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

Maschine zur Herstellung von Bewehrungskäfigen

Machine pour la fabrication des cages de renforcement

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(73) Proprietor: **Galanos S.A.**
38500 (GR)

(72) Inventor: **Galanos, Andreas**
385 00 (GR)

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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 (5a) 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 (28) for the holding of the straightened iron rod (26).

[0018] At the upper part, is adjusted the mobile base (6) that has the ability to move upwards-downwards via motor (7), chain (5b) and bolts (8). At the rear side of the guides are adjusted the assisting guides (28) for the holding of the straightened iron rod (26).

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

[0020] Also, it has supporting bars (9) for the shaped iron rods (27) to which they are stored and either automatically or manually propelled one by one the shaped iron rods to be assembled.

[0021] The supporting bars (9) are also used as guides of the straightened iron rod (26) in case of main concrete reinforcement assembly.

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

[0023] The assembling phase is carried out by two mobile assembling columns (10) that are adjusted on first glide-guides (11) and the whole system of the two columns glides forwards-backwards on second 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 7, figures 7-8 and 9) consists of the hook (19) for the holding of the straightened 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 shaped iron rod (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 shaped iron rod (27) (size and diameter) is done, the selected number of shaped iron rods is put on the supporting bars (9) of the formed shapes. 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 shaped iron rod (27) is propelled at the assembling point via the propulsion mechanism (29), (30), (31) & (32), and then, through the hook (19) the holding of the straightened rod and through the clamp (21) the holding of the shaped iron rod (27) follows. At this phase, the electric welding heads (23) are activated which weld the shaped 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 shaped iron rods (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. Automatic Assembler of Concrete Reinforcement for assembling by use of the welding method shaped iron rods (27) with straightened iron rods (26) and creating the main or auxiliary concrete reinforcement, which is essential for the construction of buildings, the assembler consisting of an immovable metal frame (1) upon which is adjusted an immovable base (2) of movable lower guides (3) of the straightened iron rods (26), said lower guides (3) being adapted to open and close according to the size of the concrete reinforcement to be assembled, a mobile base (6) being adjusted on the upper part of the assembler and having the ability of an upward-downward movement, said mobile base (6) having upper guides (3) for the straightened iron rods (26), said upper guides (3) being adapted to open and close according to the size of the concrete reinforcement to be assembled, and said mobile base (6) further having supporting bars (9) for the shaped iron rods (27), which at the same time may also be used as guides for the straightened iron rods (26), on said mobile base (6) being adjusted a mechanism ((29), (30), (31) and (32)) for automatic propulsion of the shaped iron rod (27), two mobile assembling columns (10) for accomplishing the assembling, said mobile assembling columns (10) being adjusted on first glide-guides (11) for the opening-closing and the whole system of both two columns being adapted to glide forwards and backwards on second glide-guides (12), on the upper and lower part of each assembling column (10) being adjusted a system for holding, welding and propulsion of the concrete reinforcement, and a corresponding bench (33) for placing the -ready for placement- concrete reinforcement, the size of which may be varied depending on the sizes of the concrete reinforcements to be assembled.

2. The Automatic Assembler of Concrete Reinforcement according to claim 1, further **characterized in 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, further **characterized in that** on the upper and lower part of each assembling column (10) is adjusted the system for holding, welding and propulsion of concrete reinforcement, said system consisting of a hook (19) for the holding of the straightened iron rod (26), which is adapted to execute an opening-closing movement, a clamp (21), which is adapted to carry out the holding or releasing of the shaped iron rod (27), and an electric welding head (23) for accomplishing the welding, said system for holding, welding and propulsion of concrete reinforcement being adapted to move forwards-backwards, thus releasing or shutting in the concrete reinforcement already formed.
4. The Automatic Assembler of Concrete Reinforcement according to claim 3, further **characterized in that** said system for holding, welding and propulsion of the concrete reinforcement is adapted to move upwards-downwards according to demand.

