

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 0 674 553 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:

31.03.1999 Bulletin 1999/13

(21) Application number: **94926160.6**

(22) Date of filing: **06.08.1994**

(51) Int. Cl.⁶: **B21F 27/10**, B21F 23/00

(86) International application number:
PCT/EP94/02616

(87) International publication number:
WO 95/06532 (09.03.1995 Gazette 1995/11)

(54) AUTOMATIC BAR FEEDING DEVICE

AUTOMATISCHE ZUFÜHRVORRICHTUNG FÜR STANGEN

DISPOSITIF AUTOMATIQUE D'ALIMENTATION EN BARRES

(84) Designated Contracting States:
AT CH DE LI

(30) Priority: **30.08.1993 IT UD930000**

(43) Date of publication of application:
04.10.1995 Bulletin 1995/40

(73) Proprietors:
• **Bernardinis, Claudio**
I-33010 Treppo Grande (IT)
• **Zebelloni, Carino**
I-33030 Buia (IT)

(72) Inventors:
• **Bernardinis, Claudio**
I-33010 Treppo Grande (IT)
• **Zebelloni, Carino**
I-33030 Buia (IT)

(74) Representative:
Cragnolini, Sergio
Viale Venezia 277
33100 Udine (IT)

(56) References cited:
EP-A- 0 241 449 **EP-A- 0 482 842**
US-A- 3 194 935

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 0 674 553 B1

Description

[0001] This invention is concerned with an automatic feeding device for bars according to the preamble of claim 1, to be used on machines for the production of an electrowelded mesh the particular feature of which is to position, at a requested distance, one or more pieces of said bars and/or rods.

[0002] Such device allows unilateral continuous introduction of bars, wherein the bars are continuous or in pieces, on their own positioning level. Likewise for a bilateral positioning, there is the need to have two devices which are opposite in position and in function.

[0003] The invention permits to produce automatically and quickly special electrowelded meshes (with orthogonal links) having general shapes with different geometrical shape, partial local reinforcements, empty spaces or project interruptions.

[0004] The state of the art, as currently in use, provides in case of construction of an irregular electrowelded mesh construction according to project drawing for manual and/or automatic operation on electrowelded normal mesh by cutting parts which are to be cut off and eventually add reinforcements partially.

[0005] This, besides forming a number of wastes and necessitating a large spaces to work, was not very economic because such operations need a long time and modifications which influence the unit price of the product.

[0006] An automatic feeding device for bars, as defined in the precharacterizing portion of claim 1, is known from EP-A-482 842.

[0007] An object of the present invention is the provision of an automatic feeding device for bars and/or rods to be applied continuously on welding machines for electrowelded meshes. This allows one or more bars of equal or different length to be positioned in any point in the lateral orthogonal direction, according to the feeding direction of the mesh. This way, besides avoiding staff intervention (therefore achieving time and cost reduction), also avoids wastes because only the necessary bar is used.

[0008] As mentioned, the device is driven automatically and therefore it is capable to operate on project drawings.

[0009] The above object is achieved by an automatic feeding device for bars, as defined in claim 1. The dependent claims define preferred embodiments of the invention.

[0010] The mechanical combination of the invention permits to position bars or pieces in a continuous or spaced mode, automatically, by acting in synchrony and/or in progression between all the parts of the device.

[0011] As a matter of fact, supposing that a straight bar used comes from an unwinding of continuous metal wire coil, the working sequences (in a possible solution) of the combination are the following: the entraining

device, which is bidirectional, feeds up a bar of required size through the special guides; afterwards, the cutting device makes the cutting to measure (in case of full dimension, the bar will be placed under the welding unit, and in case of partial dimension it will need to be moved straight according to the project drawing); for the rectilinear positioning of the piece the bidirectional entraining device comes into action and the edge of the new bar pushes forward the end of the first bar guided by means of the special guides, the special guides being gauged and elastic, until reaching the position required, thus avoiding any uncontrolled moving of said bar; then, the entrainer device inverts rotation direction and takes back the new bar while the first cut bar remains still in the reached position; the entrainer device takes back totally or partially the new bar for a distance equal to the positioning distance space between both bars; afterwards the cutting device comes into action and cuts the new bar; now, the previous phase will be more or less repeated until reaching the rectilinear definitive positioning of the bars according to the drawing; in conclusion, orthogonal carriers come into action automatically and move the positioned bars from the openable special guides (subject to springs) to the welding device (where the joining of the lateral bars with the longitudinal ones of the mesh fed by other machines occurs).

