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GB 1075711 GB 0859752

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(54) An apparatus for manufacturing a trussed steel girder

(57) The manufacturing apparatus includes: a welding machine for welding portions to be jointed of an upper cord member 1,1, a lower cord member 2,2 and a lattice member 4 at two predetermined welding positions 17,17; a carriage 11 for carrying the upper cord member, the lower cord member and the lattice member toward the welding machine for welding; holding jigs 37, mounted on the carriage, for preassembling the upper cord member, the lower cord member and the lattice member above the carriage to form a preassembled trussed girder having a longitudinal direction thereof substantially directed parallel to a line of travel of the carriage; and control means for controlling the carriage to successively locate each portion to be jointed at corresponding one of the welding positions and for actuating the welding machine to weld each portion to be jointed while the portion to be jointed is located at the corresponding welding position.

FIG.5

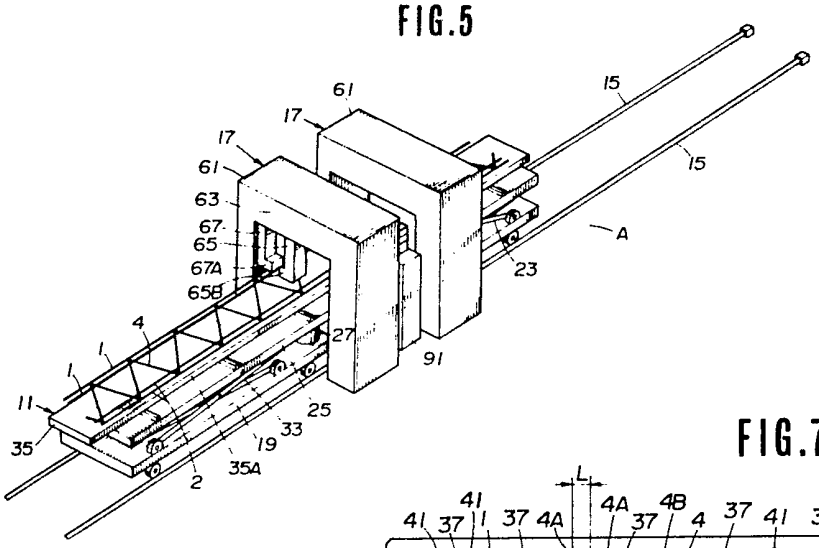

FIG.7

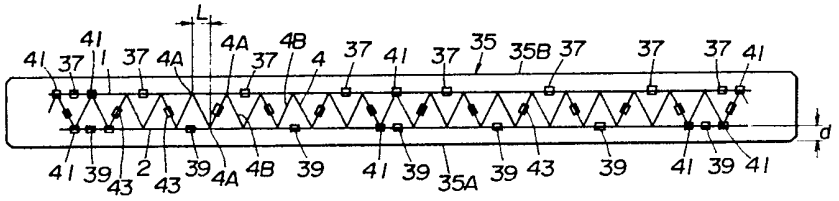

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FIG.1
(PRIOR ART)

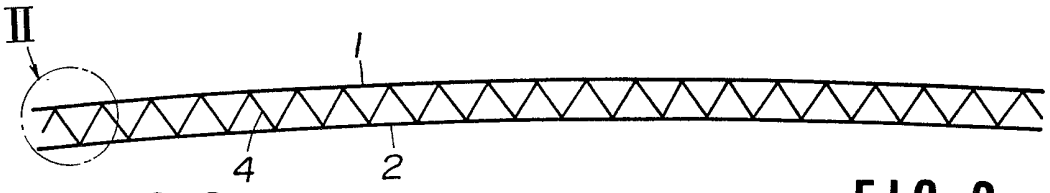


FIG.2
(PRIOR ART)

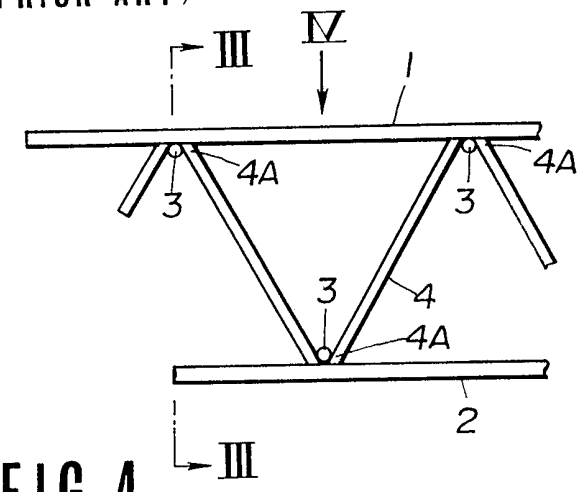


FIG.3
(PRIOR ART)

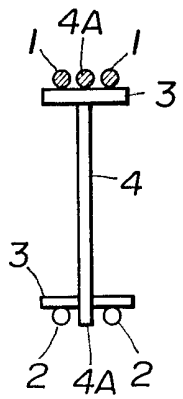


FIG.4
(PRIOR ART)