Patentansprüche

1. Automatische Montageanlage für Bewehrungsstahl für die zusammen Setzung mit der Methode des Schweißens von Bewehrungsstahl (27) mit linearen Bewehrungsstahl (26) erzeugt mann das haupt oder hilfs material für Bewehrungsstahl der sehr wichtig ist für den Bau die Montageanlage besteht aus einem stabilen Metal Rahmen (1) und einen festen Sockel (2) wo bewegliche Führer (3) für den linearen Bewehrungsstahl (26) die so genannten Führer (3) Sie sind so angebracht das Sie sich öffnen und schließen lassen je nach belieben für die Größe des Bewehrungsstahls ein beweglicher Sockel (6) ist so angebracht das die Montageanlage die Möglichkeit hat eine oben -unten Bewegung, der so genannte Sockel (6) hat oben die Führer (3) für den linearen Bewehrungsstahl (26) die so genannten Führer oben (3) sind so angebracht das Sie sich öffnen und schließen lassen je nach Größe des Bewehrungsstahls und der so genannte bewegliche Sockel (6) hat zusätzlich Halterungen (9) die, den gebogenen Bewehrungsstahl (27) halten gleichzeitig können die auch als hilfs Führer für den linearen Bewehrungsstahl benutzt werden in den so genannten beweglichen Sockel (6) wird ein Mechanismus ((29), (30), (31), (32)) angebracht der den gebogenen Bewehrungsstahl in Position bringt (27) zwei bewegliche Säulen der Montageanlage (10) für das ermöglichen der Montage (10) sind erst auf Führer (11) für das auf und zumachen und, das ganze System ist auf Führer für die vor und rückwärts Bewegung (12) auf das obere und untere teil jeder Montage Säule (10) ist ein System angebracht für das halten, schweißen und bewegen des Bewehrungsstahls eine Bank (33) für das fertige Montierte Bewehrungsstahl die man so Einstellen kann für jede Größe des Bewehrungsstahls.
2. Automatische Montageanlage für Bewehrungsstahl so wie in der Beschreibung 1. eine besondere Eigenschaft ist das, das obere teil (17) jeder Montage Säule (10) hat die Möglichkeit sich getrennt von der anderen sich zu bewegen.
3. Automatische Montageanlage für Bewehrungsstahl so wie in der Beschreibung 1. eine besondere Eigenschaft ist das, das obere teil jeder Montage Säule (10) ist ein System angebracht für das festhalten und bewegen des Bewehrungsstahls das so genannte System bestecht aus einem hacken (19) für das halten des linearen Bewehrungsstahls (26) ist so angepasst das Sie eine Bewegung ausführt zum auf -und zumachen der Klammer (21) die dafür da ist den gebogenen Bewehrungsstahl zu halten oder loszulassen (27) und ein Schweißkopf (23) das so genannte System für das halten, schweißen und bewegen des Bewehrungsstahls das so genannte System bewegt den fertig geschweißten Bewehrungsstahl nach vorne hinten.
4. Automatische Montageanlage für Bewehrungsstahl so wie in der Beschreibung 3. eine besonderheit das so genannte Systems für das halten, schweißen und bewegen des Bewehrungsstahls ist angebracht für das bewegen nach oben und unten je nach Anwendung.

Revendications

1. Assembleur automatique du renfort concret pour se réunir au moyen de la méthode soudre tiges formées de fer (27) avec les tiges redressées de fer (26) et créer le renfort concret auxiliaire ou principal, qui est essentiel pour la construction des bâtiments, se composer d' assembleur un immeuble de l'armature en métal (1) qui est ajusté une base d' immobile (2) des guides mobiles a bas (3) des tiges redressées de fer (26), appelés les guides inférieurs (3) étant adaptés pour s'ouvrir et fermer en accord à la taille du renfort concret à réunir, une base de mobile (6)

étant ajustée sur la partie supérieure de l'assembleur et ayant l'abîlité d'un mouvement haut et bas, appelé la base mobile (6) ayant les guides supérieurs (3) redressés de tiges de fer (26) appelés les guides supérieurs(3) étant adaptés pour s'ouvrir et clôturent en accord a la taille du renfort concret à réunir, et de la base appelée mobile (6) ayant plus loin les barres de support (9) pour les tiges formées de fer (27), qui en même temps peuvent également être utilisées comme guides pour les tiges redressées de fer (26), sur la base appelée de mobile (6) étant ajustée un mécanisme ((29), (30), (31) et (32)) pour automatique propulsion de la tige formée de fer (27), deux colonnes se réunissantes mobiles (10) pour accomplir se réunir, appelées les colonnes assemblé mobiles (10) étant ajustées dessus d'abord les guides de glissement (11) pour l'ouverture - fermeture et le système entier des deux colonnes de deux étant glissement adapté d' expédie et vers l'arrière glisser - guides de on deuxièmes (12), a le haut et la pièce inférieur de chaque colonne se réunissant (10) étant a ajusté système pour tenir, souder et propulsion du renfort concret, et un banc correspondant (33) pour jeter - préparer pour le concret de placement, la taille dont peut être on dépendre changé que les tailles des renforts concrets à être assemblé.

2. L' Assembleur automatique du renfort concret selon la revendication 1, autre **caractérisé que** le supérieur partie (17) de chaque colonne se réunissant (10) a la capacité de se déplacer en s'ouvrant et fermer indépendamment.
3. L' Assembleur automatique du renfort concret selon la revendication 1, encore **caractérisé que** le on la partie supérieure et plus inférieure de chaque colonne assemblée (10) est ajusté le système à se tenir, à souder et à propulsion du renfort concret, appelé se composer de système un crochet (19) pour tenir de la tige redressée de fer (26), qui est adaptée pour exécuter le mouvement d' ouverture -fermeture, une bride (21), qui est adapté pour effectuer libérer se tenant de or de la tige formée de fer (27), et une tête de soudure électrique (23) pour accomplir souder, appelé système pour se tenir, soudure et propulsion du renfort concret étant adapté au de mouvement expédie - vers l'arrière, ainsi ou de laisser fermant dans le renfort concret déjà formé.
4. L' Assembleur automatique du renfort concret selon la revendication 3, autre **caractérisé** qui a appelé le système pour tenir, soudant et la propulsion du renfort concret est adapté aux haut ou bas de mouvement selon la demande.