[0012] A first preferred embodiment of this invention is concerned with the possibility to adjust the dimension of the diameter of the bars of the automatic entraining device and the possibility to use openable special guides, spaced, rectilinear, invertable of the same or of different diameter and/or openable special guides having more parallel housings of a same or of different diameter.

[0013] A second preferred embodiment of this invention is the possibility to make the whole feeding combination mobile in order to controllably position the rods or wire pieces in parallel on a construction level of a mesh.

[0014] A third preferred embodiment of this invention is concerned with the possibility to use the feeding device pairwise, on opposite sides, on the same line or on parallel lines in order to operate for the construction of large electrowelded meshes.

[0015] A fourth preferred embodiment of this invention is concerned with the possibility to make many electrowelded side by side meshes previously cut; as a matter of fact the feeding device can cut, push and position many rod pieces on the same trajectory, wherein each one of them will be part of a single electrowelded mesh.

[0016] Above mentioned characteristics will be better understood and pointed out while other will appear from the following detailed description of an embodiment, in the four attached drawings, in which:

- Fig.1 shows a plan view of a special electrowelded mesh, with orthogonal links, shaped with empty spaces and possible local reinforcements according to drawing;

- Fig.2 shows a side view of a bar positioning device into welding zone pointing out the movement of the carrier from the release from the openable special guides;
- Fig.3 shows a schematic front view of the entraining device, the cutting device and the special guides pointing out the first work phase, which consists of the cutting of a piece bar;
- Fig.4 shows a front view, as per Fig.3, of the second work phase, that is the pushing of the piece of wire with the new bar through the spaced special guides until reaching a requested position;
- Fig.5 is a front view, as per Fig.3 and 4, of the third phase, that is the taking back of continuous bar leaving the cut piece in position;
- Fig.6 is a front view, as per Fig.3, 4 and 5, of the fourth phase consisting in the cutting to measure of the second piece of wire on the same direction (for example x-coordinate);
- Fig.7 shows a front view, as per Fig.3, 4, 5 and 6, of the fifth phase; that is the pushing of the second piece of wire with the edge of the new bar;
- Fig.8 shows a front view, as per previous Fig.3, 4, 5, 6, and 7, of the sixth phase of taking back of the new bar leaving in position the second piece of cut wire. The following phase will be the positioning of the first and the second piece under the welding device. Besides, the drawing points out an example of electrowelded mesh composed by discontinuous bars and spaced in order to form an empty space.

[0017] According to the invention and in conformity with an embodiment of the automatic feeding device of bars or steel rods in a continuous mode, coming from a skein or coils, the automatic feeding device includes an automatic entraining device (2) adjustable in order to operate on different diameters of wire and to push it in both directions: forwards and backwards. Following, is the automatic cutting device (3) which cuts to measure bars of any length, of maximum dimension possible for the device or shorter pieces. Following is a set of special guides (4), spaced, and elastically half-moon openable, with two holes of different diameter for the passing of relevant steel bars. They are interrupted and spaced to permit the action of a lever or carrier (6) orthogonal to the bar feeding direction; the carrier (6) moves and positions bars under the electrodes of the welding device (7) which will link the bars (1.1 - 1.2) to the orthogonal wires (8) already present as a mesh component.

[0018] The whole feeding device is capable to cut to measure bars (1.1 - 1.2) and to position it at a requested distance making it pass through the holes of the special openable guides (4), through the pushing action of the edge of upstream bar (1.2) on the edge of the cut, downstream bar (1.1). Once such position is reached the entrainer device takes back the bar (1), leaving the bar (1.1) in position, and waits for the next cut to measure on the same line or for a new line; the positioning

operation is repeated as already described with the particularity that a second bar can be positioned distant from the first, on the same line, leaving space according to the project drawing. After this, the carries (6) come into action by moving the pieces under the electrodes for the effective welding.