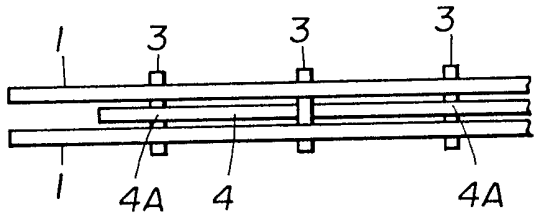


FIG.5

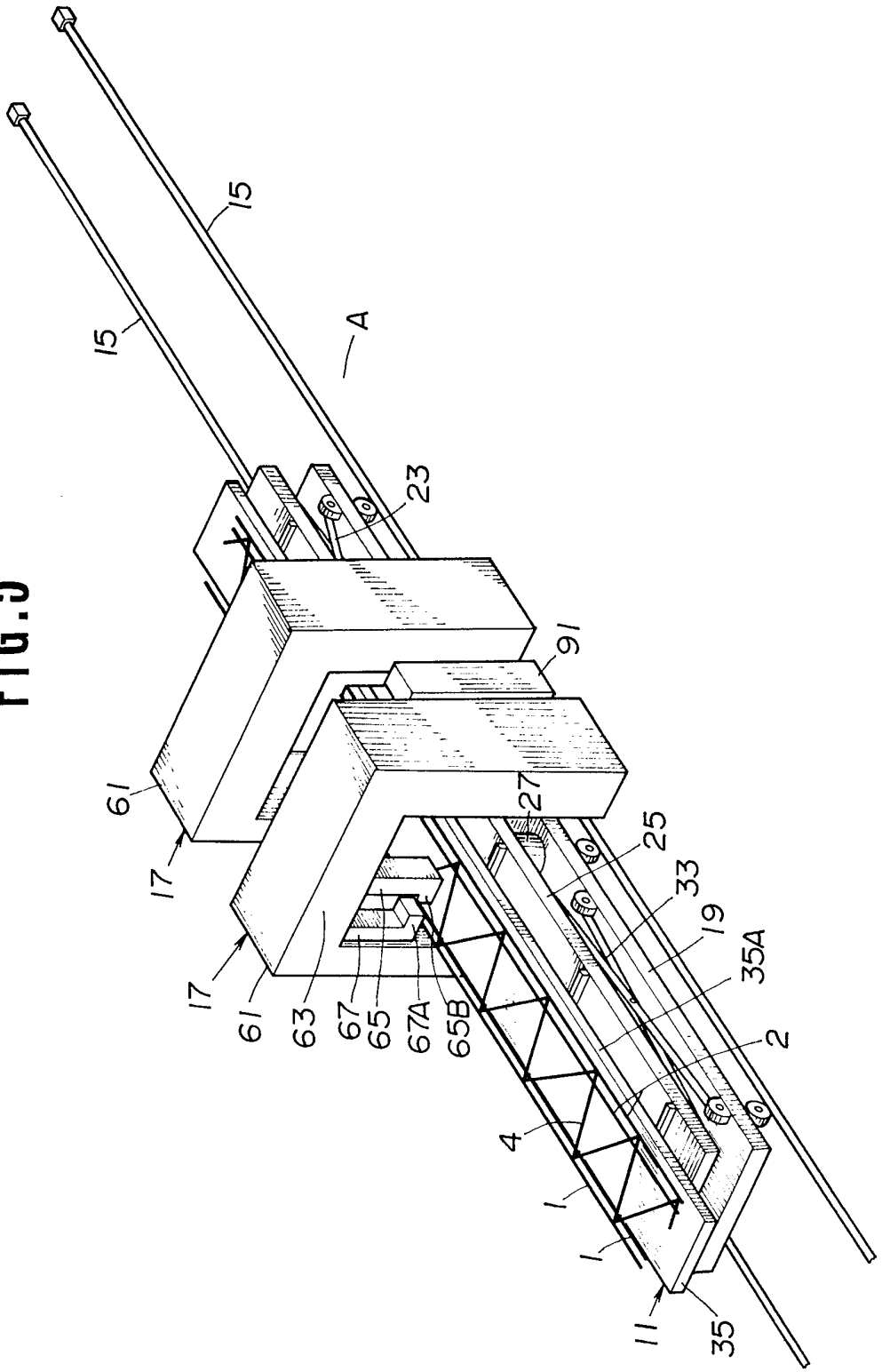


FIG.6

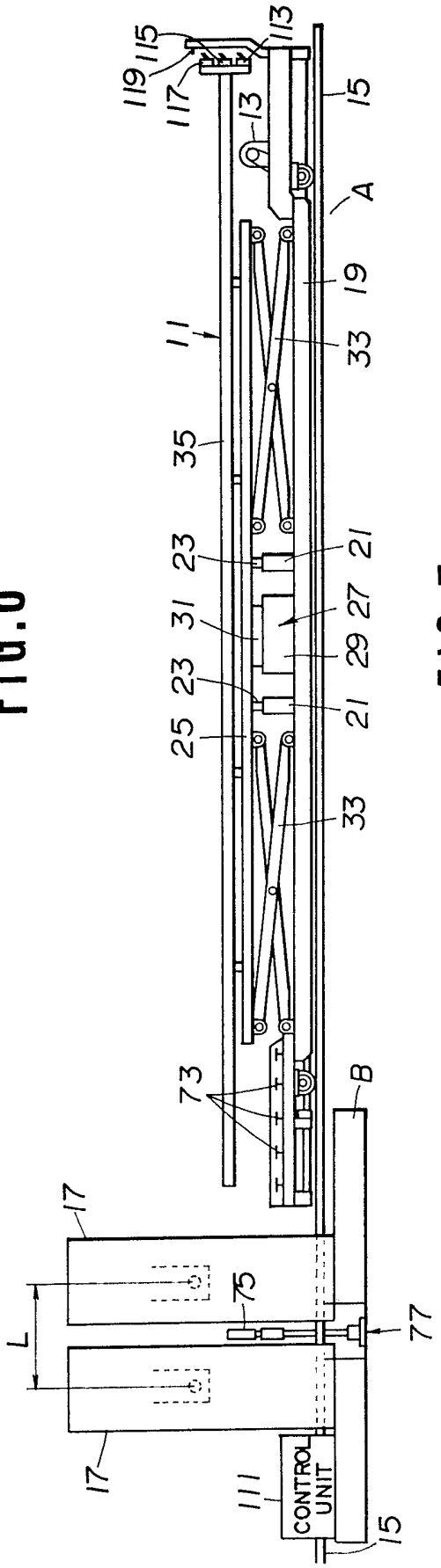

119
115
113
117
13
15
A
19
11
33
35
23
21
31
27
29
25
73
B
17
75
77
L
CONTROL UNIT
111

FIG.7

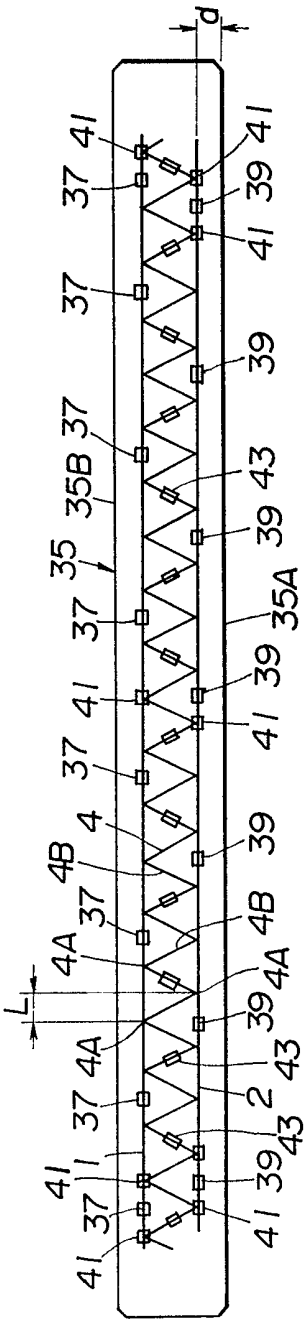

d
41
37
39
35B
43
35
35A
4
4B
4A
L
2
1

FIG.8

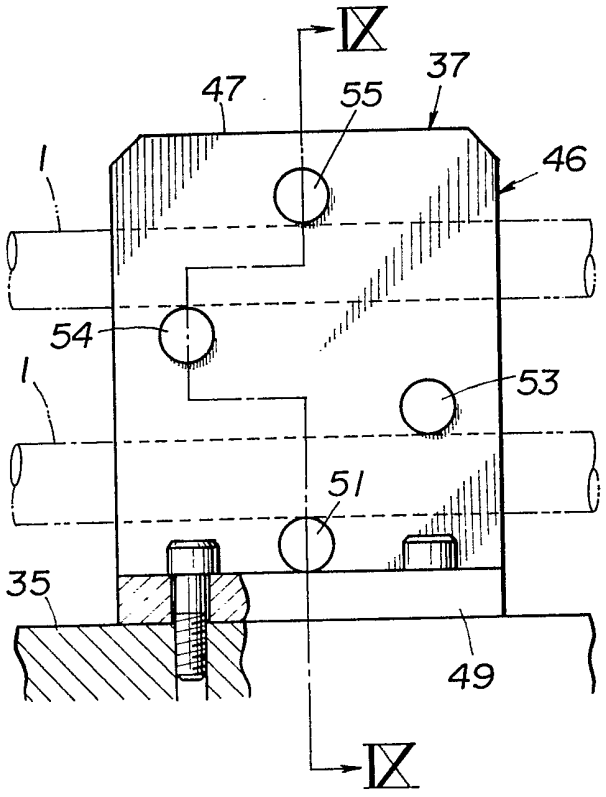


FIG.9

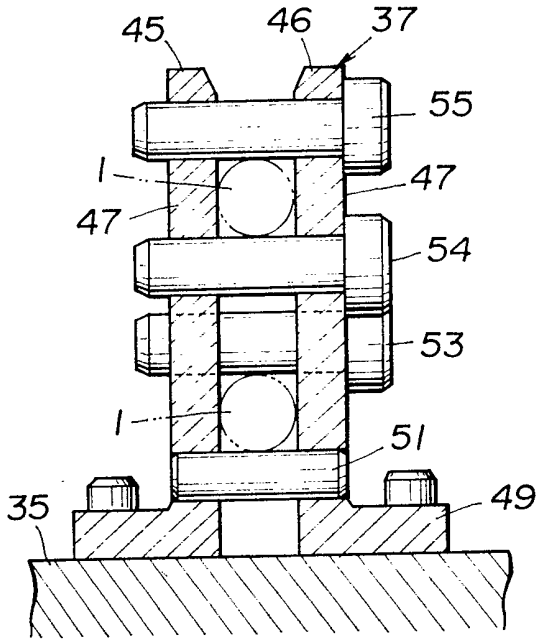


FIG.10

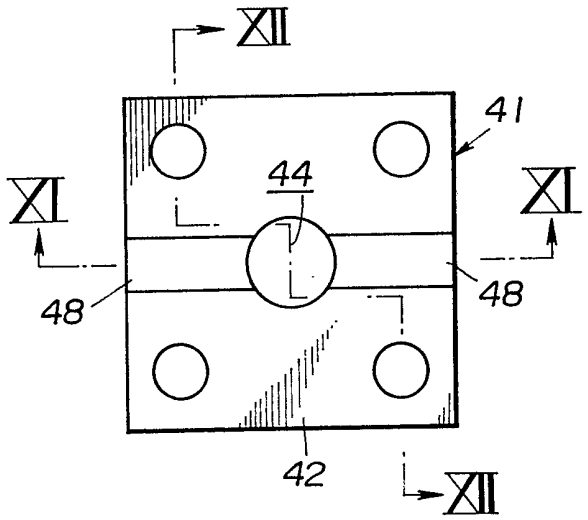


FIG.11

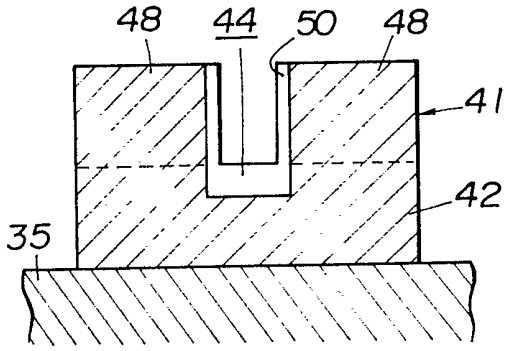


FIG.12

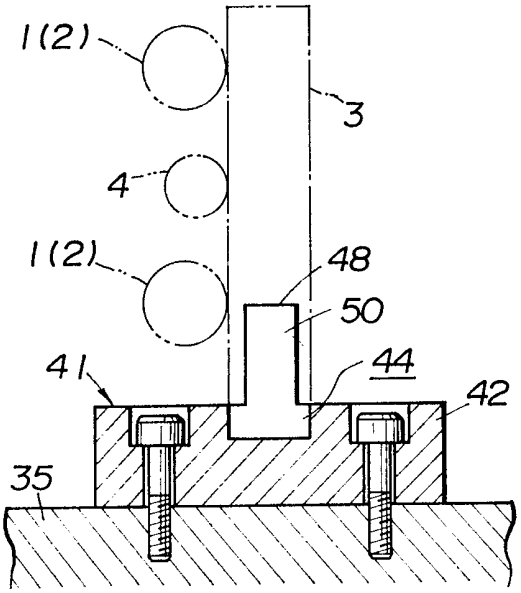


FIG.13

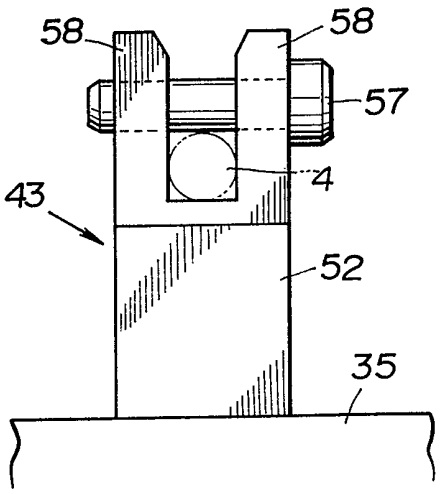


FIG.14

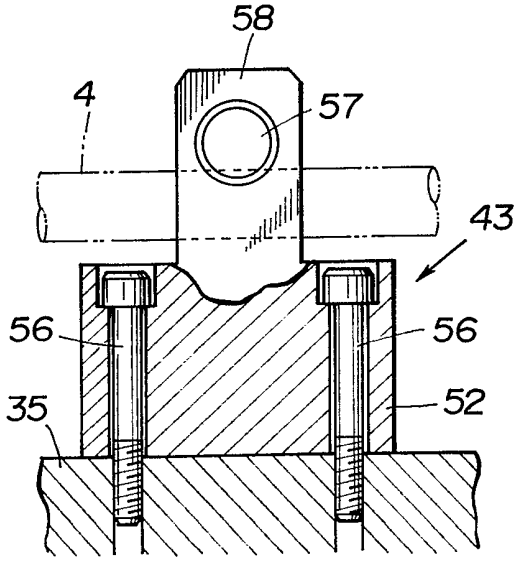


FIG.15

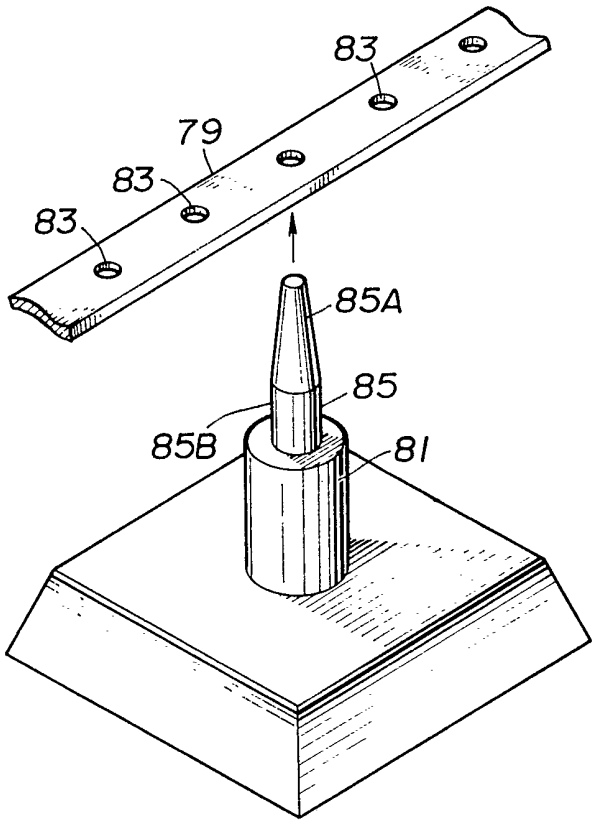


FIG.16

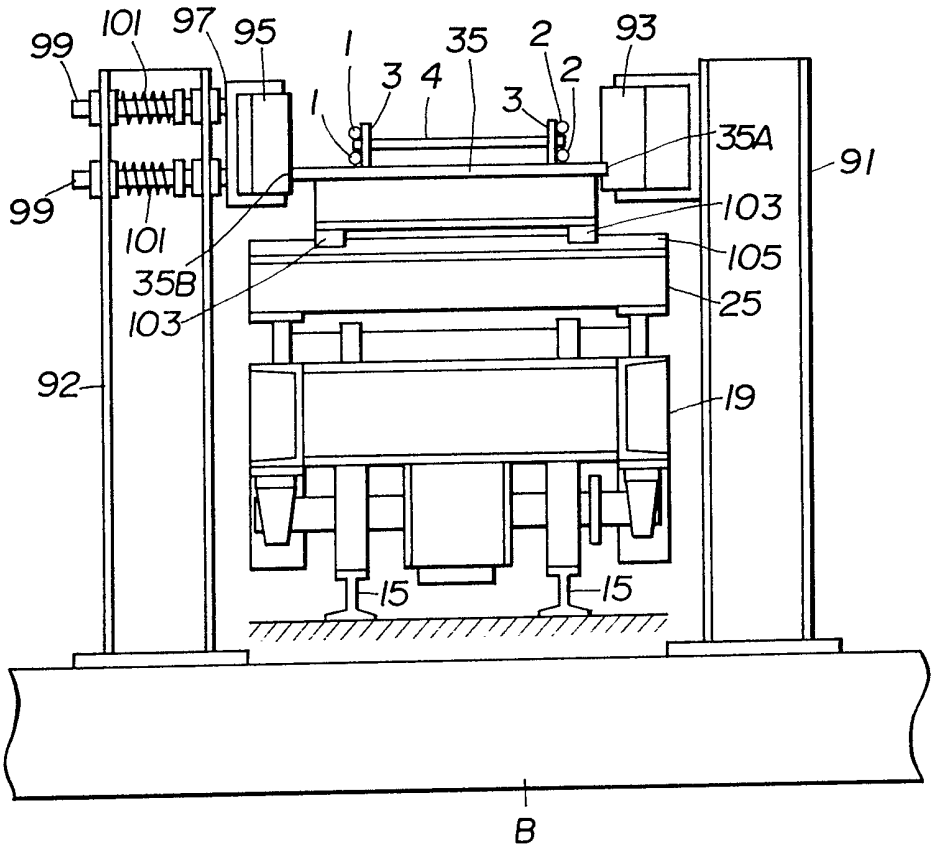

99
101
97
95
1
35
2
93
3
4
3
2
1
35A
91
99
101
103
105
35B
103
25
92
19
15
15
B

FIG.17

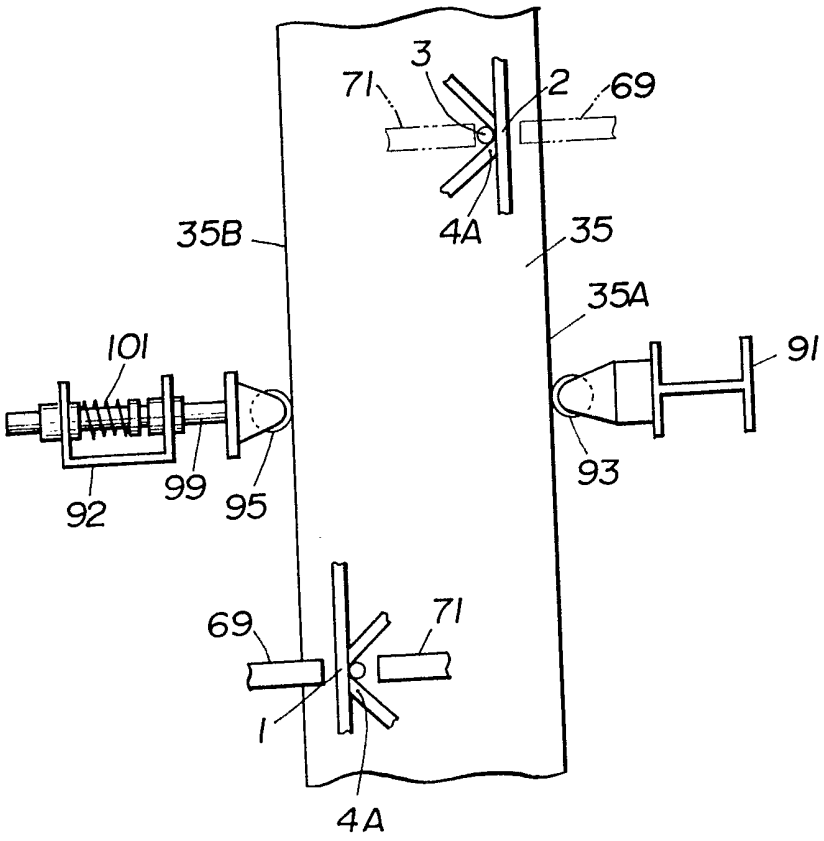


FIG.18

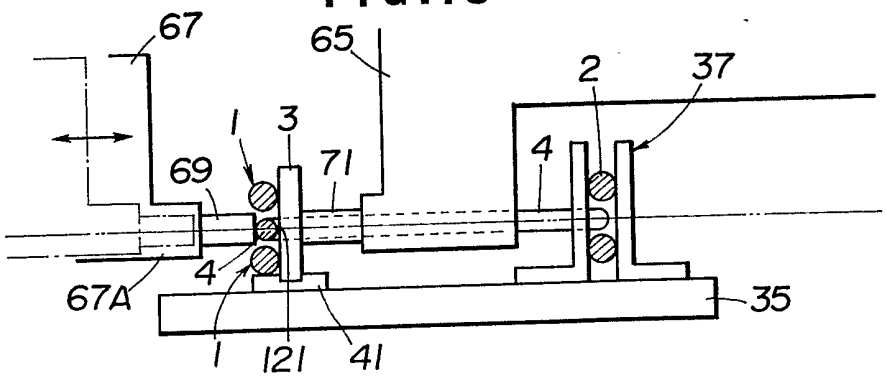


FIG.19

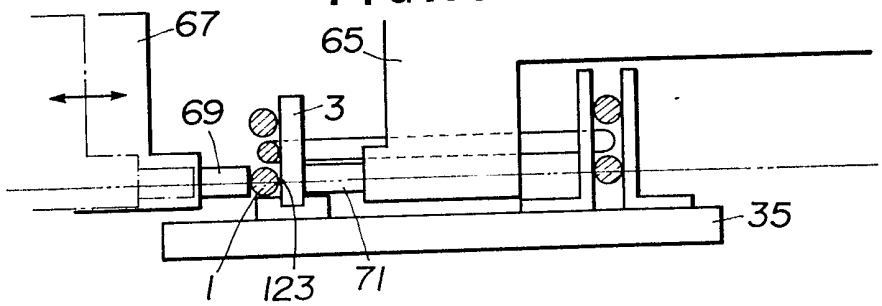


FIG.20

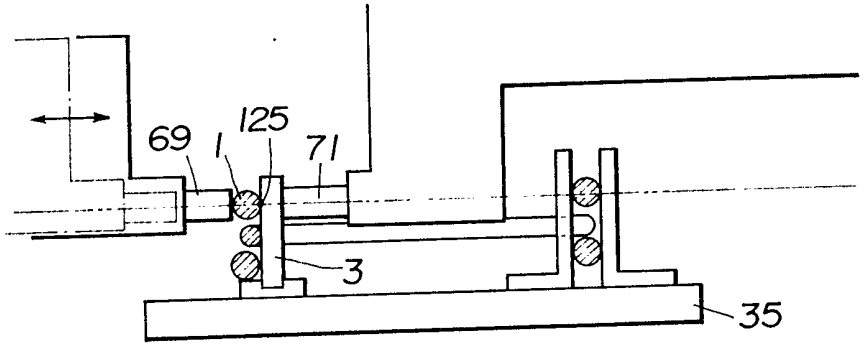


FIG.21

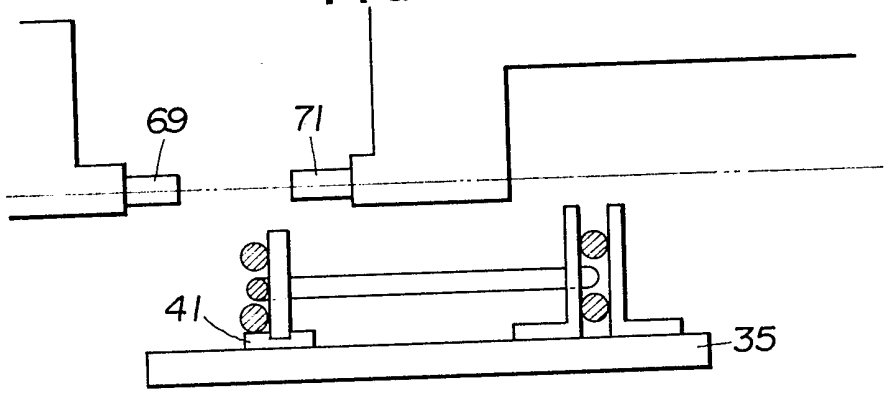
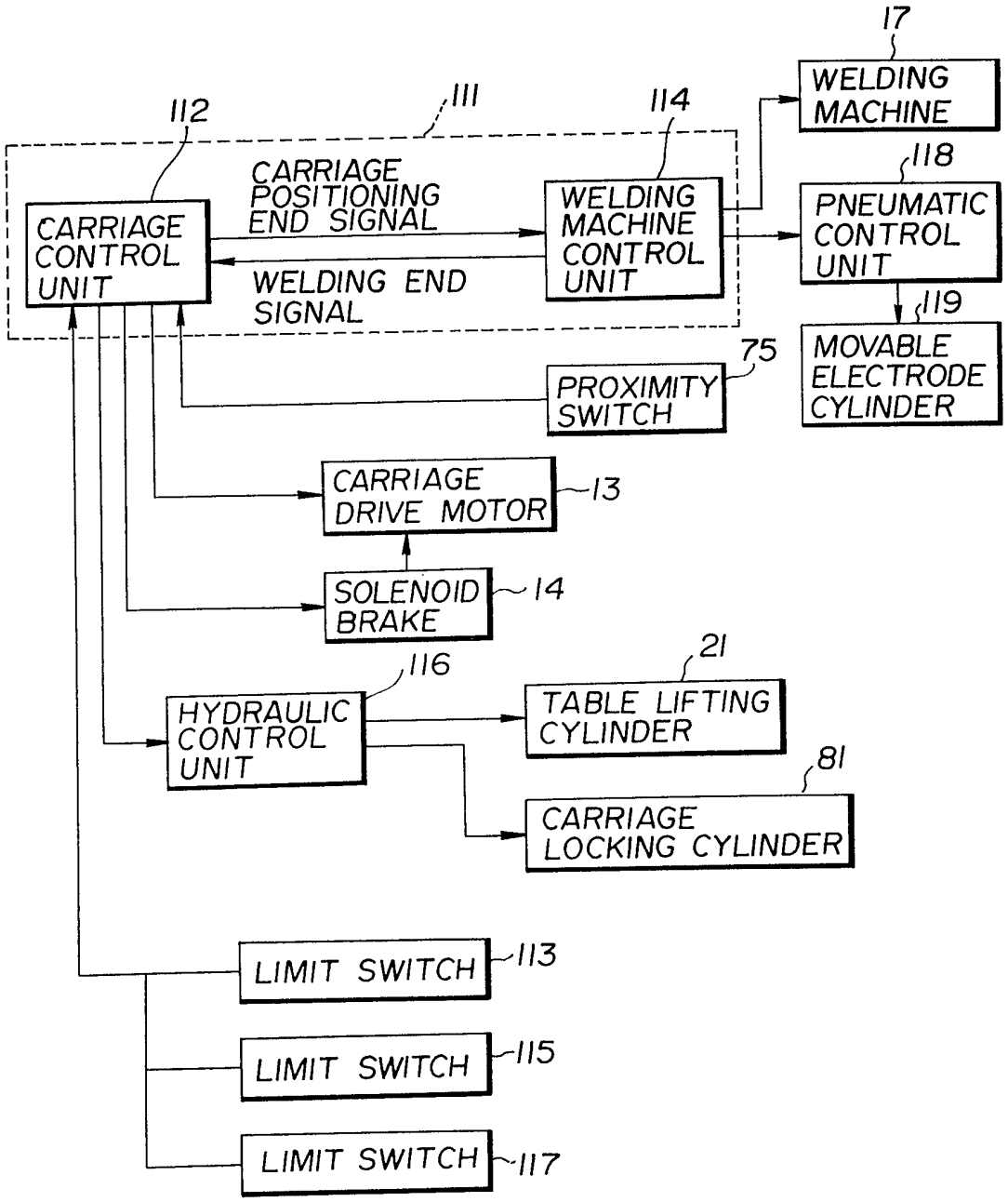


FIG.22


17
WELDING MACHINE
112
111
114
CARRIAGE CONTROL UNIT
