(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 206 437**
A2

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **86201245.7**

(51) Int. Cl.⁴: **E02B 3/12**

(22) Date of filing: **02.05.83**

(43) Date of publication of application:
30.12.86 Bulletin 86/52

(60) Publication number of the original application in accordance with Art.76 EPC: **0 123 737**

(84) Designated Contracting States:
AT BE CH DE FR GB IT LI LU NL SE

(71) Applicant: **Gebroeders Rook Beheer B.V.**
Ijsseldijk 351 P.O. Box 9
NL-2920 AA Krimpen a/d Ijssel(NL)

(72) Inventor: **Rook, Cornelis**
Rijsdijk 8
NL-2931 AW Krimpen a/d Lek(NL)

(74) Representative: **Noz, Franciscus Xaverius, Ir. et al**
Algemeen Octrooibureau P.O. Box 645
NL-5600 AP Eindhoven(NL)

(54) Block mat comprising concrete blocks.

(57) A block mat comprising concrete blocks fastened to a carrying cloth with the aid of nails driven through the cloth into the blocks, whereby the blocks have been provided with preformed holes for accomodating the nails which have been provided with a head and a shank having at least slightly resilient extensions, the outer diameter defined by the free edges of said extensions in unloaded condition being greater as the inner diameter of said holes.

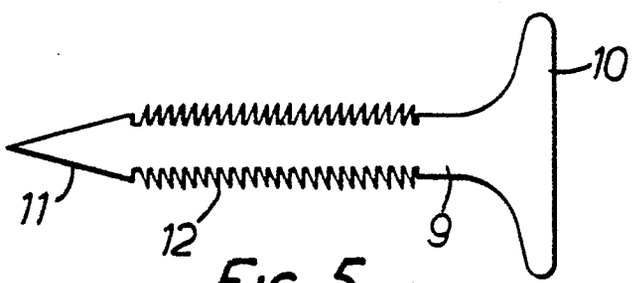

FIG. 5.

EP 0 206 437 A2

Block mat comprising concrete blocks.

The invention relates to a blockmat comprising concrete blocks fastened to a carrying cloth with the aid of nails driven through the cloth into the blocks.

DE-B-1.813.450 shows a mat, wherein the blocks can be fixed to a cloth by driving pins through the cloth into the blocks.

At random driving pins into blocks may give problems like bending of the pins on the hard concrete or breaking away of parts of the concrete blocks expecially when the pins are driven into the block close to periphery of the block.

Fr-A-2.411.269 discloses a structure wherein in a block there are formed various apertures having a frusto-conical shape. For fixing said blocks to a cloth there are pushed pins through said cloth and in said apertures, said pins having a relatively small diameter compared with the diameter of said apertures. For fixing the pins to the block there are shifted clamping members on the pins, said clamping members having a size corresponding to the size of said apertures. So this system requires many loose parts and mounting said parts is time-consuming.

Fr-A-2.211.952 discloses a system wherein the pins are pushed through the cloth and thereafter the blocks are moulded on the cloth around the pins.

In this way it is not possible to form blocks having a high density like blocks formed with a press.

The invention has for its object to provide a method of the kind set forth in which the drawbacks inherent in the methods hitherto used for manufacturing block mats can be avoided.

According the invention this can be achieved in that the blocks have been provided with preformed holes for accomodating the nails which have been provided with a head and a shank having at least slightly resilient extensions, the outer diameter defined by the free edges of said extensions in unloaded condition being greater as the inner diameter of said holes.

In forming the concrete blocks on a press the holes can be made simultaneously in a favourable position. Thereafter the nails can be driven into the blocks without any risk for damaging the blocks, whilst yet a good anchoring of the blocks on the mat can be assured.

According a further aspect of the invention the same advantages can be obtained when the nails have shanks received in passages provided in the concrete blocks, the ends of said passages remote from the carrying cloth having a larger diameter than the further parts of the passages whilst at least the free ends of the nails are provided with relatively elastically movable projecting parts which, when the nails are inserted into the concrete blocks are engaged in the widened ends of the passages in the concrete blocks.

The invention will be described more fully hereinafter with reference to the accompanying Figures.

Fig. 1 is a schematic plan view of a mould in which concrete blocks for a block mat can be manufactured.

Fig. 2 is an enlarged plan view of a potential embodiment of a concrete block.

Fig. 3 is a side elevation of Fig. 2.

Fig. 4 shows an embodiment of a ram plate suitable for ramming down the concrete mortar in the mould shown in Fig. 1.

Fig. 5 is a sectional view of a nail suitable for fixing a carrying cloth to a concrete block.

Fig. 6 is a sectional view of a further potential embodiment of a concrete block.

Fig. 7 is a plan view of a mould in which concrete blocks can be placed.

Fig. 8 shows on an enlarged scale a detail of the mould of Fig. 7 in a plan view.

Fig. 9 is a sectional view taken on the line IX-IX in Fig. 8.

Fig. 10 shows on an enlarged scale like Fig. 8 a detail of a further embodiment of a mould.

Fig. 11 is a sectional view taken on the line XI-XI in Fig. 10.

Fig. 12 is a schematic side elevation of a further embodiment of a device for manufacturing block mats.

Fig. 13 is a plan view of the device of Fig. 12.

Fig. 14 is a schematic side elevation of a further embodiment of a device for manufacturing block mats.

Fig. 15 is a schematic plan view of a further embodiment of a device for the manufacture of block mats.

Fig. 16 is a side elevation of the device of Fig.15.

Fig. 17 is a schematic plan view of a further embodiment of a device for manufacturing block mats.

Fig. 18 is a side elevation of the device of Fig. 17.

Fig. 19 is a schematic plan view of a device for manufacturing block mats together with a carriage for the delivery of the ready block mat.

Fig. 20 is a side elevation of the device of Fig. 19.

Fig. 21 shows on an enlarged scale a detail of the device of Fig. 19.

Fig. 22 is an elevational view of the device of Fig. 21 taken in the direction of the arrow XXII.

Fig. 23 is an elevational view of part of Fig. 21 taken in the direction of arrow XXIII in Fig. 21.

For manufacturing concrete blocks suitable for use on a block mat the mould 1 shown in Fig. 1 may be employed. Said mould comprises sidewalls 2 and transverse partitions 3 arranged between said sidewalls and being orthogonal to one another, said partitions dividing the space bounded by the walls 2 into a plurality of compartments 4 having a rectangular section in this embodiment.

This mould can be arranged to form rectangular concrete blocks 5 of the kind shown by way of example in Figs. 2 and 3 in a known press device not shown in the Figures, which may be provided with a plurality of ramming plates 6 of the form shown in Fig. 4. It will be obvious that the ramming plates 6 are disposed in the press in a manner such that the number and disposition of the ramming plates 6 correspond with the number and disposition of the recesses 4 in the mould 1. Concrete mortar can then be poured into the recesses 4 and be consolidated with the aid of the ramming plates. In the embodiment shown in the Figure the ramming plate is provided with a plurality of pins 7, in this case three, so that during the manufacture of a concrete block 5 three recesses 8 are simultaneously formed in a given pattern in the concrete block.

The design of said recesses 8 will match the shape of the nails to be introduced into the recesses in a manner to be described in detail hereinafter. One embodiment of such a nail is represented in Fig. 5.

From Fig. 5 it will be apparent that the nail, preferably made from synthetic resin, has a shank 9 and a head 10 adjoining the top end of the shank. The lower end of the shank has the shape of a tip. The shank is furthermore provided along a large part of its length with at least substantially radial superjacent, continuous ribs 12. When such a pin is pressed or struck into a recess 8 having a section suitable for receiving the head 10 and the shank 9, the continuous ribs 12 will be slightly deflected upwards. When it is then attempted to draw the nail out of the opening, the ribs 12 tend to regain their radial position shown in the Figure so that firm anchoring of the nail in the concrete block 5 is ensured.

Fig. 6 shows a further embodiment of a concrete block. In this block is formed a recess 14, the lower part of which has a larger diameter than the upper part, as will be apparent from Fig. 6. Such a concrete block can be formed by a mould bearing on a bottom plate having pins the shape of which matches the design of the passage 14. In this case the ramming plate can be constructed without pins or the like. Using such concrete blocks having such passages 14 nails can be used, which are split over at least part of their length, whilst the lower ends thereof are provided with protruding lugs which can move towards one another when the nail is introduced from above and when the lugs get into the part of the larger diameter of the passage, they resiliently move away from one another and grip behind the shoulder formed at the transition between the parts of the passage 14 having different diameters. It will be obvious that in this way several variations in designs of passages and the associated nails can be conceived.

For manufacturing a block mat the concrete blocks can be dispo sed subsequent to sufficient curing on a mould of the design shown by way of example in Figs. 7 to 9.