[0019] Afterwards, the cycle will be repeated following the construction of mesh according to the drawing.

[0020] The mesh may be normal or elaborated with perimetric and inner shapings, as for example empty spaces (5) and local reinforcements.

Claims

1. An automatic feeding device for bars (1), particularly suitable for the construction of electrowelded meshes, said feeding device comprising:

an entraining device (2) for continuously entraining wires or bars (1) from skeins and coils,

a cutting device (3), said cutting device (3) being adjustable in a feeding direction of said wires or bars (1) for the customized cutting of said wires or bars (1), and

carriers (6) for removing said wires or bars (1) and for placing said wires or bars (1) under a welding device (7), such as to allow the linking of said wires or bars (1) with respective rods (8) forming a part of a mesh and disposed in a direction substantially orthogonal to a feeding direction of said wires or bars (1) into said entraining device (2),

characterized in that said feeding device further comprises:

a set of special guides (4), said special guides (4) being gauged and elastic for controlling the movement of said wires or bars (1) in a straight and spaced manner, said special guides (4) having one or more passing holes in respect to said wires or bars (1), said special guides (4) being formed with two openable parts in order to permit the orthogonal movement of said wires or bars (1) by means of said carriers (6), said entraining device (2) being capable to operate in both directions, forwards or backwards,

said entraining device (2) being controllable, such as to position entire bars or pieces of bars (1.1, 1.2) at required distances by pushing the edge of a first downstream bar (1.1) with the head of a second upstream bar (1.2), moved forward by said entraining device (2), through passing holes of said openable special guides (4) which simply hold it and keep it always stopped into the position required,

said entraining device (2) being further controllable, such as to invert its motion and take back

said second upstream bar (1.2) and leaving said first downstream bar (1.1) in position for a new cycle.

2. The automatic feeding device according to claim 1, characterized in that said entraining device (2) is further adjustable to operate on wires or bars (1) having different diameters. 5

3. The automatic feeding device according to claims 1 or 2, characterized in that said special guides (4) have said one or more passing holes of different or of same diameter and gauged in order to stop bars, said special guides (4) being made in two parts one of which can be lifted in order to permit lateral removal or orthogonal removal in respect to the passing hole direction and to the bar feeding direction. 10 15

4. The automatic feeding device according to one or more of the preceding claims, characterized in that said feeding device operates laterally, transversally to the feeding direction of mesh construction; in that it can be made fix or mobile; in that it operates unilaterally or also side by side, at variable or fixed distance, in order to operate in parallel under independent control; and in that at last, in case of large construction of electrowelded mesh, it operates on the same line at opposite positions. 20 25 30

5. The automatic feeding device according to one or more of the preceding claims, characterized in that said feeding device is capable to pre-cut electrowelded meshes, said entraining device (2) being adapted and arranged, such as to feed transversally several pieces of said wires or bars (1), one after the other, on the same trajectory, such that the mesh which is composed by transversal and longitudinal bars and rods (1.1, 1.2, 8), once welding is over, will be interrupted, already cut in stripes side by side. 35 40

6. The automatic feeding device according to one or more of the preceding claims, characterized in that said automatic feeding device is adapted to be operational with machines producing metal electrowelded meshes, normal or shaped, and with other machines operating on metal wires or bars as for example stirrup machines or bending machines for building purposes and selectioning units for rods of different length. 45 50

7. The automatic feeding device according to one or more of the preceding claims, characterized in that said automatic feeding device further comprises different mechanical devices which are automatically synchronously and/or progressively controlled through a program in order to place said bars 55

and/or straight metal rods coming from said skeins or coils, of variable length, at required distances in a continuous or in a discontinuous mode, on a work level or transversally to the forming direction of the electrowelded meshes, and in that

said second upstream bar (1.2) can be on the same trajectory or line, continuously or leaving spaces, or on a new line in respect to said first downstream bar (1.1).