CARRIAGE POSITIONING END SIGNAL
WELDING END SIGNAL
WELDING MACHINE CONTROL UNIT
118
PNEUMATIC CONTROL UNIT
119
MOVABLE ELECTRODE CYLINDER
75
PROXIMITY SWITCH
CARRIAGE DRIVE MOTOR
13
SOLENOID BRAKE
14
116
21
HYDRAULIC CONTROL UNIT
TABLE LIFTING CYLINDER
81
CARRIAGE LOCKING CYLINDER
LIMIT SWITCH
113
LIMIT SWITCH
115
LIMIT SWITCH
117

SPECIFICATION

Apparatus for manufacturing a trussed steel girder

The present invention relates to an apparatus for manufacturing a trussed steel girder.

An example of the conventional trussed steel girder is illustrated in Figs. 1 to 4. The trussed girder has a pair of parallel upper cords 1 and 1, a pair of parallel lower cords 2 and 2, horizontal bars 3 . . . welded to the upper cords or the lower cords to extend across them and a zigzag-shaped lattice bar 4 welded at their bent portions 4A . . . to the horizontal bars 3. Electric resistance welding has been adopted for welding these members. As the trussed girder there has been also used a girder having a lattice bar welded directly to upper and lower cords without using horizontal bars.

As a typical example of the conventional trussed steel girder manufacturing apparatus, there has been known an apparatus in which members of the trussed girder are automatically produced and then welded to form the trussed girder. More specifically, in this prior art apparatus, upper cords 1 and 1, lower cords 2 and 2 and lattice bar 4 are fed by separate feed devices until bent portion 4A reaches at a predetermined welding position, where horizontal bar 3 is supplied to engage with the bent portion 4A and the corresponding upper and lower cords 1 and 2 and then welded to them while the feeding of subsequent members of the trussed girder is stopped. By repeating these steps a trussed girder is automatically produced.

Although this prior art trussed girder manufacturing apparatus is superior in productivity and is suitable for factory fabrication of the trussed girder, it has the following disadvantages. The upper cords 1 and 1, lower cords 2 and 2 and the lattice bar 4 are separately fed for welding and hence a number of feeding devices are needed in addition to the device for supplying horizontal bars 3. Furthermore, these members of the trussed girder must be synchronously fed for preventing each welded portion thereof from getting out of welding position to thereby accurately produce the trussed girder. This prior art apparatus is hence complicated in structure. Therefore, it is excessively high in equipment cost and too large in size to be transported to construction site. In addition, the production rate of this apparatus is too high for site fabrication. For these reasons the prior art apparatus is not suitable for site fabrication of the trussed girder.

Accordingly, it is an object of the present invention to provide an apparatus for manufacturing a trussed steel girder, in which the manufacturing apparatus which is less complicated in the structure of the feed mechanism for feeding members of the girder and hence less expensive in equipment cost than the prior art apparatus of the type above described.

It is another object of the present invention to provide an apparatus for manufacturing a trussed steel girder, which is relatively small in size and hence easy of transportation. Further, the apparatus occupies smaller floor space than the above-described prior art and is therefore suitable for site fabrication of the trussed girder.

It is a further object of the present invention to provide an apparatus for manufacturing a trussed steel girder, in which the trussed girder is efficiently manufactured within a tolerance even by semiskilled workers.