From these Figures it is apparent that the mould comprises a bottom plate 15 and relatively orthogonal pieces of angle-section irons 17, the ends of which are mitred for obtaining relative joints as shown in Figs. 8 and 9. Thus the angle-section irons 16 and 17 delimit compartments 18 on the plate 15, the shape of which corresponds to the sectional area of the concrete blocks to be processed, which can be deposited between the angle-section irons 16 and 17 on the bottom plate 15 as is schematically shown in Fig. 9 by broken lines for concrete blocks 5' and 5". The dimensions of the angle-section irons are chosen so that the concrete blocks will occupy the relative positions desired for the block mat to be obtained.

It will be preferred to deposit the concrete blocks obtained from the mould of Fig. 1 as a package on the gauge shown in Fig. 7. This may be carried out with the aid of a device provided with a plurality of suction cups which can be put on the concrete blocks and in which subatmospheric pressure can be generated so that the concrete blocks can be lifted with the aid of the suction cups. Since the distance between the concrete blocks deposited on the gauge of Fig. 7 will in general be larger than the distance between the concrete blocks after removal from the mould of Fig. 1, the suction cups are preferably connected with the further part of the hoisting tool for lifting the concrete blocks in a manner such that the suction cups tend to occupy a position matching the position of the concrete blocks after their removal from the mould 1, whilst said suction cups are relatively displaceable in a horizontal direction so that when lowered onto the gauge shown in Fig. 7 the concrete blocks are guided by the sides of the angle-section irons 16 and 17 to the correct place on the bottom plate 15 without being hindered by the suspension of the suction cups to the hoisting tool or the like.

As a matter of course hoisting devices of different design may be used, for example, hoisting devices provided with clamping members for gripping the concrete blocks to deposit the blocks on the gauge.

The gauge shown in Fig. 7 may have any desired width and length. After the deposition of the blocks the carrying cloth can be spread on the blocks. After the carrying cloth is put on the blocks, the openings 8 in the blocks are no longer visible. It will be obvious from the foregoing that these openings 8 are arranged in an accurately defined pattern in the gauge of Fig. 7. By arranging on the carrying cloth suitable guide means, the position of which matches the form of the gauge of Fig. 7, a shooting device can be moved across the carrying cloth with the aid of said guide members, the device being each time set in a position such that nails can be inserted by means of said shooting device across the carrying cloth into the holes 8 concerned.

These guide means may be formed by a partition to be placed on the carrying cloth, passages matching in place the passages 8 being provided therein for passing the nails. A further possibility resides in the arrangement of rails along which the shooting device can run, whilst stops or the like are provided for correctly positioning the shooting device above the holes in the concrete blocks 5. The shooting device is then preferably designed so that a plurality of nails corresponding with the plurality of recesses 8 in a concrete block can be fired simultaneously. As a matter of course, the number of recesses 8 is not limited to three as in the embodiment shown in Figs. 2 and 3, since any desired number of recesses may be provided in a concrete block for obtaining a satisfactory fixation of the carrying cloth to the concrete blocks.

The carrying cloth will preferably extend at least on two orthogonal sides to a sufficient extent beyond these sides in order to permit the deposition of a concrete block on a protruding rim of the carrying cloth of the neighbouring block mat.

Although in the method described above a gauge having a bottom plate is used for depositing the blocks, it is as an alternative possible to first place the blocks on the ground or on the carrying cloth spread on a support, after which with the aid of a gauge to be placed on top of the blocks the correct position and relative distances between the concrete blocks can be determined. When the blocks are then lying on the cloth, the nails can be inserted from below.

Furthermore, instead of placing angle-section irons 16 and 17 joining one another in a mitre, continuous angle-section irons may be arranged on the bottom plate 15, between which angle-section irons 18 are then arranged angle-section irons 19 shortened by an orthogonal cut as shown in Figs. 10 and 11.

Instead of the setting members in the form of a gauge as described above devices having differently designed setting members may be used as an alternative for manufacturing the block mats.

Figs. 12 and 13 show a device provided with an endless belt 20 guided along two drums 21 rotatable about horizontal rotary axes, at least one of which can be driven by means not shown. The endless belt 20 is provided with upright ridges 22 and 23 or similar extensions or lugs extending in the direction of length and at right angles to said direction of length of the belt, said extensions bounding a compartment for depositing a block. The deposition of the blocks may be manually carried out by persons 24, who pick up the blocks from stacks 25 and put them on the belt. As a matter of course this deposition on the belt may, as an alternative, take place automatically. It is then possible to connect the device as well as the devices to be discussed hereinafter with the device pressing the blocks so that the whole process can be substantially fully automated from the manufacture of the blocks up to the manufacture of the mats.

Fig. 12 furthermore shows that above the belt 20 is arranged a reel 26, from which the cloth 27 is wound to be placed on the blocks deposited on the belt. The device may furthermore comprise a travelling bridge 28 or the like extending transversely above the belt, along which a device 29 for inserting the nails into the blocks is movable. This device may be manually operated by a person 30 or it may be designed so that it operates automatically.

The device shown in Fig. 14 comprises a frame 31 supporting an endless belt not shown. For feeding the blocks 32 to the endless belt a feeding device is provided, which comprises a carrier 34 disposed above a table 33 and being reciprocatory in the direction of the arrow A, to which are pivotally fastened latches 35 with the aid of horizontal pivotal shafts 36 extending at right angles to the direction of movement indicated by the arrow A. The design is such that the latches 35 can only turn in clockwise direction (Fig. 14) out of a position in which the latches 35 extend vertically downwards from their pivotal shafts. With the aid of the carrier 34 provided with the latches 35 blocks placed on the table 33 can be shifted in a direction towards the frame 31, in which case each concrete block is lying between two latches 35 succeeding

one another in the direction of displacement indicated by the arrow A so that the latches 35 serve as setting members by means of which the blocks are moved into their desired relative positions.

When the blocks are shifted to the left as viewed in Fig. 14 onto the endless belt supported by the frame 31 with the aid of the carrier 34 provided with the latches 35, the belt is simultaneously displaced over the same distance so that the blocks maintain their desired distance between one another.

Above the frame 31 a reel 37 is arranged to feed the carrying cloth 38 to the concrete blocks. At the area of the broken line 39 means suitable for inserting the nails can be provided to put the nails in the desired manner in the blocks. When a mat of the desired length is made, the cloth can be cut, after which a new block mat can be initiated.

Figs. 15 and 16 show a device provided with two hoisting members 40 and 41 supporting rails 42 and 43 respectively. Along these rails can run a carriage 44. The top surface of this carriage may have the shape of a gauge as described above with reference to Figs. 7 to 11.

When the carriage 44 is located on the hoisting member 41 in its lowermost position, the carriage 44 can be moved into a topmost position, as is indicated in Fig. 16, for picking up a layer of blocks on the top surface of the carriage. On these blocks can be laid a carrying cloth of the desired dimensions, after which the carriage is driven to the left, as viewed in the Figures and passed along a station located at the area of the broken line 45, where means are provided for inserting the nails into the blocks. When the carriage has reached the left-most position shown in Figs. 15 and 16, where the carriage is supported by the rails 42 supported by the lifting member 40, the block mat can be removed, for example, by retaining the block mat with the aid of members not shown and by moving down the carriage 44 with the aid of the lifting member 40. Then the carriage 44 can again be driven to the right as viewed in the Figures, after which the above-mentioned cycle can be repeated.

In the device shown in Figs. 17 and 18 at least one carriage 46 is employed, the top surface of which may also be designed in the form of a gauge of the kind described above with reference to Figs. 7 to 11. The device furthermore comprises two sets of relatively parallel rails 47 and 48 respectively, the carriage being displaceable either along the rails 47 or along the rails 48, for which purpose the carriage 46 is provided with supporting ground wheels 49. For transferring the carriage 46 from the set of rails 47 to the set of rails 48 or conversely, two further sets of rails 50 and 51 respectively are provided. From Figs. 17 and 18 it is apparent that the rails 50 and 51 are at right angles to the rails 47 and 48. The rails 50 are supported by a lifting device 52 and the rails 51 are supported by a lifting device 53. For displacing the carriage 46 along the rails 50 and 51, it is provided with ground wheels 54, the rotary axes of which are at right angles to the rotary axes of the ground wheels 49.

When the carriage 46 is at the station A, the blocks and the carrying cloth can be deposited on the carriage by means not shown, after which the carriage can be driven to the station B along the rails 47, whilst the carriage is passed along a device (not shown) with the aid of which the nails are inserted into the blocks. At station B the mat can be removed. After the removal of the mat from the carriage, the latter can be driven along the rails 54 to station C and from this station C to station D, from which the carriage can be driven along the rails 51 to station A. When in this case two carriages are employed, a fast production of block mats can be carried out.

The device shown in Figs. 19 and 20 comprises a portal carriage 54, which is displaceable along rails 55. In the embodiment shown two compartments 56 and 57 are provided between said two rails for the deposition of the required number of concrete blocks for a block mat in a given, desired pattern, for example, by using a gauge of the kind described above, It will be obvious that, as the case may be, only one compartment or more than two may be provided.