Patentansprüche

1. Eine automatische Zufuhrvorrichtung für Stangen (1), die besonders zum Aufbau von elektrogeschweißten Maschen geeignet ist, wobei die Zufuhrvorrichtung folgendes umfaßt:

eine Mitführungsvorrichtung (2), um fortwährend Drähte oder Stangen (1) von Docken und Spulen abziehen,
 eine Schneidevorrichtung (3), wobei die Schneidevorrichtung (3) in einer Zufuhrrichtung der Drähte oder Stangen (1) einstellbar ist, um die Drähte oder Stangen (1) kundenspezifisch zu schneiden, und
 Transportmittel (6), um die Drähte oder Stangen (1) zu entnehmen und um die Drähte oder Stangen (1) unter eine Schweißvorrichtung (7) zu legen, um das Verbinden der Drähte oder Stangen (1) mit jeweiligen Stäben (8) zu gestatten, die einen Teil einer Masche bilden und in einer Richtung angeordnet sind, die im wesentlichen rechtwinklig zu einer Zufuhrrichtung der Drähte oder Stangen (1) in die Mitführungsvorrichtung (2) angeordnet sind, dadurch gekennzeichnet, daß die Zufuhrvorrichtung weiterhin folgendes umfaßt:
 einen Satz von speziellen Führungsschienen (4), wobei die speziellen Führungsschienen (4) kalibriert und elastisch sind, um die Bewegung der Drähte oder Stangen (1) in einer geraden und beabstandeten Weise zu steuern, wobei die speziellen Führungsschienen (4) in Bezug auf die Drähte oder Stangen (1) eine oder mehrere Durchlaßöffnungen aufweisen, wobei die speziellen Führungsschienen (4) mit zwei Teilen, die aufschließbar sind, ausgebildet sind, um mit Hilfe der Transportmittel (6) die senkrechte Bewegung der Drähte oder Stangen (1) zu erlauben,
 wobei die Mitführungsvorrichtung (2) in der Lage ist, in beiden Richtungen, und zwar vorwärts oder rückwärts, zu arbeiten,
 wobei die Mitführungsvorrichtung (2) derart steuerbar ist, um ganze Stangen oder Stücke von Stangen (1.1, 1.2) in erforderlichen Abständen zu positionieren, indem der Rand