With these objects in view, as well as other objects which will appear in the course of the specification, the present invention provides an apparatus for manufacturing a trussed steel girder by welding portions to be jointed of a zigzaged steel lattice member, an upper steel cord member and a lower steel cord member. The manufacturing apparatus includes: welding means for welding the portions to be jointed at two predetermined welding positions; a carriage for carrying the upper cord member, the lower cord member and the lattice member toward the welding means for welding; holding jigs, mounted on the carriage, for preassembling the upper cord member, the lower cord member and the lattice member above the carriage to form a preassembled trussed girder having a longitudinal direction thereof substantially directed parallel to a line of travel of the carriage; and control means for controlling the carriage to successively locate each portion to be jointed at corresponding one of the welding positions and for actuating the welding means to weld each portion to be jointed while the portion to be joined is located at the corresponding welding position.

In the drawings, like reference numerals apply to similar parts throughout the several views:

Figure 1 is a side view of the conventional steel trussed girder;

Figure 2 is an enlarged view of the encircled part of the trussed girder in Fig. 1;

Figure 3 is a view taken along the line III–III in Fig. 2;

Figure 4 is a view in the direction of the arrow IV in Fig. 2;

Figure 5 is a perspective view of an apparatus constructed according to the present invention;

Figure 6 is a side view of the apparatus in Fig. 5;

Figure 7 is a plan view of the table in Fig. 6;

Figure 8 is an enlarged side view of the jig for holding upper cords shown in Fig. 7;

Figure 9 is a view taken along the line

IX–IX in Fig. 8;

Figure 10 is an enlarged plan view of the jig for holding the horizontal bar in Fig. 7;

Figure 11 is a view taken along the line XI–XI in Fig. 10;

Figure 12 is a view taken along the line XII–XII in Fig. 10;

Figure 13 is an enlarged side view of the jig for holding the lattice bar in Fig. 7;

Figure 14 is a front view of the holding jig in Fig. 13 with a part broken away;

Figure 15 is an enlarged perspective view of the locking mechanism of Fig. 6;

Figure 16 is an enlarged front view illustrating the structural relationship between the carriage and the table slide mechanism in Fig. 5;

Figure 17 is a top plan view of the apparatus in Fig. 16 with parts omitted for clarity;

Figures 18 to 20 illustrate, in an enlarged scale, electrodes of one welding machine of Fig. 5 in which members of the trussed girder are welded;

Figure 21 shows the electrodes in Fig. 18 in the rest position.

Figure 22 is a block diagram illustrating a control system of the steel trussed girder manufacturing apparatus in Fig. 5.

Referring to Figs. 5 to 18 an apparatus for manufacturing a trussed steel girder according to one embodiment of the present invention will be described. This apparatus produces a steel trussed girder similar to the girder illustrated in Figs. 1 to 4.

Fig. 5 shows the overall structure of the apparatus. This apparatus generally includes a carriage 11, which is propelled by a carriage drive motor 13 (Fig. 6) to intermittently travel on a pair of straight rails 15 and 15 provided on the ground A in parallel with each other, and a pair of gate-shaped projection welding machines 17 and 17 erected in a parallel manner on a base B, which is embedded in the ground A, to cross over the rails 15 and 15 so as to allow the carriage 11 to pass through the welding machines 17 and 17. The welding machines 17 and 17 may be directly mounted on the ground A. The apparatus further includes a conventional electric control unit 111 having a carriage control unit 112 and a welding machine control unit 114 which will be described hereinafter.

The carriage 11 has a wheeled frame 19 running on the rails 15 and 15. The frame 19 is, a shown in Figs. 5 and 6, provided at the center portion thereof with a pair of bed lifting cylinders 21 and 21, on rods 23 of which is supported a bed 25. Between the frame 19 and the bed 25 there is provided a guide mechanism 27 disposed at the center thereof and having a guide tube 29 fixed to the frame 19 and a slider 31 slidably fitted into the guide tube 29. Symmetrically about the guide mechanism 27 there are further provided at opposite end portions of the frame 19 with a pair of pantographs 33 and 33. With the guide mechanism 27 and the pantographs 33 and 33, the bed 25 can be smoothly lifted in a horizontal manner.

an elongated rectangular table 35 is horizontally mounted on the bed 25 along the longitudinal direction of the frame 19. On the table 35 upper and lower cords 1, 1, 2 and 2, horizontal bars 3 and lattice bar 4, which are parts of a steel trussed girder to be constructed, are preassembled so that a trussed girder completed is placed on the table 35 with one side thereof down and the longitudinal direction thereof substantially in parallel with the line of travel of the carriage 11. In order to accurately and readily carry out this preassemblage, a plurality of holding jigs 37, 39, 41 and 43 for respectively holding the upper cord 1, lower cord 2, horizontal bars 3 and lattice bar 4 are disposed in predetermined positions on the table 35.

Each holding jig 37 for holding the upper cord 1 is, as shown in Fjgs. 8 and 9, provided with a pair of L-shaped holding members 45 and 46 each having an upright plate portion 47 and a leg portion 49 integrally and vertically formed with the upright portion 47. The holding members 45 and 46 are mounted on the table 35 by fixing the leg portions 49 to the table 35 so that the back faces of upright portions 47 thereof are faced each other at a distance substantially equal to the diameter of the upper cord 1. Each holding jig 37 is further provided with a knock pin 51, holding pin 53, positioning pin 54 and another holding pin 55. All these pins pass through both upright plate portions 47 and 47. The two upper cords 1 and 1 are to be held between the knock pin 51 and the holding pin 53 and between the positioning pin 54 and the holding pin 55 respectively. The holding pin 53, the positioning pin 54 and the holding pin 55 are detachably attached to the upright plate portions 47 and 47 for removing the upper cords 1 and 1.

The holding jigs 39 for holding the lower cords 2 have the same structure as the jigs 37 above described and hence the explanation of the structure thereof is omitted. The jigs 39 are disposed on the table 35 so that the lower cord 2 is held by them at a constant distance *d* from one side edge 35A of the table 35.

The holding jigs 41 for holding the horizontal bars 3 are, as illustrated in Fig. 7, disposed at predetermined positions, where bent portions 4A of the lattice bar 4 are to be located, along lines on which the upper and lower cords 1 and 1 and 2 and 2 are positioned. Each holding jig 41 has a base portion 42 of a substantially thin rectangular parallelopiped shape and has a holding hole 44 vertically formed at the center of the top face thereof so as to fit one end of a horizontal bar 3 into it for holding the bar 3. The base

portion 42 is provided at the upper face thereof with a pair of projections 48 and 48 extending from the opposite sides of the top face to the holding hole 44. The inner ends of the projections 48 and 48 have arcuate faces 50 and 50 formed to be continuous with the wall of the hole 44 and to face each other. The thickness of the projections 48 and 48 is as shown in Fig. 10 designed to be smaller than the diameter of the horizontal bars 3 for preventing electrodes 69 and 71 of the welding machines 17 and 17, which will be described hereinafter, from contacting the projections 48 and 48.

The holding jigs 43 for holding the lattice bar 4 are, as shown in Fig. 7, mounted on the table 35 so that they are located at positions where linear portions 4B of the lattice bar 4 is to pass through. Each holding jig 43 has a base portion 52, fastened to the table 35 by bolts 56, and a pair of opposed holding walls 58 and 58 integrally formed with the base portion 52 to project upward. The holding walls 58 and 58 are spaced at a distance substantially equal to the diameter of the lattice bar 4. The holding jig 43 is further provided with a holding pin 57 removably passing through the holding walls 58 and 58 for preventing the lattice bar 4, inserted between the walls 58 and 58, from moving upwards.