Apart from the portal carriage 54 a further carriage 58 is displaceable along the rails. The carriage 58 supports a cloth reel 59, which is freely rotatable about its horizontal centre line, which is at right angles to the direction of length of the rails 55.

The carriages 54 and 58 may be coupled with one another to be displaced in common along the rails 55, whereas it is also conceiva ble to drive the carriages separately.

The portal carriage 54 is provided with two insertion systems 60 for inserting the nails or pins. The insertion systems are mobile or slidable with respect to the portal transversely of the direction of length of the rails 55.

Each insertion system 60 comprises a container 61 for a quantity of nails or pins to be inserted. The nails or pins can be pressed home with the aid of pressing cylinders 62 forming part of the insertion systems.

The nails or pins can be fed through a feed duct 63 (Figs. 21 to 23) communicating with the container 61 to a grab comprising two claws 64, and 65.

The claw 64 is fastened to the lower end of a tube 66, which is fastened by supports 67 to a plate 68, which forms part of the set of the insertion system concerned, which is displaceable along the portal carriage.

In the tube 66 a shaft 69 is coaxially arranged, which is rotatable about its vertical centre line with respect to the tube 66. To the lower end of the shaft 69 is fastened the claw 65. The top end of the shaft 69 is provided with a fork 70. The fork 70 has pivoted to it the piston rod 72 of a hydraulic ram 71. The hydraulic ram in turn is connected with the plate 68. It will be obvious that the shaft 69 can be rotated about its longitudinal axis with the aid of the hydraulic ram 71.

The tube 66 has fastened to it a fork 73, with which is coupled the piston rod of a hydraulic ram 74, represented here only by its centre line, said hydraulic ram 74 being pivotally connected with the setting plate 68 in the manner described for the hydraulic ram 71. With the aid of the hydraulic ram 74 the tube 66 can be turned about its vertical centre line together with the claw 64 fastened to said tube 66.

From Figs. 21 and 22 it will be apparent that the plate 68 has furthermore fastened to it the insertion cylinder 62 comprising a reciprocatory pressing plunger 75.

With the aid of the hydraulic ram 71 and/or 74 the two claws 64 and 65 can be turned into a position in which the claws are in contact with one another and are located below the lower end of the feed duct 63 so that the shank 9 of a nail supplied through said duct drops into a hole 76 bounded by the two claws, the head 10 getting into a recess 7 in the top side of the arms.

Subsequently the arms can be turned into a position in which the nail is located below the pressing plunger 75. The plunger can then be moved downwards to press the nail home, after which the arms can be turned away from one another as is indicated by broken lines for the arm 64 in Fig. 23. Then the nail can be pressed through with the aid of the pressing plunger 75.

It will be obvious that the displacement of the portal carriage 54 along the rails 55 and the displacement of the insertion systems 62 along the portal carriage in a direction transverse of the direction of length of the rails 55 may be fully automatically controlled stepwise in accordance with the pattern in which the blocks are deposited so that the nails can invariably be inserted into the holes provided in the blocks across the cloth wound off the reel 59 and spread on the blocks.

The carriage supporting the insertion systems and the carriage supporting the cloth reel can be simultaneously moved over the blocks so that spreading of the cloth and insertion of the nails are simultaneously performed. As an alternative, first the carriage supporting the cloth reel may be moved over the blocks for depositing the cloth, after which the portal carriage supporting the insertion systems may be moved over the blocks.

For removing the ready mat the carriage shown in Figs. 19 and 20 can be effectively used. This carriage has a ground-wheel-supported frame 78. At one end the carriage is supported by ground wheels 79 in the embodiment shown which are fastened to a bogie 80. The bogie has fastened to it a drawbar 81. On the other side the carriage is supported by a number of ground wheels 82 which emerge behind the carriage, the top points being located approximately at the same level as the top side of the loading surface of the carriage. The carriage is furthermore provided with a winch 83 near the front end of the carriage.

The carriage thus equipped can be driven over the ready block mat until the wheels 82 are near one end of the block mat. Then a cable 85 wound off the reel winch 83 can be hooked to the end concerned of the mat. When subsequently the carriage is gradually driven towards the other end of the ready mat, that is to say, in the direction of the arrow D in Fig. 20, and at the same time the winch is actuated, the ready mat will be drawn over and across the wheels 82 onto the loading surface of the carriage 78, whilst it is simultaneously turned over so that the mat will lie on the carriage in a position in which the blocks are lying on top of the cloth, thus in the position in which the block mat will be deposited on the ground, for example, on the talus of a dike or the like.

By means of a device of the kind described above a high production capacity can be obtained, since the blocks can be deposited in one compartment whilst in the other compartment the nails are inserted and/or the ready block mat is removed with the aid of the carriage described above. Since when lifting the block mat out of the compartment concerned the mat is at the same time turned over, no additional manipulations are required for turning the mat.

Although it is assumed above that the devices inserting the nails are passed along appropriate guide members, it is also possible to find the spots of the holes by the feel of the hand, when the carrying cloth is spread across the blocks, after which the nails can be driven into the appropriate holes with the aid of a suitable shooting device or of a hand hammer. It will, however, be obvious that for mass production shooting devices passed along suitable guide members will be preferred.

The invention is, of course, not limited to blocks of square or rectangular cross-section. For example, it is possible to use blocks having on the sides or within the outer circumference recesses covering the full height or part thereof of the block and/or they may have profiled or non-profiled top faces and/or they may have a tapering shape.

It will be obvious that within the spirit and scope of the invention many variations and/or complementary designs and/or combinations of the method described above and/or of the means for carrying out said method are conceivable.

The reference numerals in the claims should not have a limiting effect on the interpretation of the claims, they are exclusively mentioned for the sake of clarity.

Claims

1. A block mat comprising concrete blocks fastened to a carrying cloth with the aid of nails - (9,10) driven through the cloth into the blocks, characterised in that the blocks have been provided with preformed holes for accomodating the nails which have been provided with a head (10) and a shank (9) having at least slightly resilient extensions (12), the outer diameter defined by the free edges of said extensions in unloaded condition being greater as the inner diameter of said holes - (8).

2. A block mat as claimed in claim 1, characterised in that said extensions are formed by projecting ribs (12) extending around the shank (9).

3. A block mat provided with concrete blocks fastened to a carrying cloth with the aid of nails driven through the cloth into the blocks characterised in that the nails have shanks received in passages (14) preformed in the concrete blocks, the ends of said passages remote from the carrying cloth having a larger diameter than the further parts of the passages, whilst at least the free ends of the nails are provided with relatively elastically movable projecting parts which, when the nails are inserted into the concrete blocks, are engaged in the widened ends of the passages in the concrete blocks.

4. A block mat as claimed in anyone of claims 1 to 3 characterised in that the heads of the nails are countersunk so that the outer surfaces of the heads are at least substantially flush with the side of the cloth remote from the blocks.

5. A nail for use in a blockmat as claimed in any preceding claims, characterised in that the plastic nail has a head (10) and a shank (9) with resilient projecting ribs (12) extending around the shank.