- einer ersten stromabwärts gelegenen Stange (1.1) mit dem Kopf einer zweiten stromaufwärts gelegenen Stange (1.2) gestoßen wird, die mittels der Mitführungsvorrichtung (2) durch die Durchlaßöffnungen der aufschließbaren speziellen Führungsschienen (4) vorwärts bewegt wird, die sie einfach halten und immer in der erforderlichen Stellung gestoppt halten, wobei die Mitführungsvorrichtung (2) weiterhin derart gesteuert werden kann, um ihre Bewegung umzukehren und die zweite stromaufwärts gelegene Stange (1.2) zurückzunehmen und die erste stromabwärts gelegene Stange (1.1) in Stellung für einen neuen Zyklus zurückzulassen.
2. Die automatische Zufuhrvorrichtung gemäß Anspruch 1, dadurch gekennzeichnet, daß die Mitführungsvorrichtung (2) weiterhin einstellbar ist, um mit Drähten oder Stangen (1) zu arbeiten, die unterschiedliche Durchmesser aufweisen.
3. Die automatische Zufuhrvorrichtung gemäß den Ansprüchen 1 oder 2, dadurch gekennzeichnet, daß die speziellen Führungsschienen (4) eine oder mehrere Durchlaßöffnungen unterschiedlichen oder gleichen Durchmessers aufweisen und kalibriert sind, um die Stangen zu stoppen, wobei die speziellen Führungsschienen (4) in zwei Teilen hergestellt werden, von denen eines angehoben werden kann, um in Bezug auf die Durchlaßöffnungs-Richtung und die Stangen-Zufuhr-Richtung das seitliche oder senkrechte Entfernen zu erlauben.
4. Die automatische Zufuhrvorrichtung gemäß einem oder mehreren der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Zufuhrvorrichtung in Bezug auf die Zufuhr-Richtung des Maschen-aufbaus seitlich und transversal arbeitet; daß sie feststehend oder mobil hergestellt werden kann; daß sie in einem veränderlichen oder festgelegten Abstand einseitig oder auch Seite an Seite arbeiten kann, um unter unabhängiger Steuerung parallel zu arbeiten; und daß sie schließlich im Fall eines großen Aufbaus von elektro-geschweißten Maschen auf derselben Linie an entgegengesetzten Stellen arbeitet.
5. Die automatische Zufuhrvorrichtung gemäß einem oder mehreren der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Zufuhrvorrichtung in der Lage ist, die elektro-geschweißten Maschen vorzuschneiden, wobei die Mitführungsvorrichtung (2) ausgebildet und angeordnet wird, um mehrere Stücke der Drähte oder Stangen (1) transversal zuzuführen, und zwar eines nach dem anderen auf derselben Bahn, so daß die Masche, die aus transversalen und longitudinalen Stangen
- und Stäben (1.1, 1.2, 8) besteht, nachdem das Schweißen abgeschlossen ist, unterbrochen wird, wobei sie bereits in Streifen Seite an Seite geschnitten ist.
6. Die automatische Zufuhrvorrichtung gemäß einem oder mehreren der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die automatische Zufuhrvorrichtung ausgebildet wird, um mit Maschinen, die Metall-elektro-geschweißten Maschen - normal oder formgeschnitten - herstellen, betrieben werden zu können, und mit anderen Maschinen, die Metalldrähte oder Stangen bearbeiten, wie beispielsweise Bügelmaschinen oder Biegewalzen für Bauzwecke und Auswahleinheiten für Stangen unterschiedlicher Länge.
7. Die automatische Zufuhrvorrichtung gemäß einem oder mehreren der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die automatische Zufuhrvorrichtung weiterhin verschiedene mechanische Vorrichtungen umfaßt, die über ein Programm automatisch synchron und/oder fortschreitend gesteuert werden, um die Stangen und/oder geraden Metallstäbe, die von den Docks und Spulen kommen, und zwar verschiedener Länge, auf kontinuierliche oder nichtkontinuierliche Weise in erforderlichen Abständen auf einer Arbeitsebene oder transversal zur Bildungsrichtung der elektro-geschweißten Maschen zu setzen, und dadurch gekennzeichnet, daß
- die zweite stromaufwärts gelegene Stange (1.2) in Bezug auf die erste stromabwärts gelegene Stange (1.1) auf derselben Bahn oder Linie liegen kann, und zwar kontinuierlich oder Zwischenräume hinterlassend, oder auf einer neuer Linie.
- ## Revendications
1. Dispositif d'alimentation automatique pour barres (1) particulièrement approprié pour la construction de treillis soudés électriquement, ledit dispositif d'alimentation comprenant :
- un dispositif d'entraînement (2) pour entraîner en continu des fils ou des barres (1) à partir d'écheveaux et d'enroulements,
- un dispositif de coupe (3), ledit dispositif de coupe (3) étant réglable dans une direction d'alimentation desdits fils ou barres (1) pour la coupe adaptée aux besoins desdits fils ou barres (1), et
- des transporteurs (6) pour enlever lesdits fils ou barres (1) et pour mettre lesdits fils ou barres (1) sous un dispositif de soudure (7), de façon à permettre la liaison desdits fils ou bar-

res (1) avec des fers respectifs (8) formant une partie d'un treillis et disposés dans une direction pratiquement orthogonale à une direction d'alimentation desdits fils ou barres (1) dans ledit dispositif d'entraînement (2),

caractérisé en ce que ledit dispositif d'alimentation comprend de plus :

un ensemble de guides spéciaux (4), lesdits guides spéciaux (4) étant calibrés et élastiques pour commander le déplacement desdits fils ou barres (1) de façon rectiligne et espacée, de ledits guides spéciaux (4) ayant un ou plusieurs trous de passage par rapport auxdits fils ou barres (1), lesdits guides spéciaux (4) étant formés en deux parties pouvant s'ouvrir afin de permettre le mouvement orthogonal desdits fils ou barres (1) au moyen desdits transporteurs (6),

