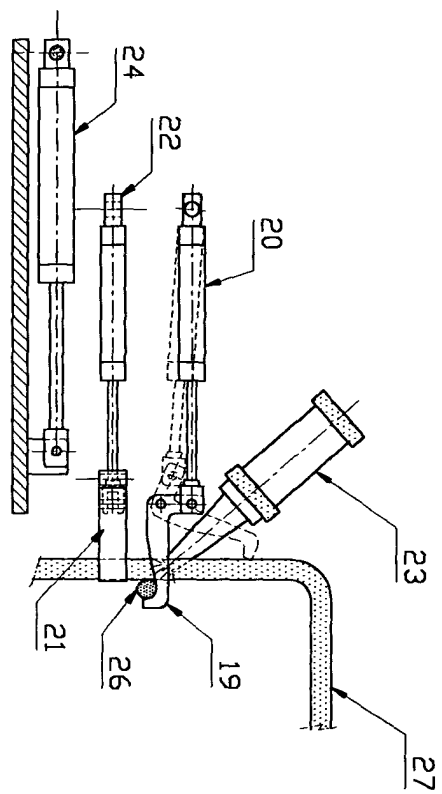


figure 8

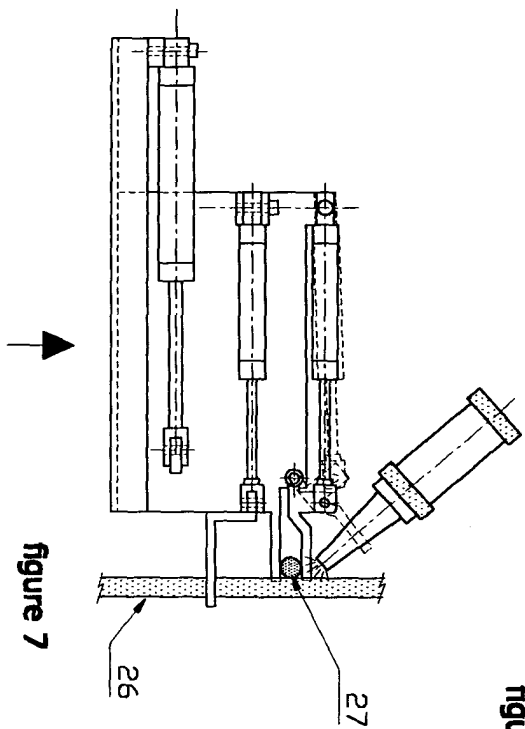


figure 7

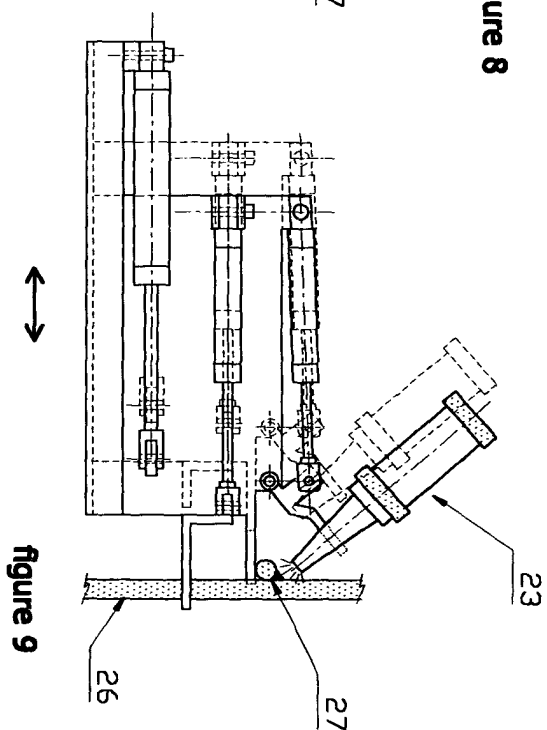
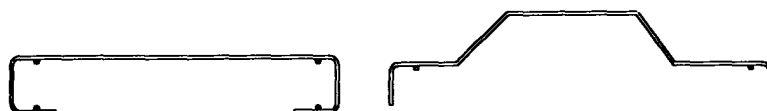
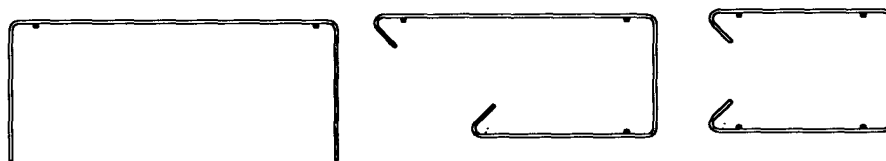