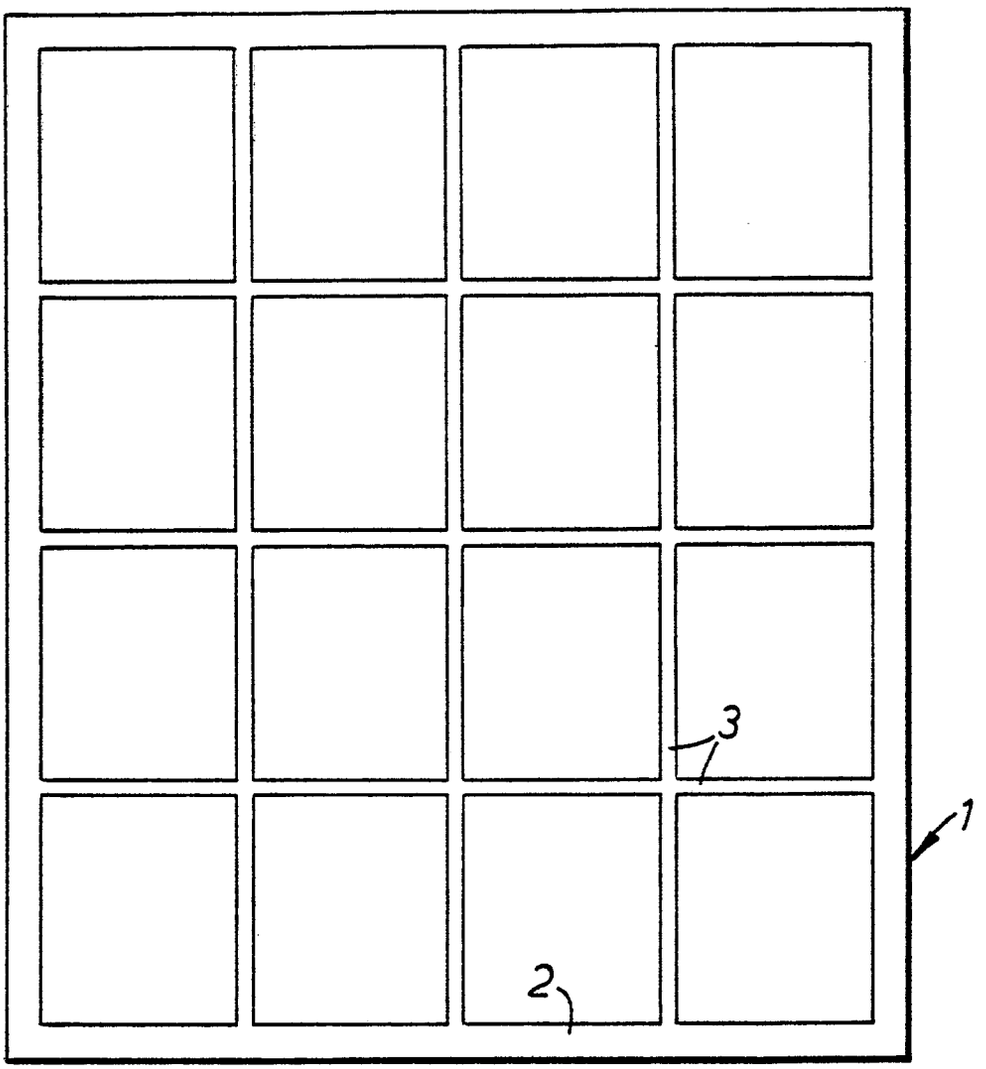

FIG. 1.

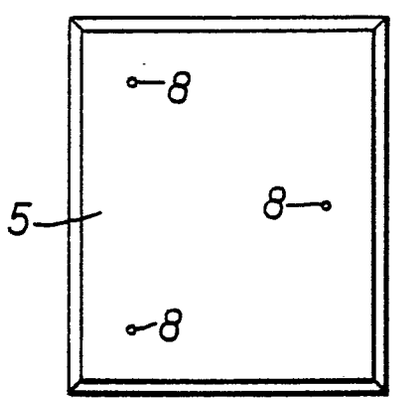

FIG. 2.

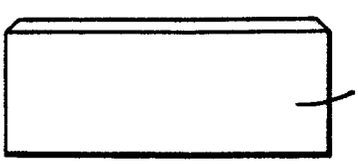

FIG. 3.

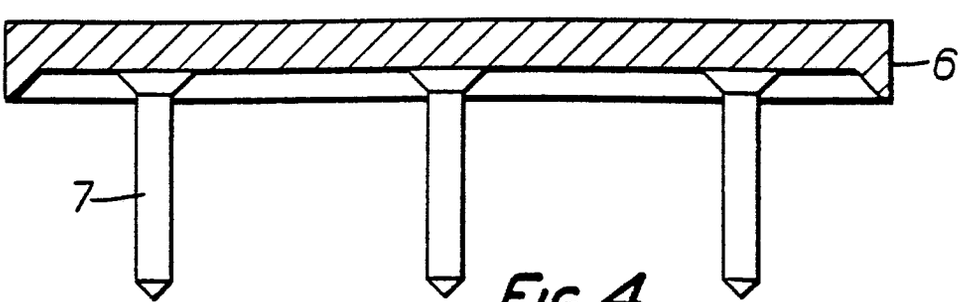

FIG. 4.

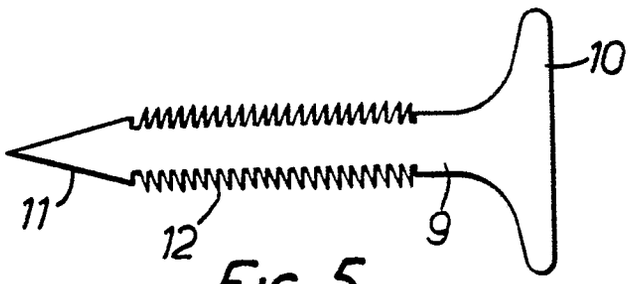

FIG. 5.

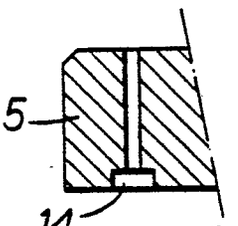

FIG. 6.

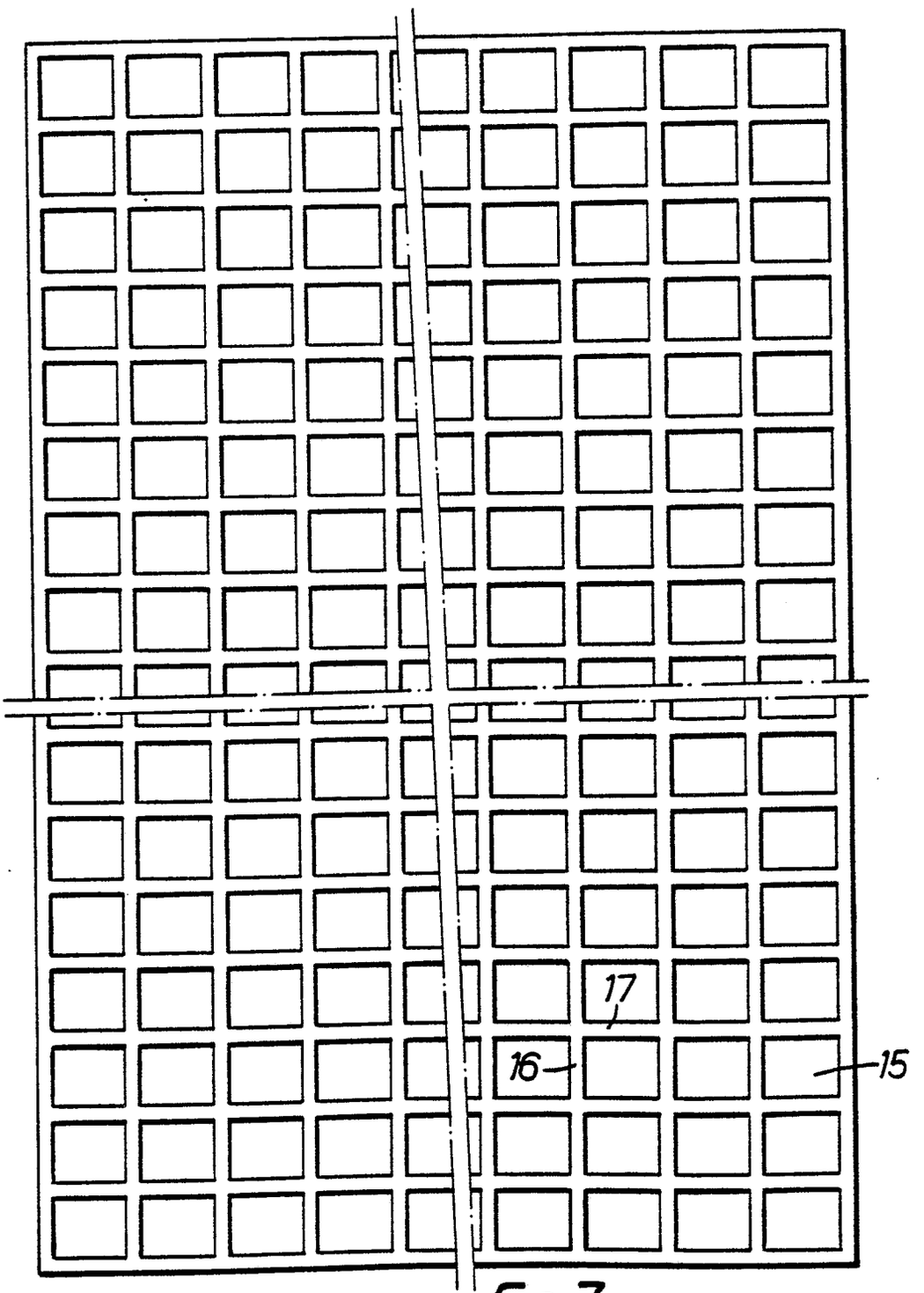

FIG. 7.