ledit dispositif d'entraînement (2) pouvant fonctionner dans les deux directions, vers l'avant ou vers l'arrière,

ledit dispositif d'entraînement (2) pouvant être commandé de façon à placer des barres entières ou des morceaux de barres (1.1, 1.2) à des distances requises en poussant le bord d'une première barre descendante (1.1) avec la tête d'une deuxième barre ascendante (1.2), déplacée vers l'avant par ledit dispositif d'entraînement (2), à travers des trous de passage desdits guides spéciaux pouvant s'ouvrir (4) qui la maintiennent simplement et la conservent toujours arrêtée dans la position requise, ledit dispositif d'entraînement (2) pouvant de plus être commandé, comme pour inverser son mouvement et reprendre la deuxième barre ascendante (1.2) et laisser ladite première barre descendante (1.1) en position pour un nouveau cycle.

2. Dispositif d'alimentation automatique selon la revendication 1, caractérisé en ce que ledit dispositif d'entraînement (2) est de plus réglable pour fonctionner avec des fils ou des barres (1) ayant différents diamètres.

3. Dispositif d'alimentation automatique selon les revendications 1 ou 2, caractérisé en ce que lesdits guides spéciaux (4) ont lesdits un ou plusieurs trous de passage de différents ou du même diamètre(s) et calibrés afin d'arrêter des barres, lesdits guides spéciaux (4) étant réalisés en deux parties dont l'une peut être soulevée afin de permettre le déplacement latéral ou le déplacement orthogonal par rapport à la direction du trou de passage et à la direction d'alimentation de la barre.

4. Dispositif d'alimentation automatique selon une ou plusieurs des revendications précédentes, caracté-

risé en ce que ledit dispositif d'alimentation fonctionne latéralement, transversalement à la direction d'alimentation de la construction de treillis; en ce qu'il peut être rendu fixe ou mobile; en ce qu'il fonctionne unilatéralement ou également à côté l'un de l'autre, à distance variable ou fixe, de façon à fonctionner en parallèle sous commande indépendante; et enfin en ce qu'en cas de grande construction de treillis soudé électriquement, il fonctionne sur la même ligne en des positions opposées.

5. Dispositif d'alimentation automatique selon une ou plusieurs des revendications précédentes, caractérisé en ce que ledit dispositif d'alimentation peut pré-couper des treillis soudés électriquement, ledit dispositif d'entraînement (2) étant conçu et disposé, de façon à alimenter transversalement plusieurs morceaux desdits fils ou barres (1), l'un après l'autre, sur la même trajectoire, de façon que le treillis qui se compose de barres et de fers transversaux et longitudinaux (1.1, 1.2, 8), une fois que le soudage est terminé, soit arrêté, déjà coupé en bandes côte à côte.

6. Dispositif d'alimentation automatique selon une ou plusieurs des revendications précédentes, caractérisé en ce que ledit dispositif d'alimentation automatique est adapté pour pouvoir fonctionner avec des machines produisant des treillis métalliques soudés électriquement, normaux ou formés, et avec d'autres machines traitant des fils ou des barres en métal comme par exemple des machines de formage en étrier ou des machines à cintrer pour le bâtiment et des unités de choix de fers de différentes longueurs.

7. Dispositif d'alimentation automatique selon une ou plusieurs des revendications précédentes, caractérisé en ce que ledit dispositif d'alimentation automatique comprend de plus différents dispositifs mécaniques qui sont commandés automatiquement synchroniquement et/ou progressivement par un programme pour placer lesdites barres et/ou fers métalliques rectilignes desdits écheveaux ou enroulements, de longueur variable, à des distances requises dans un mode continu ou discontinu, à un niveau de travail ou transversalement à la direction de formage des treillis soudés électriquement, et en ce que

ladite deuxième barre ascendante (1.2) peut être sur la même trajectoire ou ligne, en continu ou en laissant des espaces, ou sur une nouvelle ligne par rapport à ladite première barre descendante (1.1).