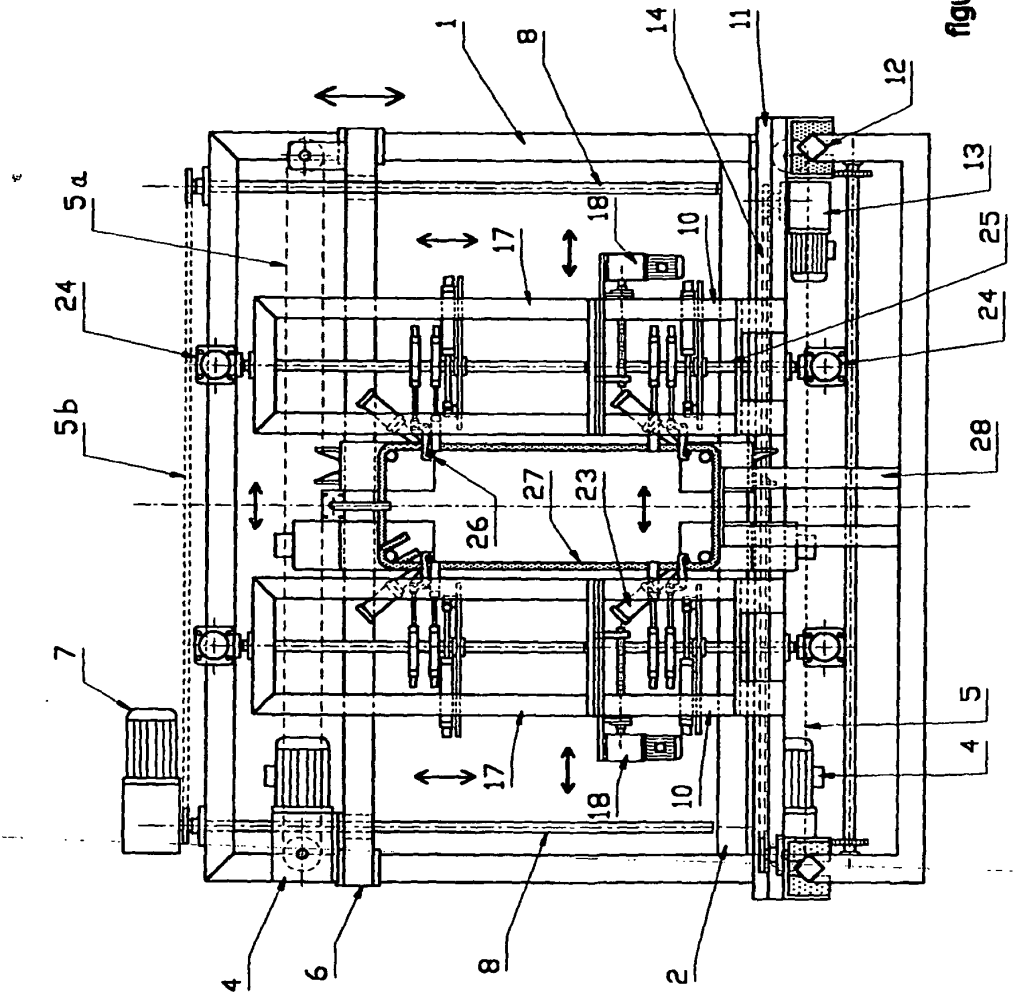
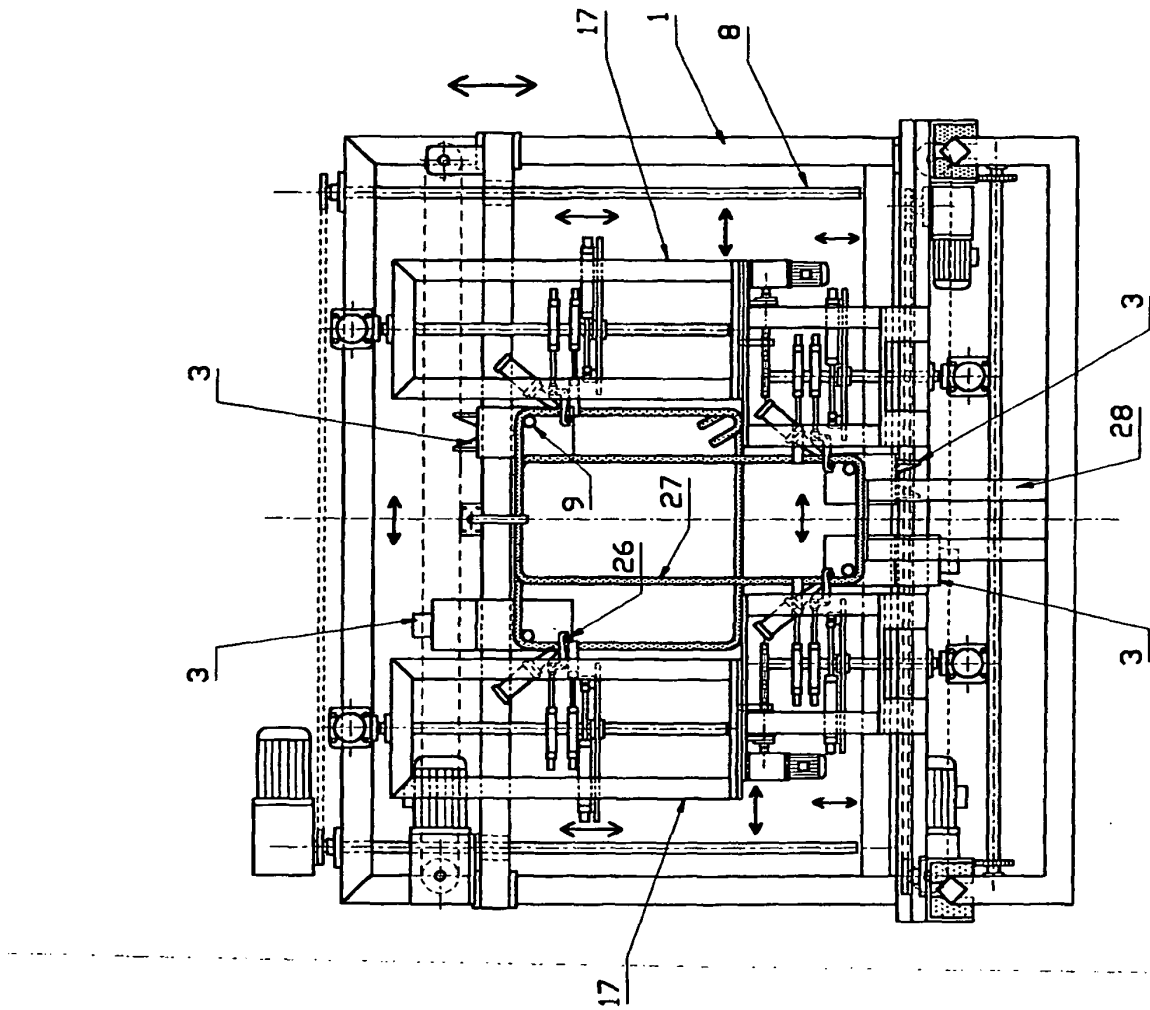