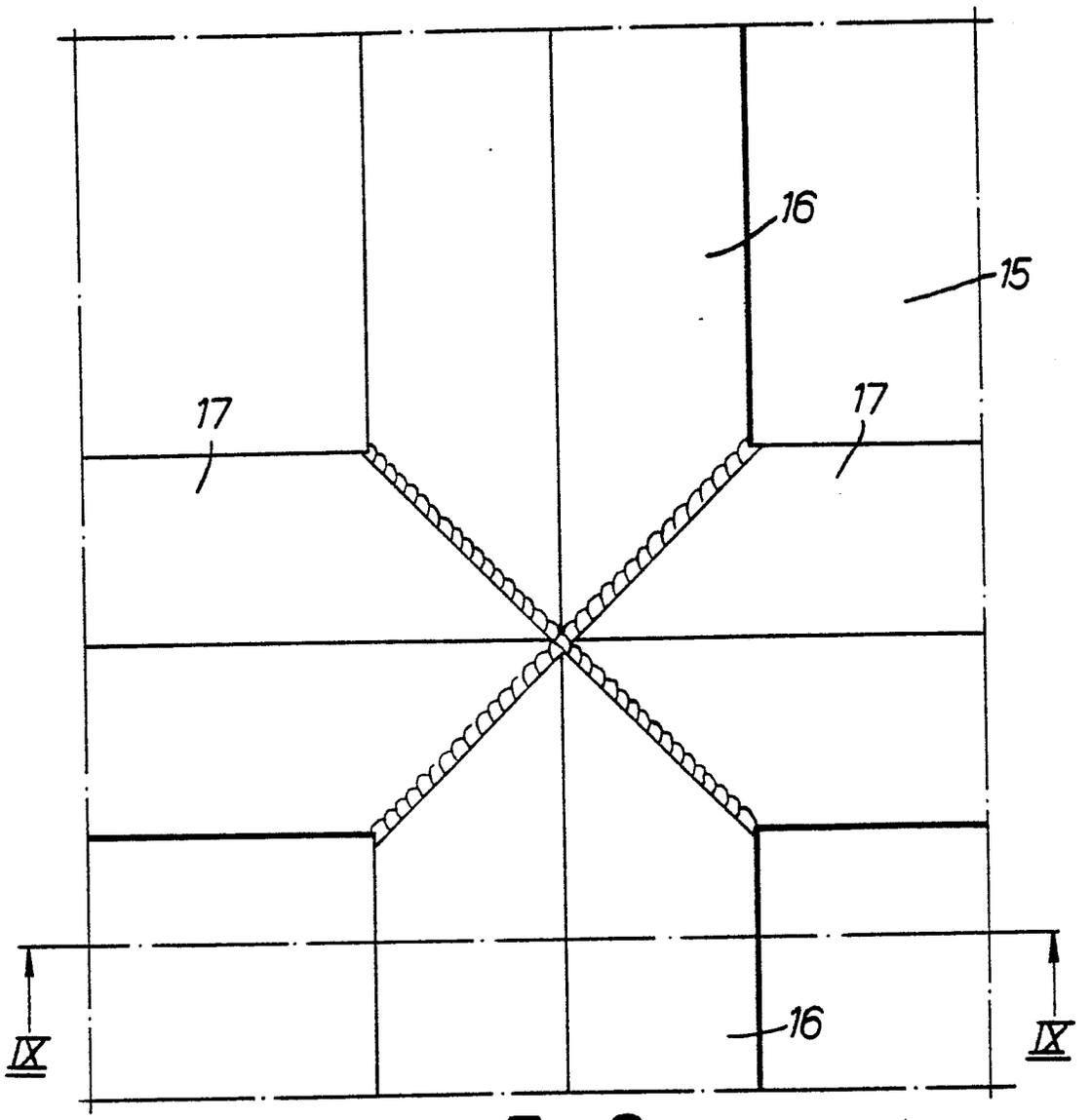

FIG. 8.

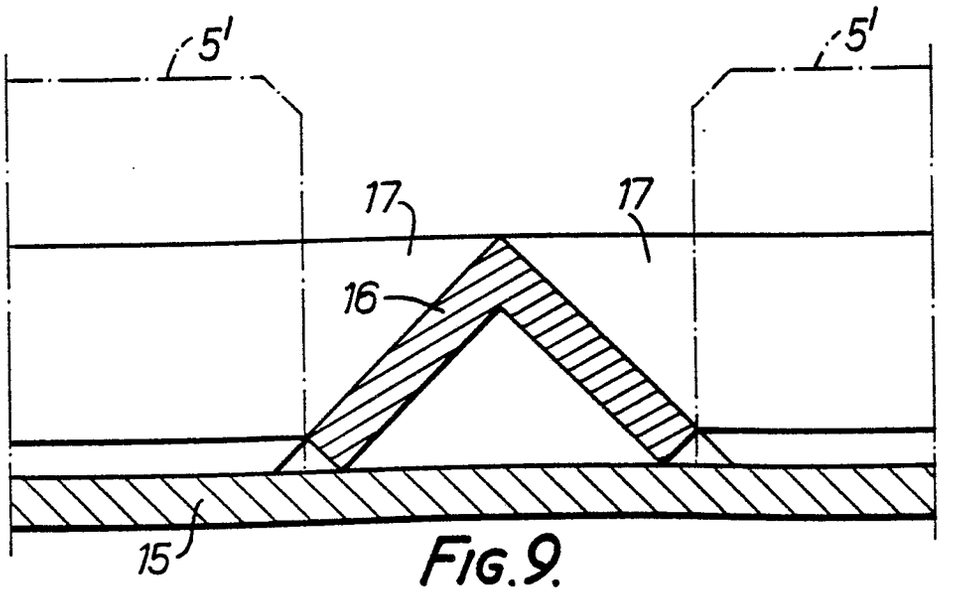

FIG. 9.

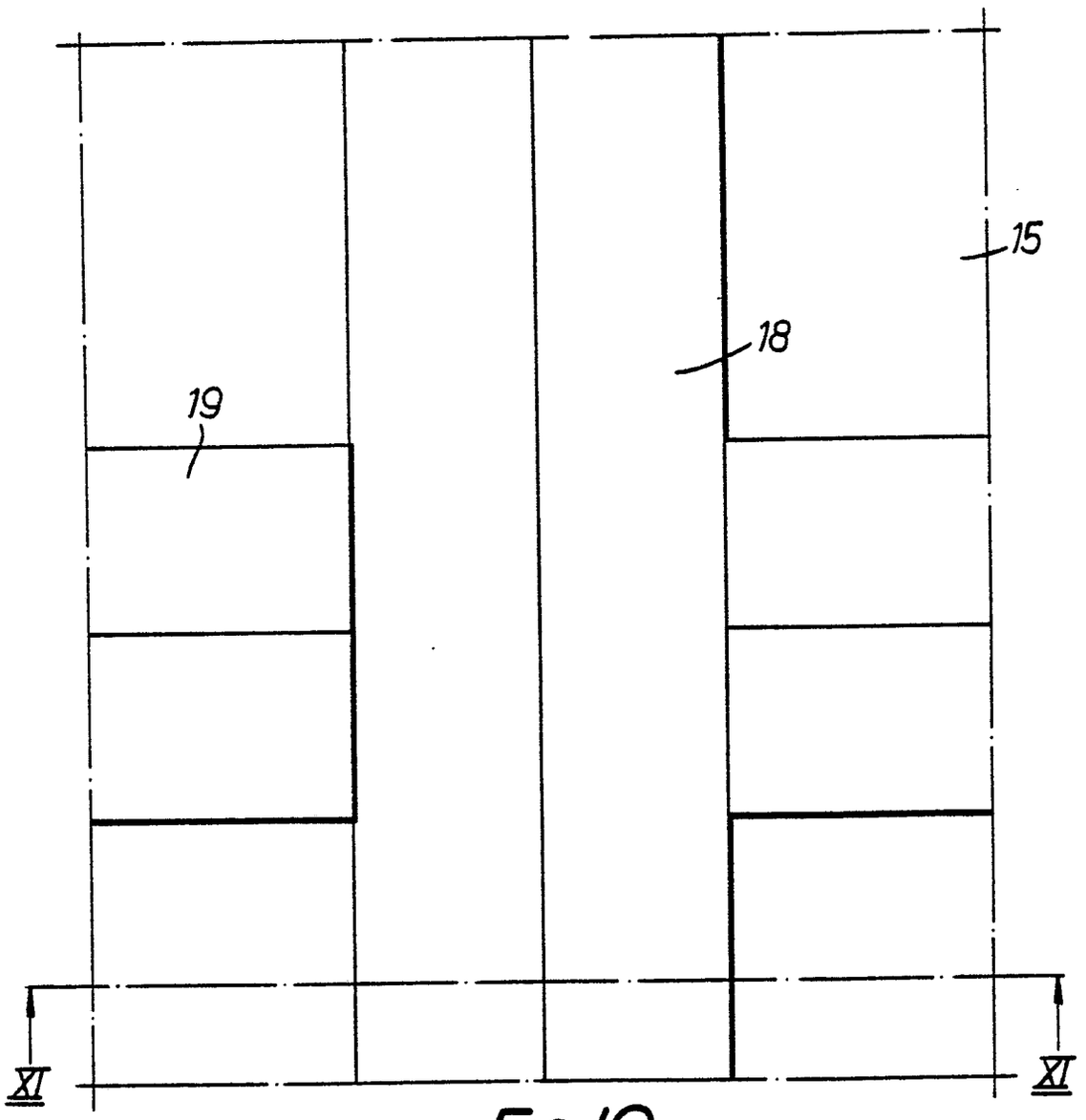

FIG. 10.