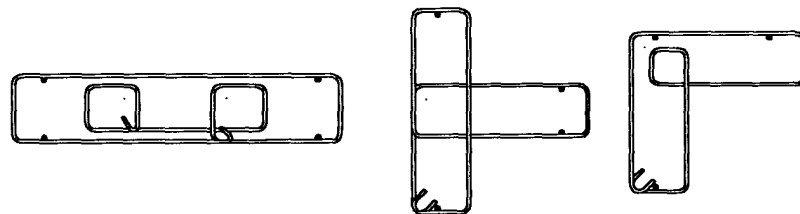
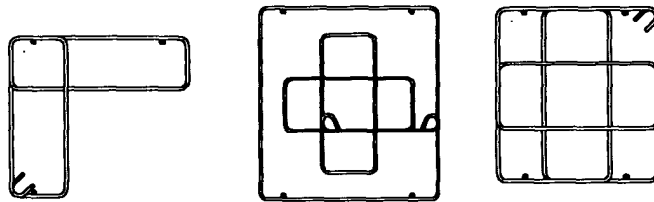
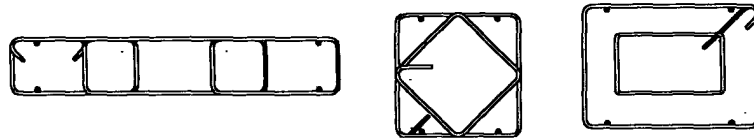
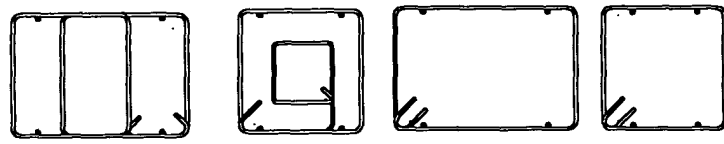
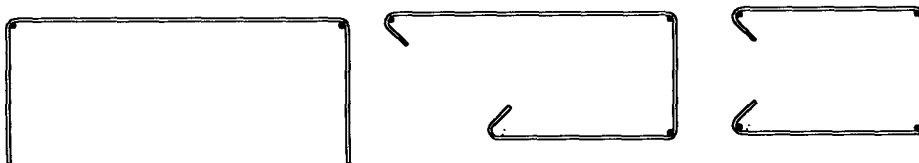