figure 1

sheet 1

figure 2



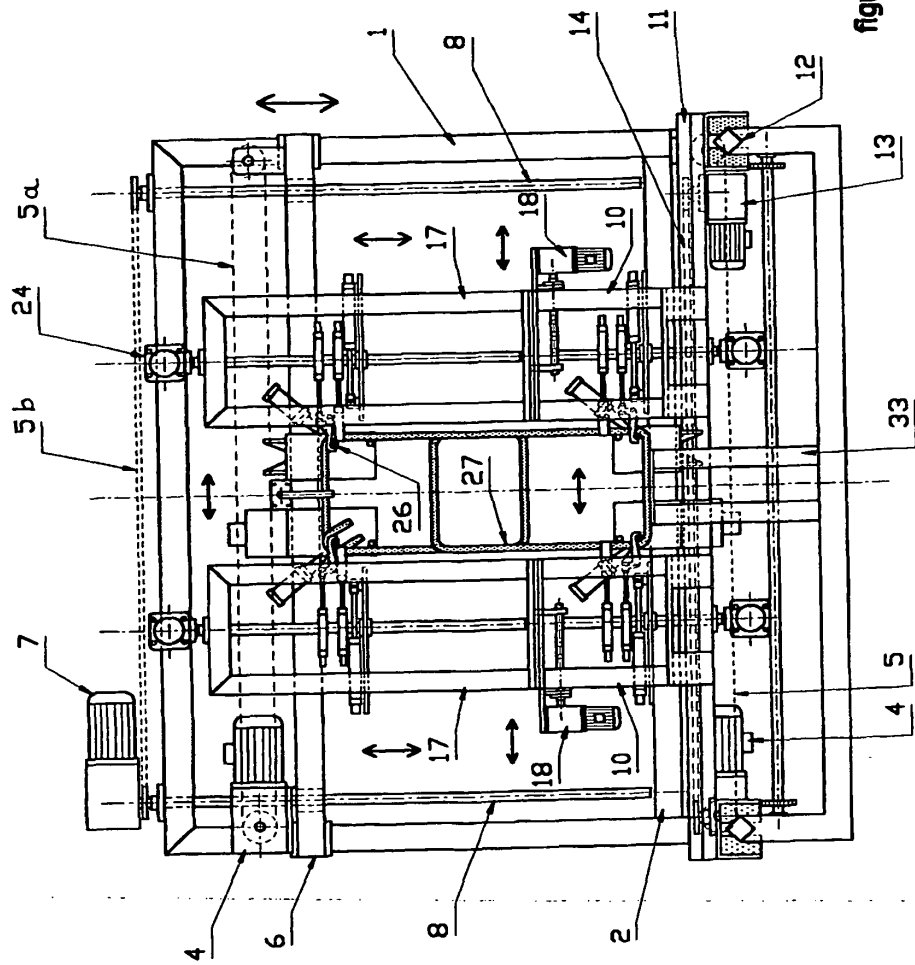


figure 3

sheet 3

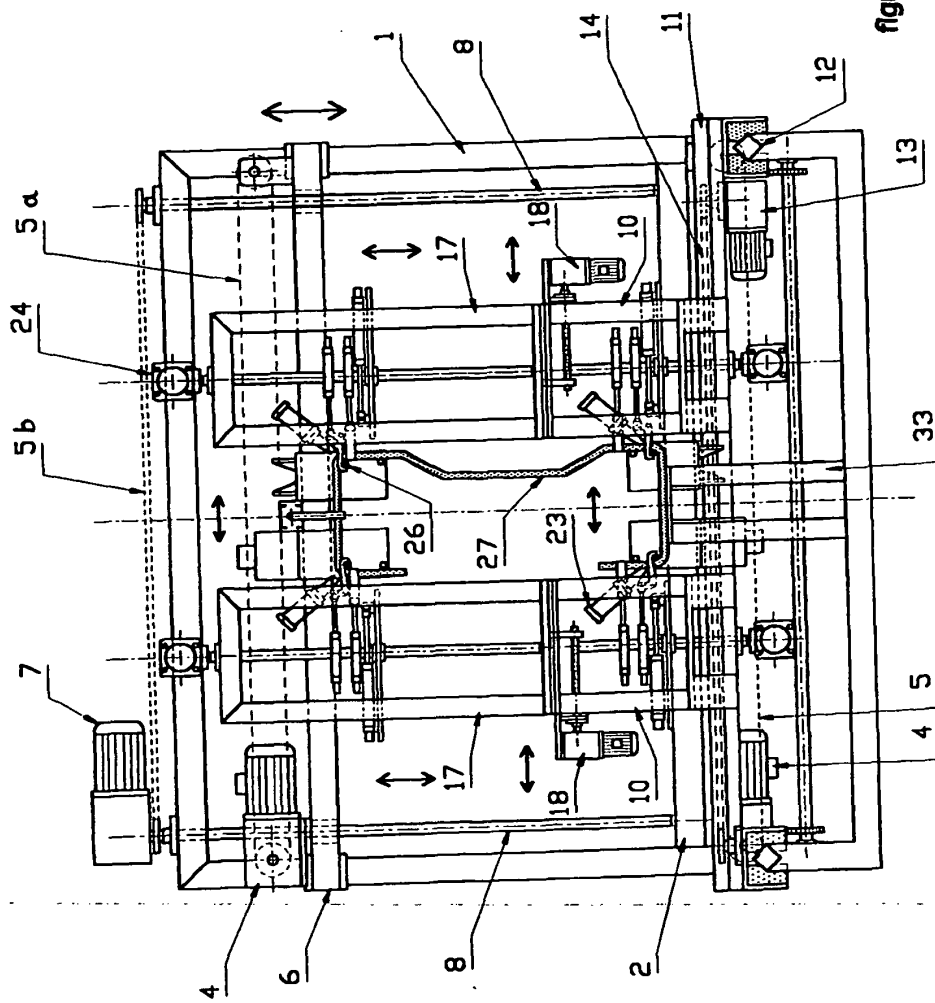


figure 4

sheet 4

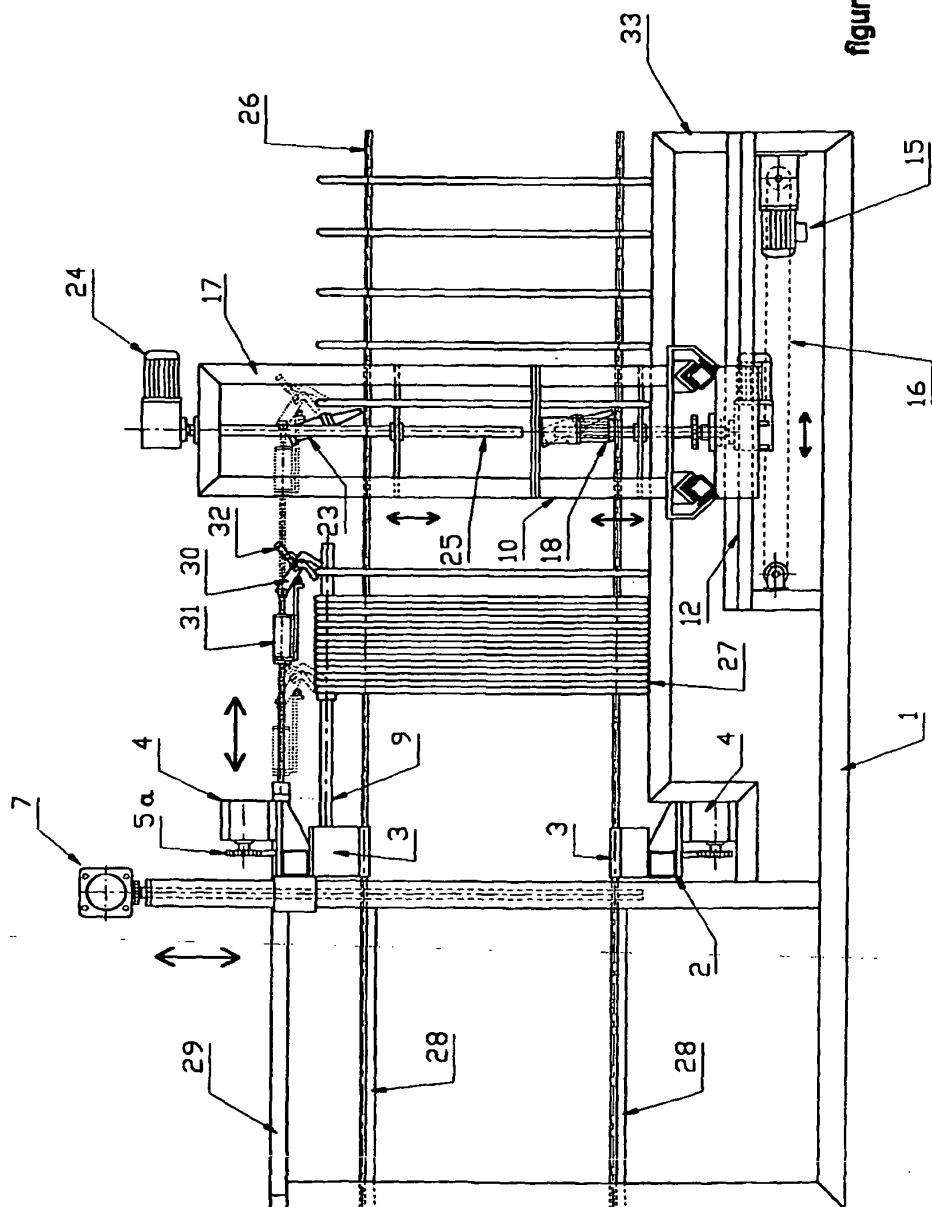