The welding machines 17 and 17 are controlled by the welding machine control unit 114 to weld members of the trussed girder at portions, engaging with each other, of the members. Information about welding current, welding time, welding pressure, etc are previously inputted into the welding machine control unit 114. Each welding machine 17, as shown in Fig. 5, has a gate-shaped body 61 erected on the ground A. Each body 61 is provided at the horizontal portion 63 thereof with a L-shaped fixed arm 65 and movable arm 67 so that the arms 65 and 67 depend from the horizontal portion 63 with short arms 65A and 67B thereof opposed to each other, the movable arm 67 being supported on the body 61 to be slidable toward and away from the fixed arm 65. Each body 61 is provided with a pneumatic cylinder 119 (Fig. 22) for moving the movable arm toward and away from the fixed arm 65. As shown in Fig. 18, the short arms 65A and 67B have respectively at opposed ends thereof electrodes 69 and 71 fixed in alignment with each other. The electrodes 69 and 71 is designed to clamp two of the members, which constitute the trussed girder, by moving the movable arm 67 toward the fixed arm 65, and then weld the two members with current flowing between them. In this event, the two welding machines 17 and 17 are arranged so that when one welding machine 17 welds the members of the upper cord side of the trussed girder, the other welding machine 17 is set to a position to weld the members of the lower cord side. For this purpose the distance L, in the direction of the carriage travel, between the corresponding electrodes, i.e., movable electrodes 69 and 69 or fixed electrodes 71 and 71, and the distance l, in the longitudinal direction of the table 35, between adjacent bent portions 4A and 4A of the lattice bar 4 are related as follows:

$$L = (2n + 1)l$$

where n is 0 or natural number. In this embodiment n is 0. The two welding machines 17 and 17 are controlled to not simultaneously but alternatively perform welding.

The apparatus is provided with a positioning device for accurately positioning portions to be welded of the members of the trussed girder at stop positions just below corresponding welding positions between the electrodes 69 and 71 of each welding machine 17. The positioning device is illustrated in Fig. 6 and includes a plurality of bolts 73 to be sensed, screwed to the frame 18, and a proximity switch 75 mounted on ground A to be located intermediate the welding machines 17 and 17. The bolts 73 are fixed to the frame 19 in the longitudinal direction of the table 35 with a pitch 2. The proximity switch 75 is activated when one of the bolts 73 is positioned just below it. When activated, the proximity switch 75 provides a carriage positioning signal to a carriage control unit 112 (Fig. 22) to cause the carriage drive motor 13 to be deenergized and a solenoid brake 14 to be energized for stopping the carriage 11 by applying a braking force to the rotational shaft of drive motor 13. When the carriage 11 is stopped in this way, a leading horizontal bar 3 contacting the upper cord 1 is positioned at a predetermined stop position just below a front welding position between the electrodes 69 and 71 of the front welding machine 17, located at the leftside in Fig. 6, and subsequent one of the horizontal bars 3 contacting the lower cord 2 is located at another predetermined stop position just below a rear welding position between the electrodes of the other welding machine 17. It will be apparent that the proximity switch 75 may be provided to the carriage 11 in which case the bolts 73 are arranged on the ground A along the travelling direction of the carriage 11.

When the positioning of the carriage 11 is carried out only by the braking force, the carriage 11 may be stopped with a misregistration of portions of be welded of the trussed girder members with the predetermined stop positions just below the welding positions, depending on the breaking force applied. In order to prevent such a misregistration the positioning device further includes a locking device 77 shown in Figs. 6 and 15. The locking device 77 has a locking plate 79

attached to the bottom of the frame 19 so as to extend in the line of travel of the carriage 11 and a hydraulic locking cylinder 81 mounted on the base B. The locking plate 79 has a plurality of locking hole 83 formed through it along the longitudinal direction thereof with a pitch of 2l. The rod 85 of the cylinder 81 is provided at the distal end portion thereof with a taper portion 85A tapering toward the distal end thereof. The cylindrical portion 85B of the rod 85 is slightly smaller in diameter than the locking holes 83. The locking cylinder 81 is disposed so that when portions to be welded of the trussed girder are accurately located just below respective welding positions, the rod 85 comes into alignment with corresponding one of the locking holes 83. The locking cylinder 81 is actuated by a hydraulic control unit 116 (Fig. 22) in response to a signal sent from the carriage control unit 112 after receipt of the carriage positioning signal from the proximity switch 75 to thereby insert the rod 85 into the corresponding one hole 83 when the carriage 11 is stopped for welding. When the corresponding one locking hole 83 is positioned in misalignment with the rod 85 of the locking cylinder 81, the taper portion 85A of the rod 85 engages the wall of the one locking hole 83 by the insertion of the rod 85 to thereby move the carriage 11 to bring the one hole 83 into alignment with the rod 85. When the cylindrical portion 85B fits into the one hole 83, the misregistration of the portions to be welded of the trussed girder is corrected, after which the rod 85 is remained fitted into the hole 83 for preventing portions to be welded of the trussed girder from being horizontally displaced by the movement of the trussed girder members to be welded during the welding operation. It will be understood that the cylinder 81 and the locking plate 79 may be provided to the carriage 11 and the base B, respectively.

As shown in Fig. 1, a camber is imparted to the trussed girder to be produced. In this embodiment, the preassembled trussed girder is, as shown in Fig. 7, laid over the table 35 one side down and is cambered upwards in Fig. 7. Hence, if the table 35 were fixed to the wheeled frame 19, the portions to be welded of the trussed girder would be located with a deviation from the respective stop positions in a direction perpendicular to the line of travel of the carriage 11 when the carriage 11 is stopped for welding. To overcome this problem the table 35 is supported to be movable perpendicularly to the line of travel of the carriage 11 as described below. The table 35 is, as shown in Fig. 16, provided at the lower side thereof with pairs of slide shoes 103 . . ., each slidably engaging with parallel guide rails 105, . . . transversely mounted on the bed 25. The table 35 is further provided at one side edge 35A thereof near the lower cord holding jigs 39 with a concave face which corresponds to the camber to imparted. The other side edge 35B has a straight face. As shown in Fig. 16, a pair of supporting columns 91 and 92 are erected on the base B so that they are located intermediate welding machines 17 and 17 to face each other across the rails 15 and 15. One support column 91 adjacent to the concave face 35A of the table 35 has a fixed roller 93 supported at the upper end portion thereof for rotation about a vertical axis. The other support column 92 has a movable roller 95 rotatably mounted with a fitting 97 on the upper portion thereof so as to be movable perpendicularly to the line of travel of the carriage 11. The fitting 97 of the movable roller 95 is provided with a pair of slide bars 99 and 99 which slidably pass through the other column 92. The movable roller 95 is urged by coil springs 101 and 101, fitted around the slide bars 99 and 99, against the straight face edge 35B of the table 35 to thereby bring the concave face edge 35A into abutment with the fixed roller 93. Thus the table 35 is forced to move perpendicularly to the line of travel of the carriage 11 according to the degree of the camber to be formed as the carriage 11 passes through the support columns 91 and 92. With such a construction the portions to be welded of the trussed girder substantially pass through respective predetermined positions in the vicinity of the rollers 93 and 95 when the carriage 11 is moved. In this embodiment, the two welding machines 17 and 17 are respectively located in the vicinity of the rollers 93 and 95, and hence the portions to be welded of the trussed girder are located substantially at respective stop positions just below the respective welding positions when they are positioned for welding.

Alternatively, the table 35 may be provided at the side edge 35A with a convex face instead of the concave face. Further, a cambered trussed girder may be produced by providing a plate, which has an edge curved according to a camber to be imparted, to the one supporting column 91 instead of provision of the fixed roller 93 and by bringing a roller, rotatably on the table 35, into engagement with the curved edge of the plate by means of the movable roller 95 urging the other side edge 35B of the table.