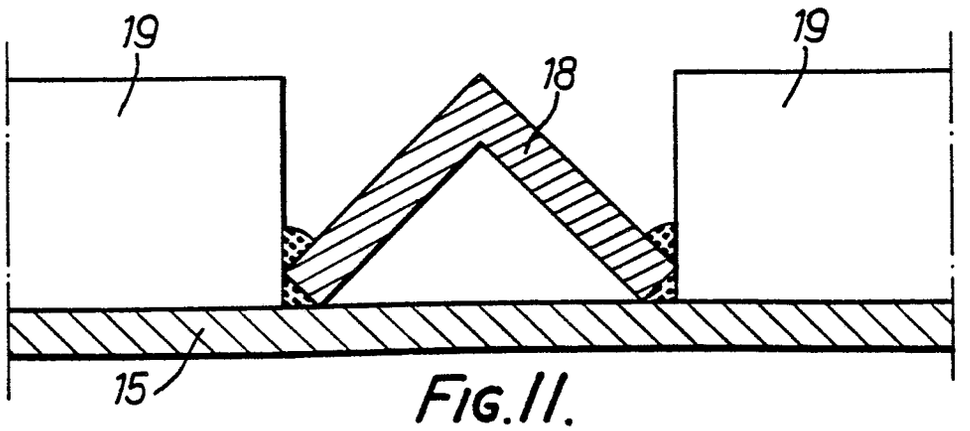

FIG. 11.

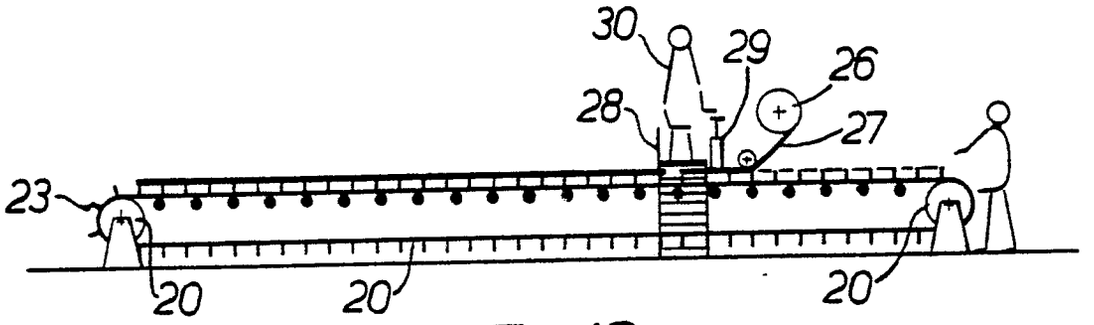

FIG. 12.

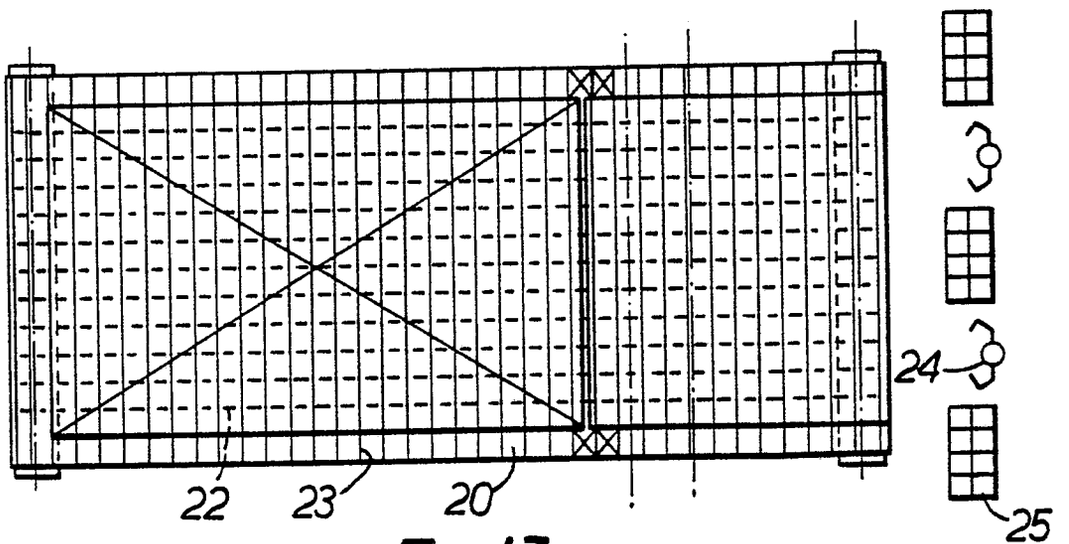

FIG. 13.

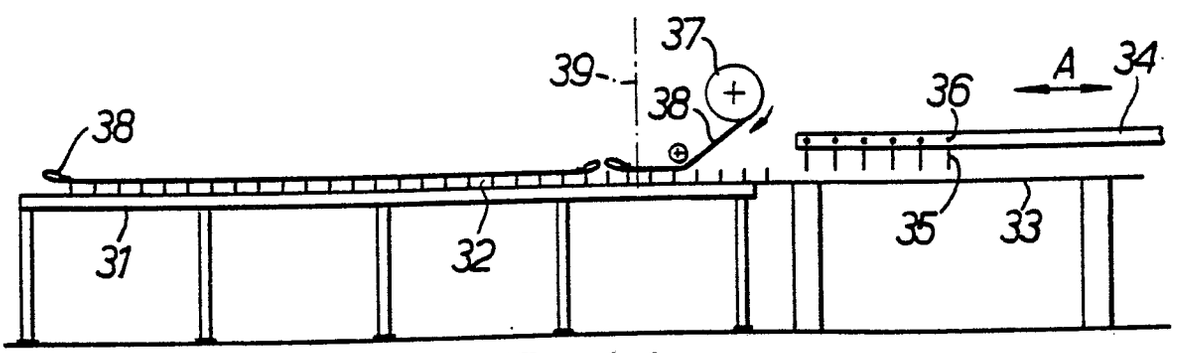

FIG. 14.

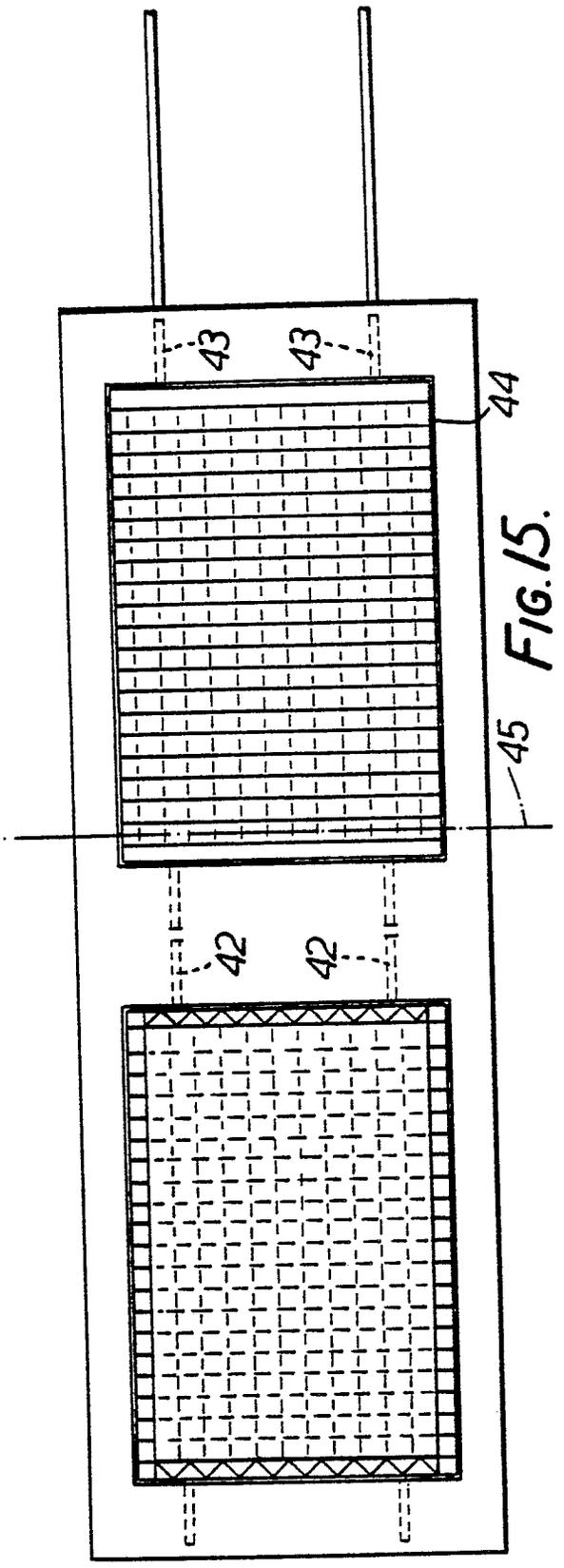

FIG. 15.