figure 5
sheet 5

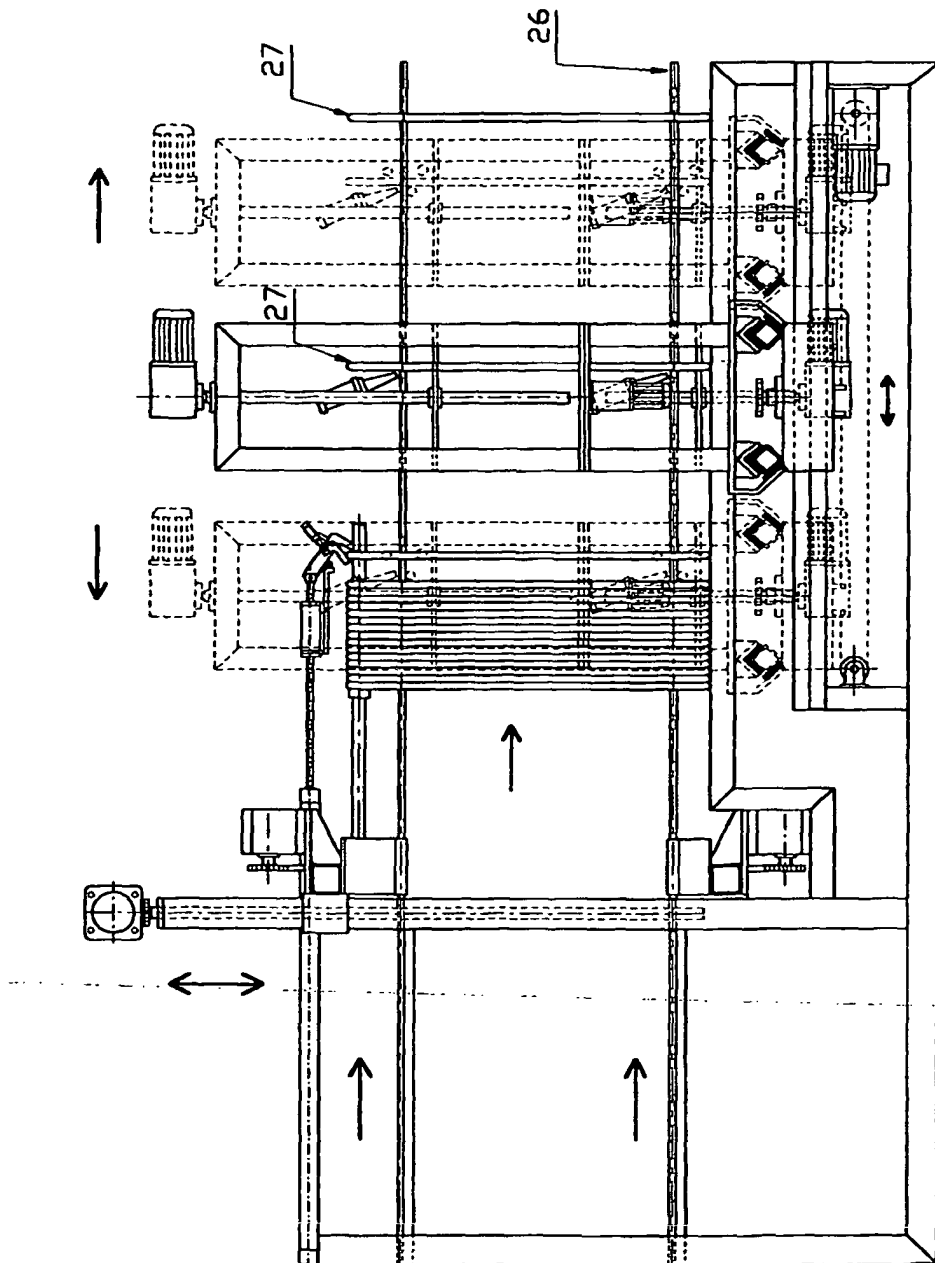


figure 6

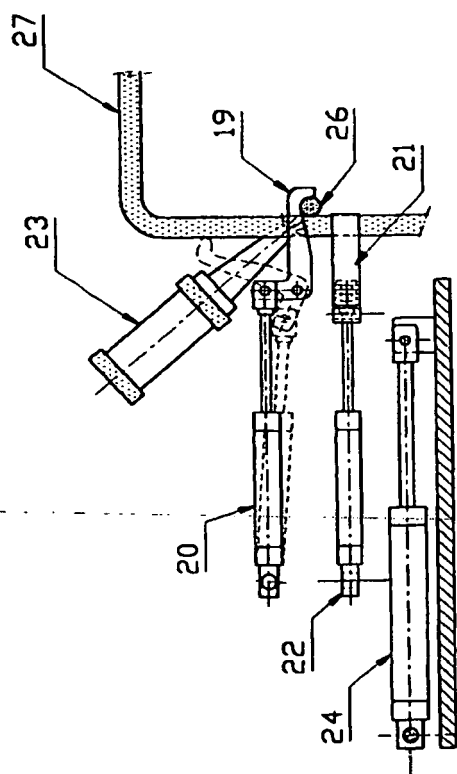


figure 7

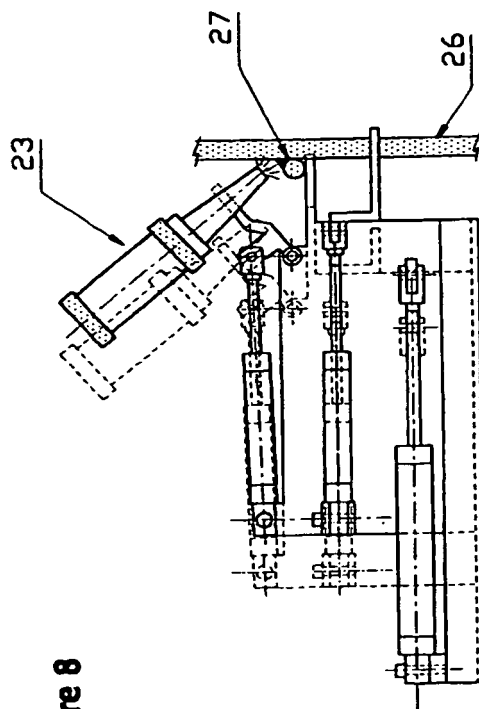