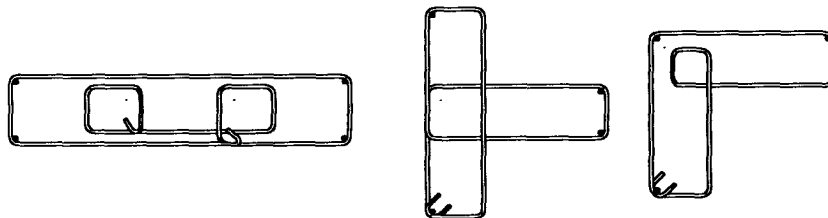
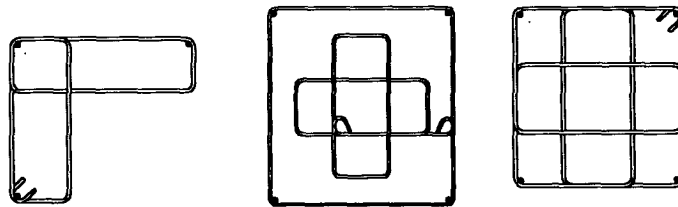
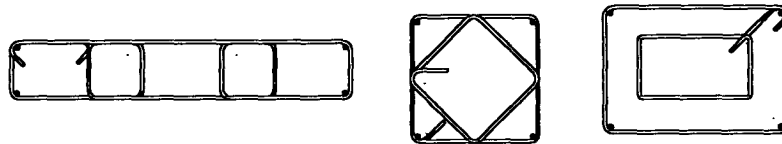
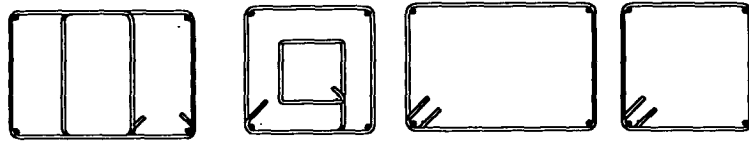
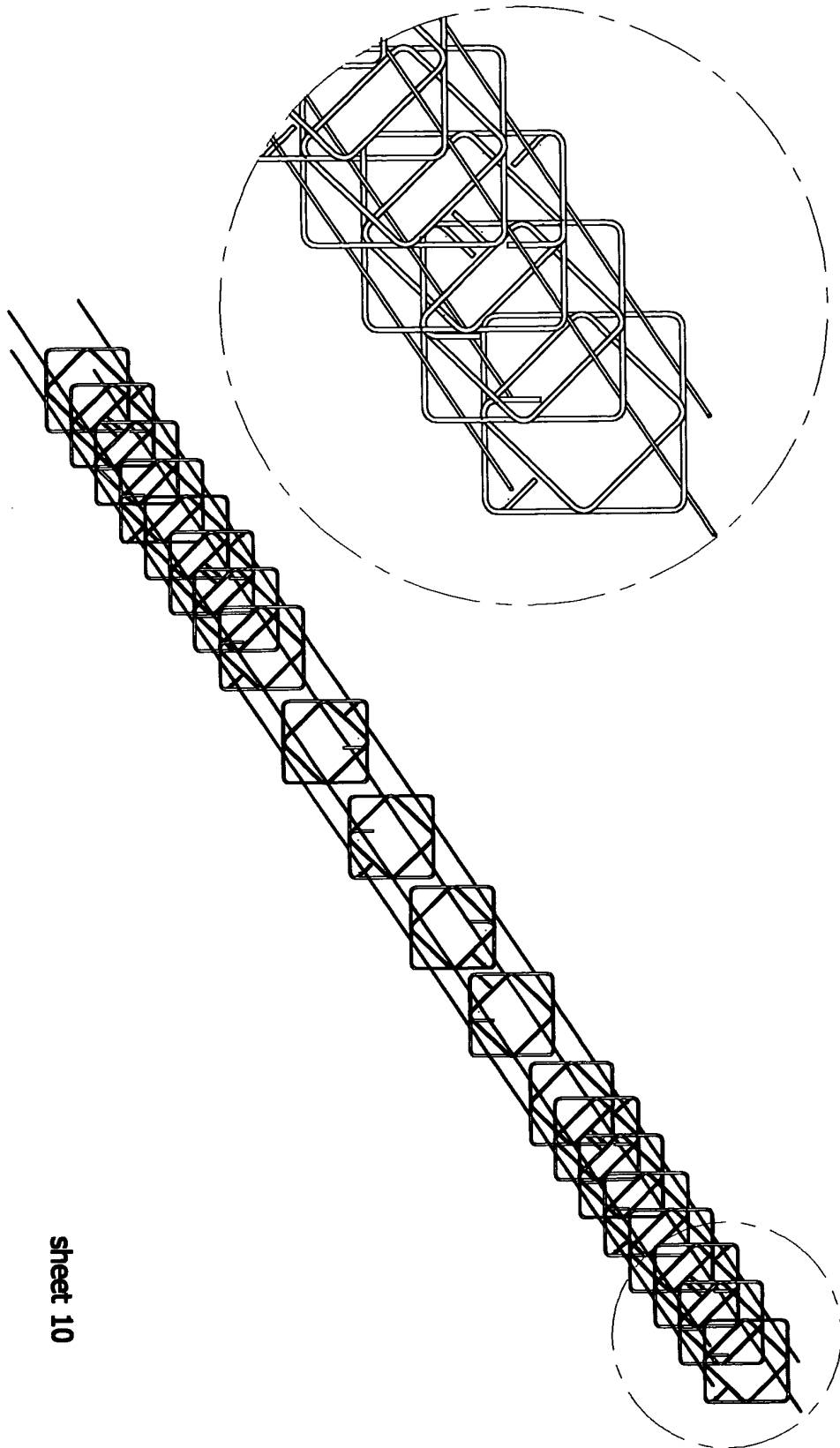