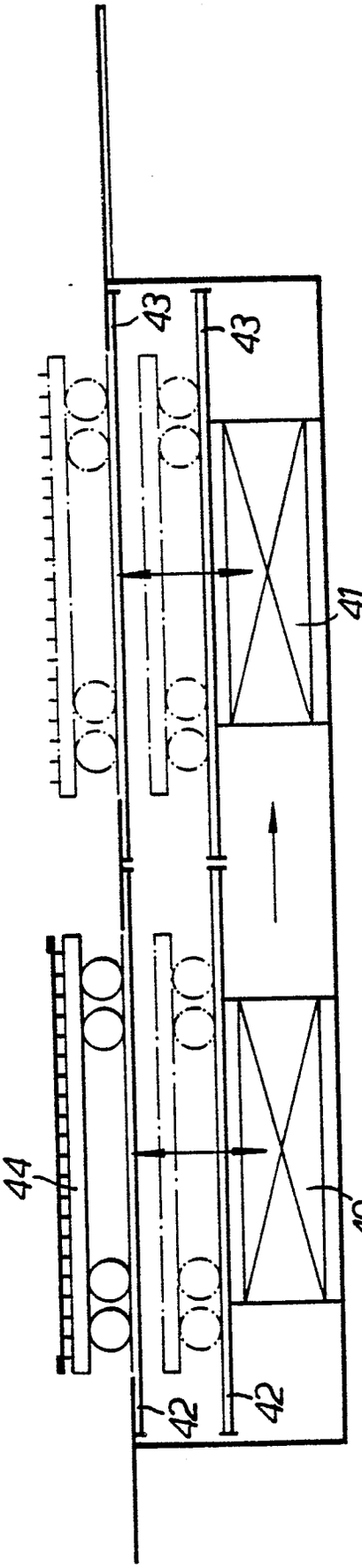

FIG. 16.

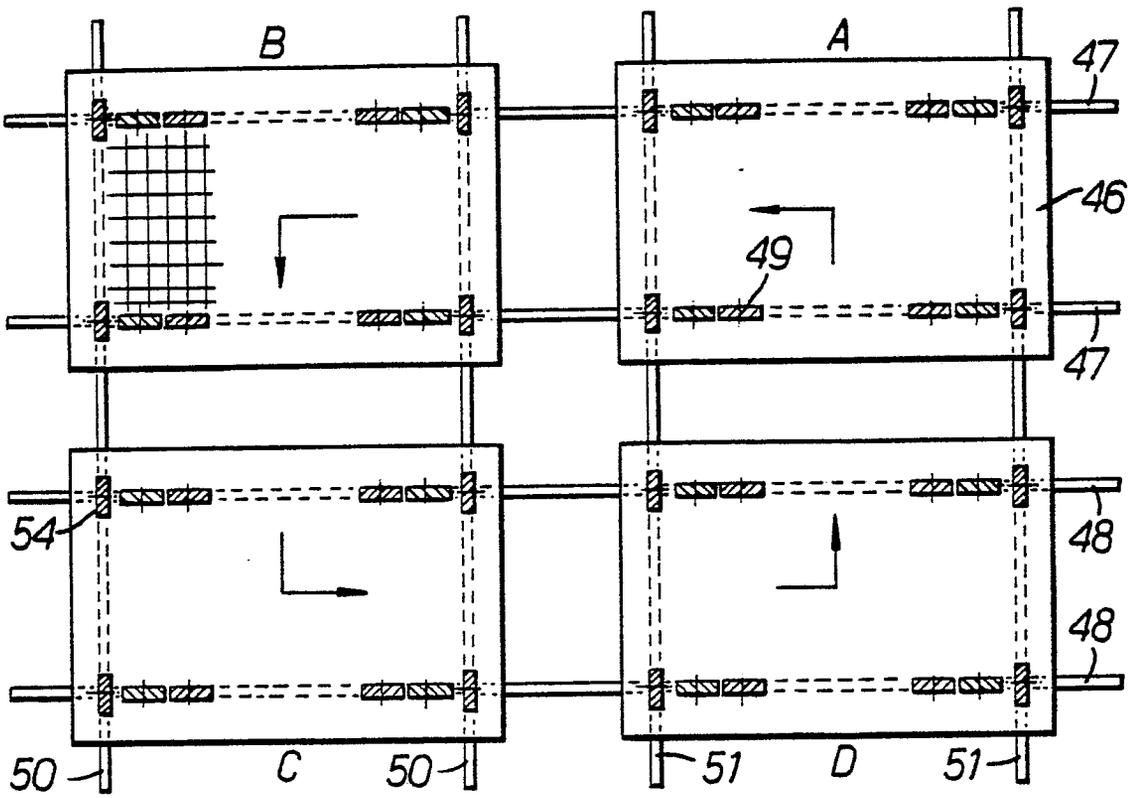
B
A
47
46
49
47
54
48
48
50
C
50
51
D
51

FIG.17.

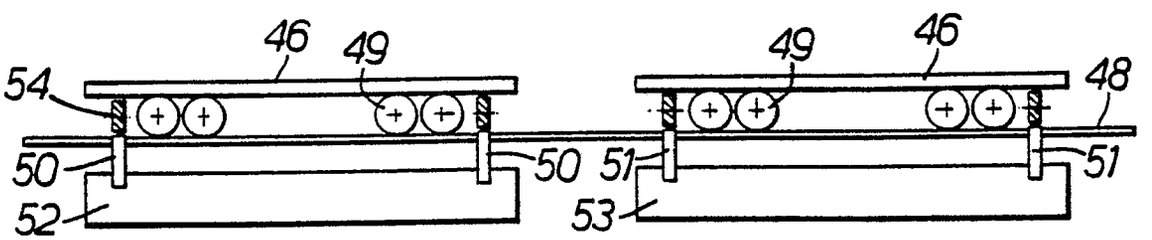
46
49
49
46
54
48
50
50
51
51
52
53

FIG.18.

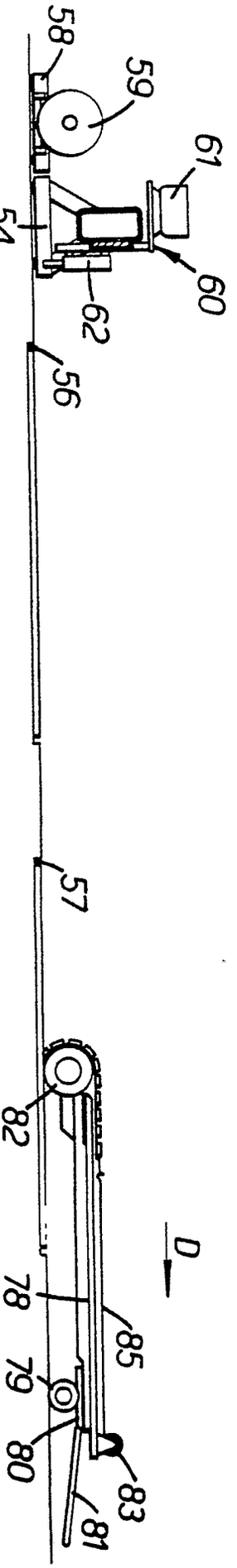
58
59
61
54
60
62
56
57
82
D
78
85
79
80
83
81

Fig. 20.

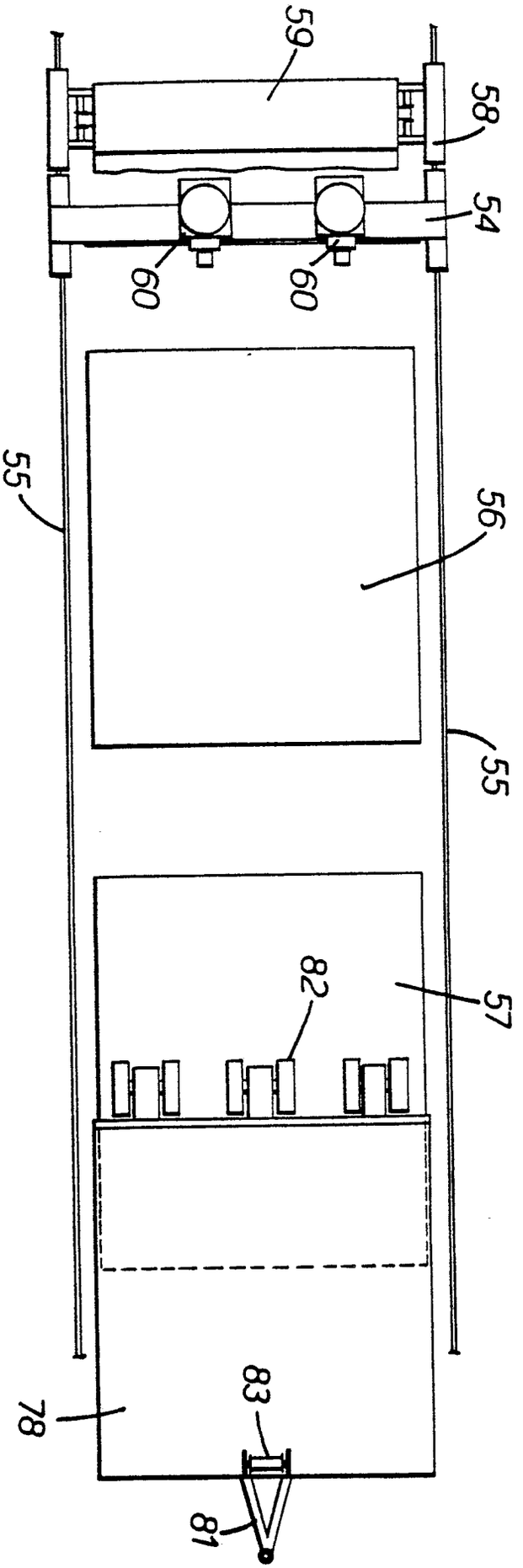
59
58
54
60
60
55
56
55
82
57
78
83
81

Fig. 19.