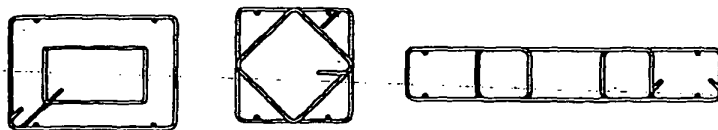
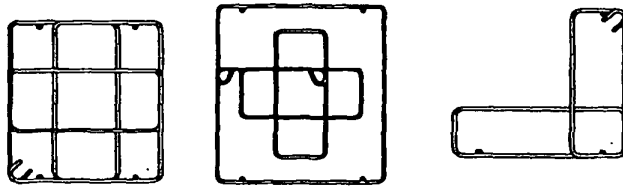
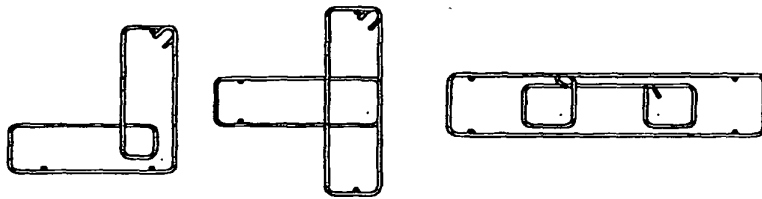
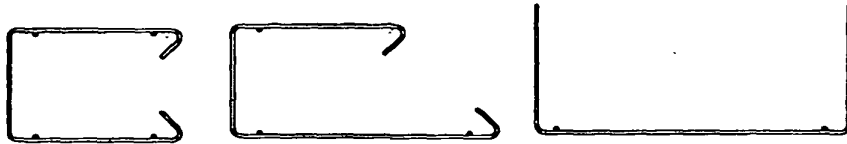
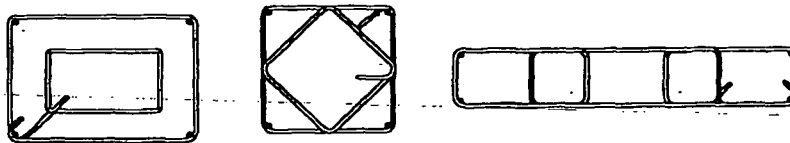