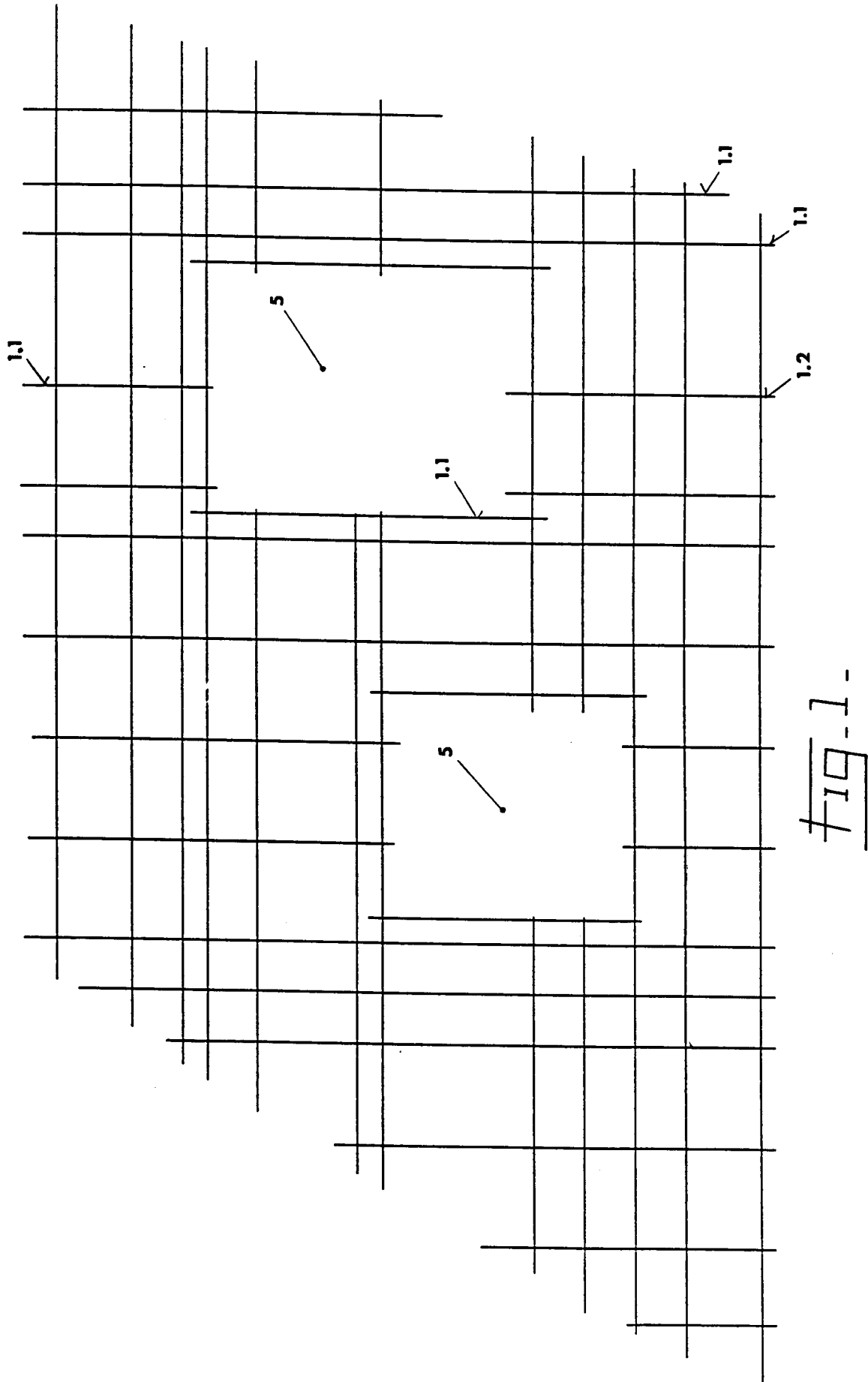


fig. 1 -