In this embodiment, each horizontal bar 3 is welded t at three portions thereof to the upper cords 1 or lower cords 2 and one of bent portions 4A of the lattice bar 4. In view of a fact that these three portions of each horizontal bar 3 are vertically situated, the table 35 is, according to the present invention, moved vertically in the following manner. The arrival of each horizontal bar 3 at the corresponding stop position just below the welding position between the electrodes 69 and 71 of the corresponding welding machine 17 is de-

tected by actuating a limit switch (not shown) mounted on the one supporting column 91 by the distal end of the cylinder rod 85 which is fitted into the corresponding hole 83 of the locking plate 79. The limit switch thus actuated provides a horizontal bar arrival signal to the carriage control unit 112, which in response to this signal actuates the hydraulic control unit 116 to thereby actuate the table lifting cylinders 21 and 21. At the rear end of the table 35 there are vertically disposed three limit switches 113, 115 and 117. When the table 35 is elevated to a level where portions to be welded or engaging portions 121 and 121 of two horizontal bars 3 and 3 and the lattice bar 4 are, as shown in Fig. 18, located at respective welding positions between the electrodes 69 and 71 of the corresponding welding machines 17 and 17, the intermediate limit switch 115 is activated by contacting an actuator 119 mounted on the frame 19 to thereby deactivate the hydraulic control unit 116 for stopping the rods 23 of the lifting cylinders 21 and 21. When the portions to be welded of the two leading horizontal bars 3 and 3 and the lattice bar 4 are stopped at respective welding positions in this way, the carriage control unit 112 provides a carriage positioning end signal to the welding machine control unit 114, which then activates a pneumatic control unit 118 to thereby actuate one movable electrode cylinder 119, which in turn moves the movable electrode 69 of one welding machine 17, shown by the phantom line in Fig. 18, to a position shown by the solid line where the portion to be welded of one leading horizontal bar 3, contacting the upper cords 1 and 1, and the lattice bar 4 are clamped between the movable and fixed electrodes 69 and 71 for welding. Then, the welding machine control unit 114 actuates the one welding machine 17 for carrying the welding of the one leading horizontal bar 3 and the lattice bar 4. After the welding of these members are completed, the welding machine control unit 114 deactivates the one welding machine 17 and activates the other welding machine 17, which welds the portion 121 to be welded of the other leading horizontal bar 3, contacting the lower cords 2 and 2, and the lattice bar 4 in the same manner. The end of the welding is detected by a timer (not shown) included in the welding machine control unit 114, which causes the lifting cylinders 21 and 21 to be actuated for further elevating the table 35. When a portion 123 to be welded of the one leading horizontal bar 3 and the upper cord 1 positioned lowermost and a portion 123 to be welded of the other leading horizontal bar 3 and the lower cord 2 positioned lowermost are located at respective welding positions, one of which is shown in Fig. 19, the limit switch 113 is activated by the actuator 119, thereby stopping the portions 123 and 123 to be welded at respective welding position. Then, welding is performed in the same manner as in the portions 121. Thereafter, the table 35 is lowered to a level where a portion 125 to be welded of the one leading horizontal bar 3 and the upper cord 1 positioned uppermost and a portion 125 to be welded of the other leading horizontal bar 3 and the lower cord 2 positioned uppermost are placed between the fixed and movable electrodes 69 and 71 of the respective welding machines (Fig. 20). This level of the table 35 is detected by activating the limit switch 117 with the actuator 119. In this level the welding of the portions 125 and 125 is carried out as in the portions 121. Thereafter, the table 35 is further lowered to a rest position shown in Fig. 6 and 21.

Before the welding of the trussed girder, the members 1, 2, 3 and 4 thereof are manually preassembled by means of the holding jigs 37, 39, 41 and 43, which are disposed in predetermined positions, thus enabling accurate and speedy preassemblage of the trussed girder. Then, the carriage 11 is propelled toward the welding machines 17 and 17. When one of bolts 73, corresponding to the leading portions to be welded, is detected by the proximity switch 75, the carriage 11 is stopped by the solenoid brake and locked by engaging the rod 85 of the cylinder 81 into the corresponding one of locking holes 83 as described above. During this positioning of the carriage 11, the table 35 is moved perpendicularly to the line of travel of the carriage 11 by a distance in accordance with the amount of the camber to be imparted. Hence, the leading portions 121, 123 and 125 to be welded of the presassembled trussed girder are located substantially just below the welding positions between the fixed and movable electrodes 69 and 71 of the respective welding machines 17 and 17 when the carriage 11 is stopped. After this positioning, the welding of the leading portions 121, 123 and 125 to be welded is carried out as hereinbefore described. Then, a welding end signal is provided from the welding machine control unit 114 to the carriage control unit 112, which energizes the carriage drive motor 13 to propel the carriage 11 until the subsequent portions 121, 123 and 125 to be welded of the preassembled trussed girder are positioned just beneath the respective welding positions. This positioning of the subsequent portions 121, 123 and 125 to be welded is made by detecting the subsequent bolt 73 by means of the proximity switch 75. Thereafter, the subsequent portions 121, 123 and 125 are welded in the same manner. The welding of the trussed girder is completed by repeating these operations, and the completed trussed girder is then removed from the holding jigs 37, 39, 41 and 43.

While the invention is disclosed in specific

details for purposes of clarity and complete disclosure, the appended claims are intended to include within their meaning all modifications and changes that come within the true scope of the invention.

CLAIMS

1. An apparatus for manufacturing a trussed steel girder by welding portions to be jointed of a zigzaged steel lattice member, an upper steel cord member and a lower steel cord member, comprising: welding means for welding the portions to be jointed at two predetermined welding positions; a carriage for carrying the upper cord member, the lower cord member and the lattice member toward the welding means for welding; holding jigs, mounted on the carriage, for preassembling the upper cord member, the lower cord member and the lattice member above the carriage to form a preassembled trussed girder having a longitudinal direction thereof substantially directed parallel to a line of travel of the carriage; and control means for controlling the carriage to successively locate each portion to be joined at corresponding one of the welding positions and for actuating the welding means to weld each portion to be jointed while the portion to be joined is located at the corresponding one welding position.

2. An apparatus as recited in Claim 1, wherein the controlling means comprises locking means for releasably locking the carriage so that each portion to be jointed is held at the corresponding welding position while the portion to be jointed is welded.

3. An apparatus as recited in Claim 2, wherein the locking means comprises: a hydraulic cylinder provided in the vicinity of the welding means and having a rod slidably fitted therein; and a locking member mounted to the carriage and having a series of locking holes formed through it so that the locking holes are aligned parallel to the line of travel of the carriage, and wherein the rod has at a distal end thereof a taper portion tapering toward the distal end thereof and is adapted to fit into the locking holes for locking the carriage to hold each portion to be jointed at the corresponding welding position while the portion to be jointed is welded.

4. An apparatus as recited in Claim 2 or 3, wherein the carriage comprises a table supported to be movable transversely to the line of travel of the carriage; the table has the jigs mounted thereon so that a camber is transversely imparted to the preassembled trussed girder; and there is provided means for feeding the table transversely to the line of travel of the carriage to conform to the camber to be imparted.

5. An apparatus as recited in Claim 4, wherein the feeding means comprises: a following face formed in one side edge of the table, the following face being formed to conform to the camber; a fixed roller supported to be rotatable about a vertical axis and engaging the following face; and a movable roller spring biased toward the fixed roller and bearing against the other side edge of the table to thereby urge the following face of the oneside edge against the fixed roller.

6. An apparatus as recited in Claim 5, wherein the controlling means comprises an elevating means, mounted on the carriage, for vertically elevating the table for locating each portion to be jointed at the corresponding welding position.

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