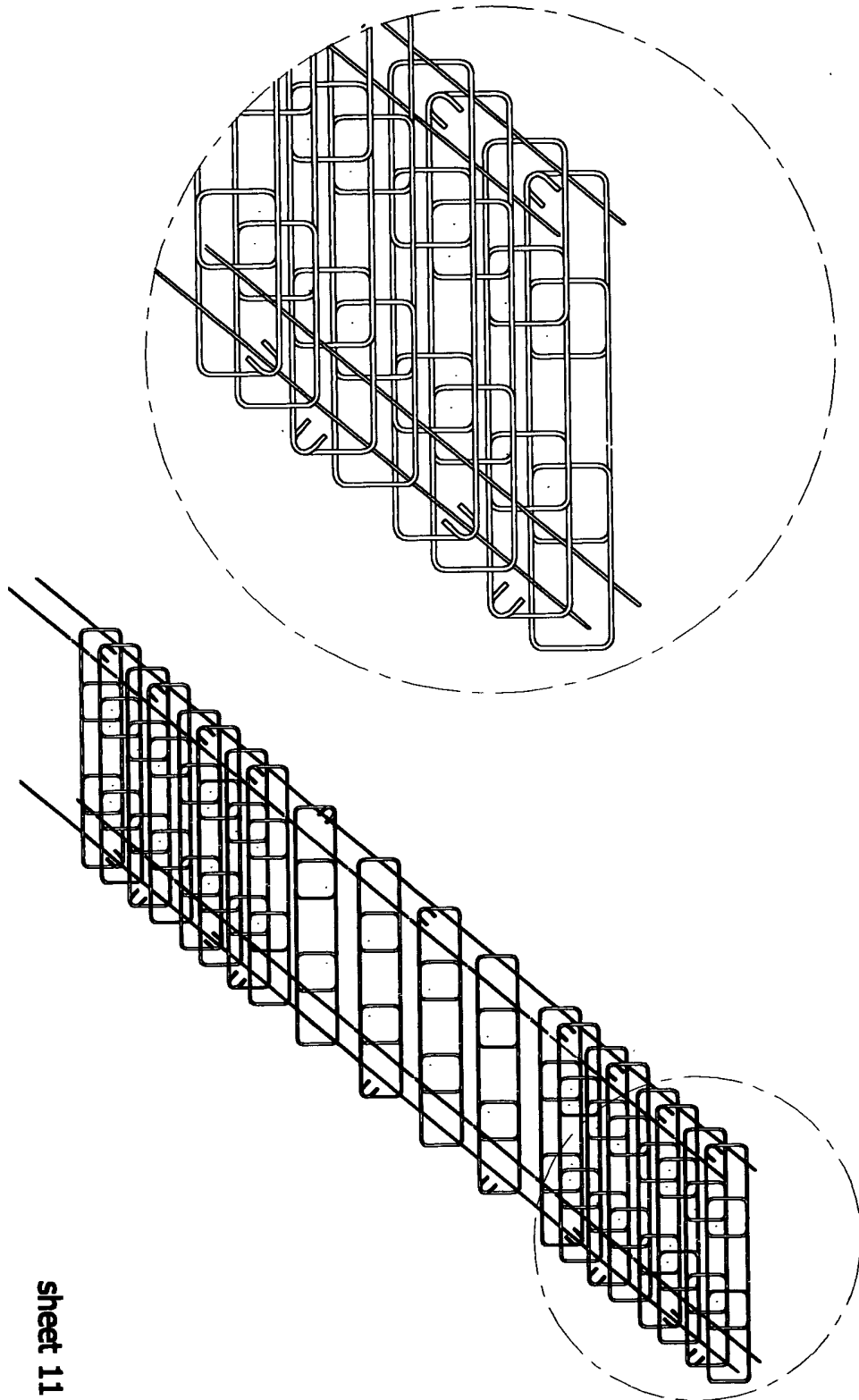
figure 9



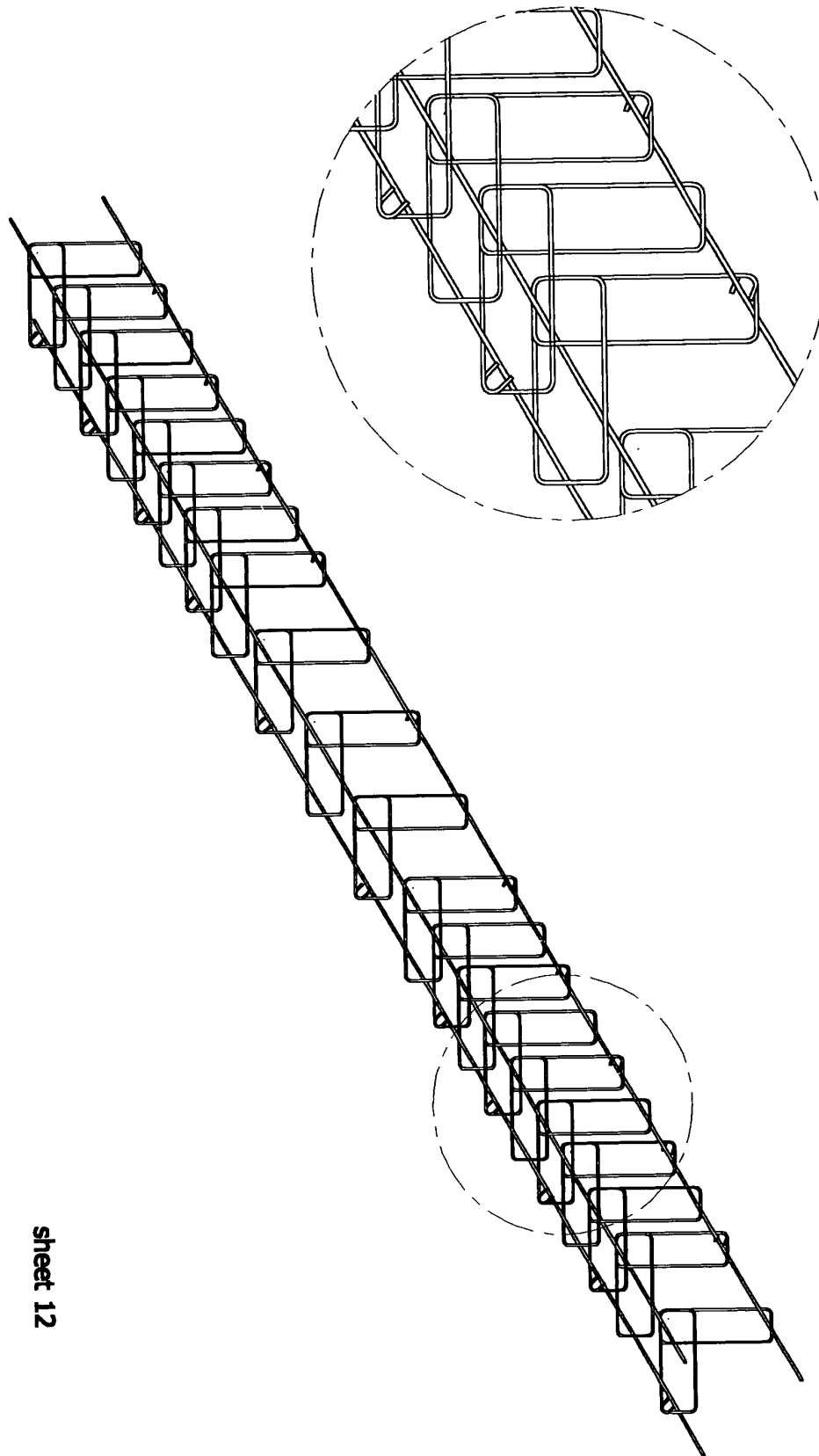




sheet 10



sheet 11



sheet 12



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 04 38 6027

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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