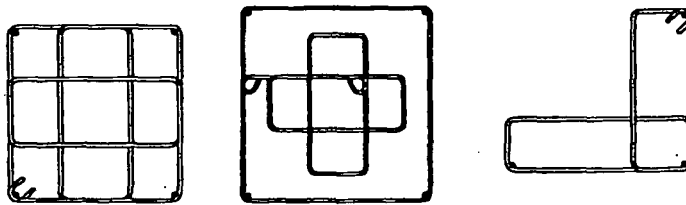
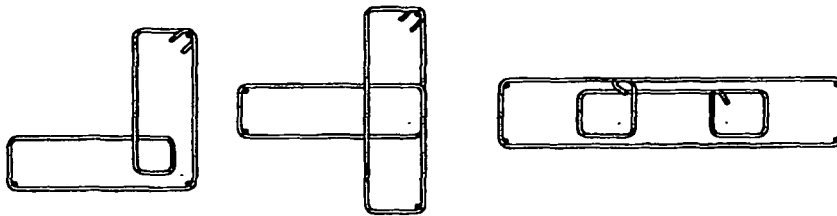
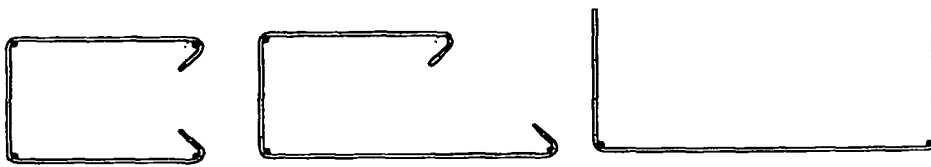
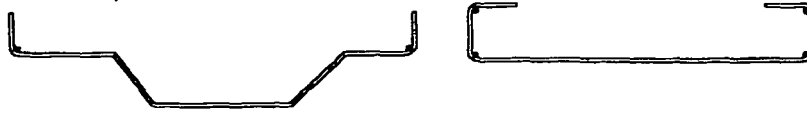