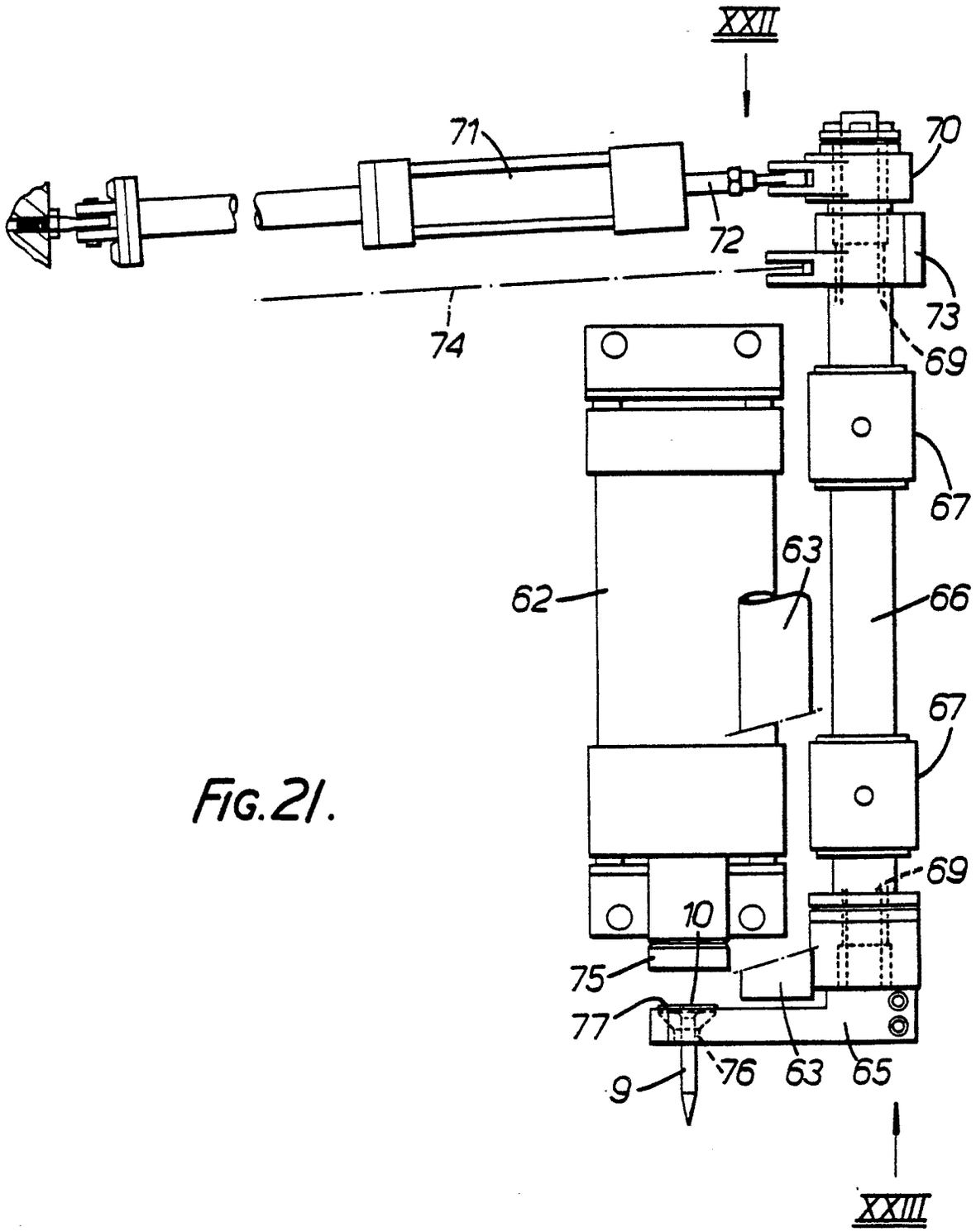

FIG. 21.

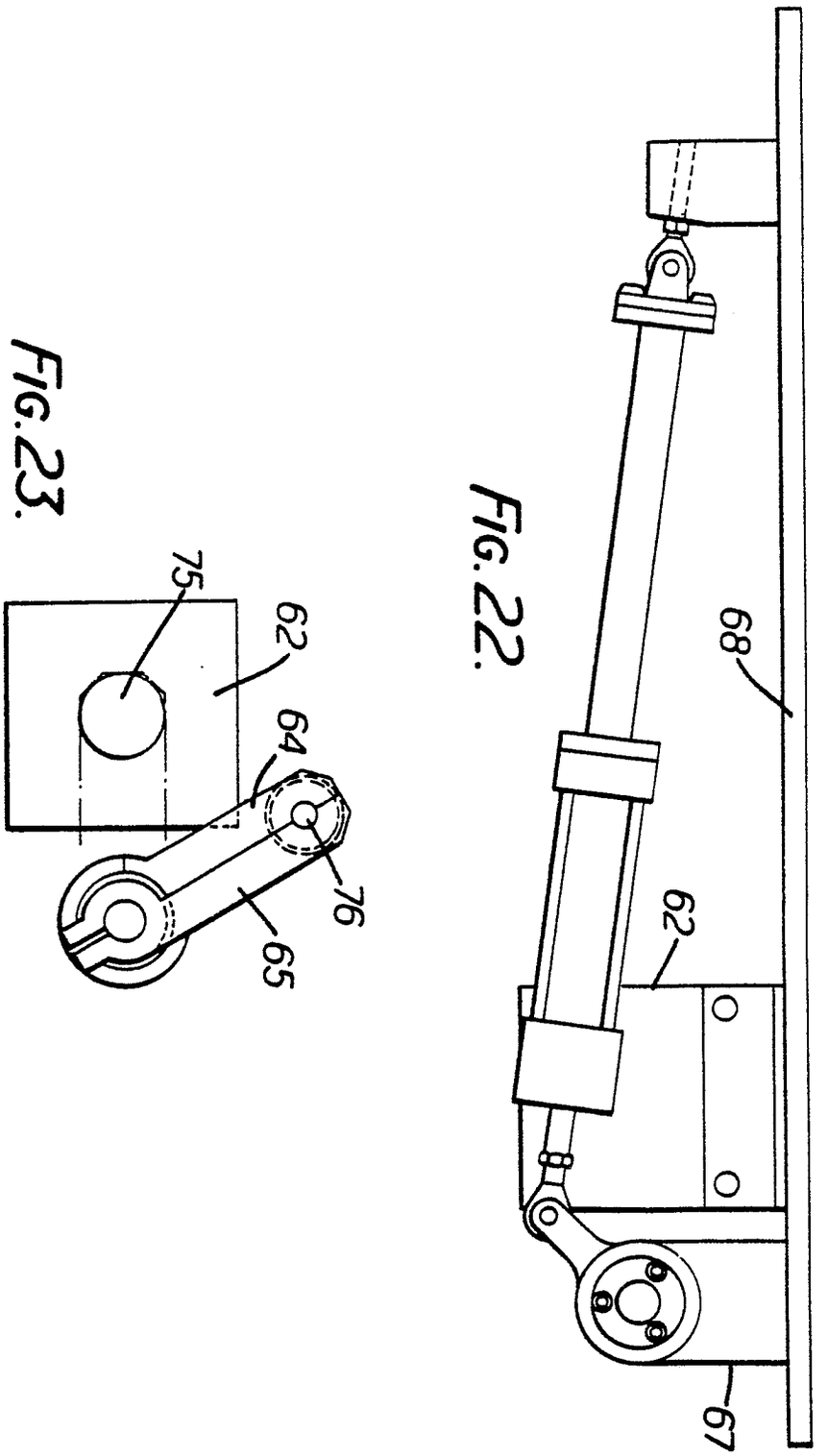

FIG. 22.

FIG. 23.