figure 8

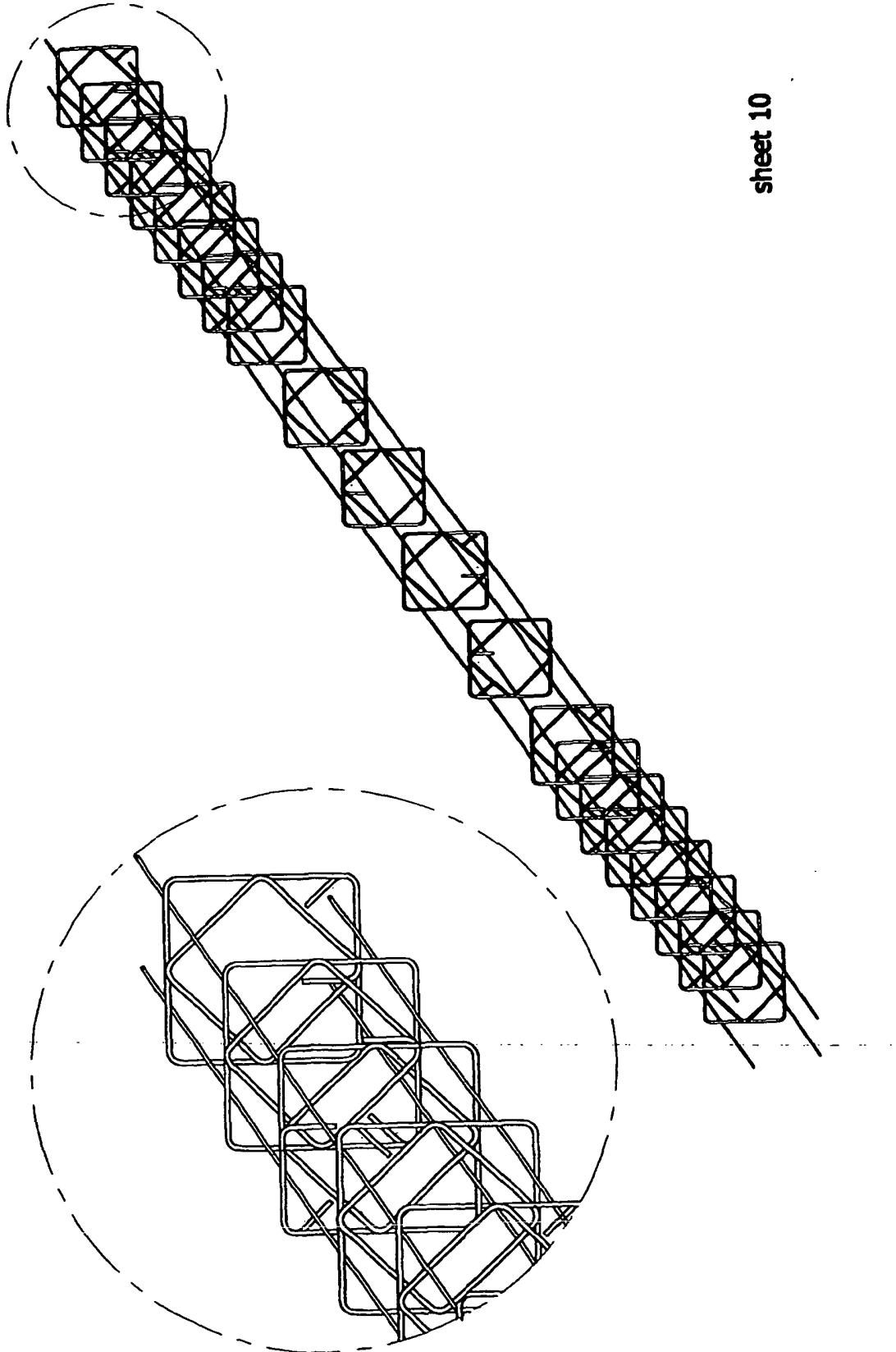


figure 9





sheet 10



sheet 11

