July 7, 1942. V. B. EDWARDS 2,288,796

FIT AND TACK MACHINE

Filed Oct. 12, 1940 4 Sheets-Sheet 1

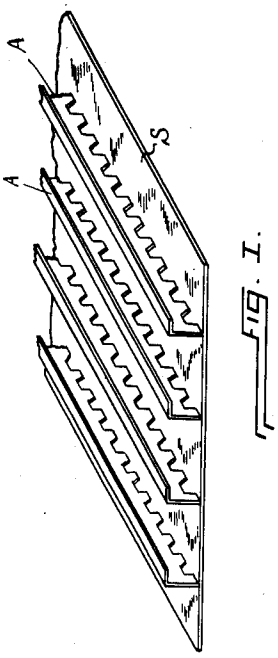


Fig. I.

Fig. II.

INVENTOR
Vere B. Edwards
by Christy, Parmelee and Wharton
his attorneys

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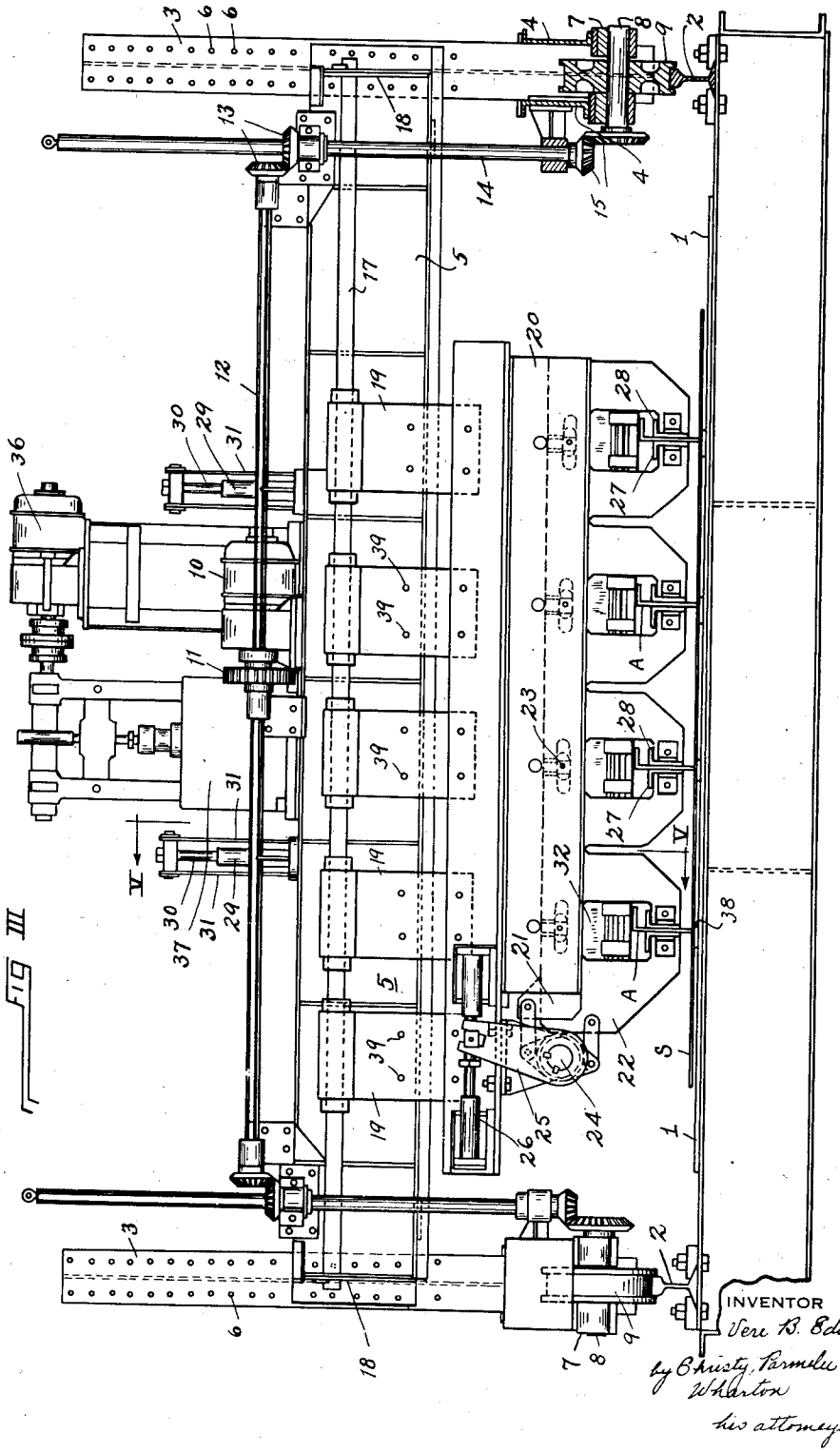


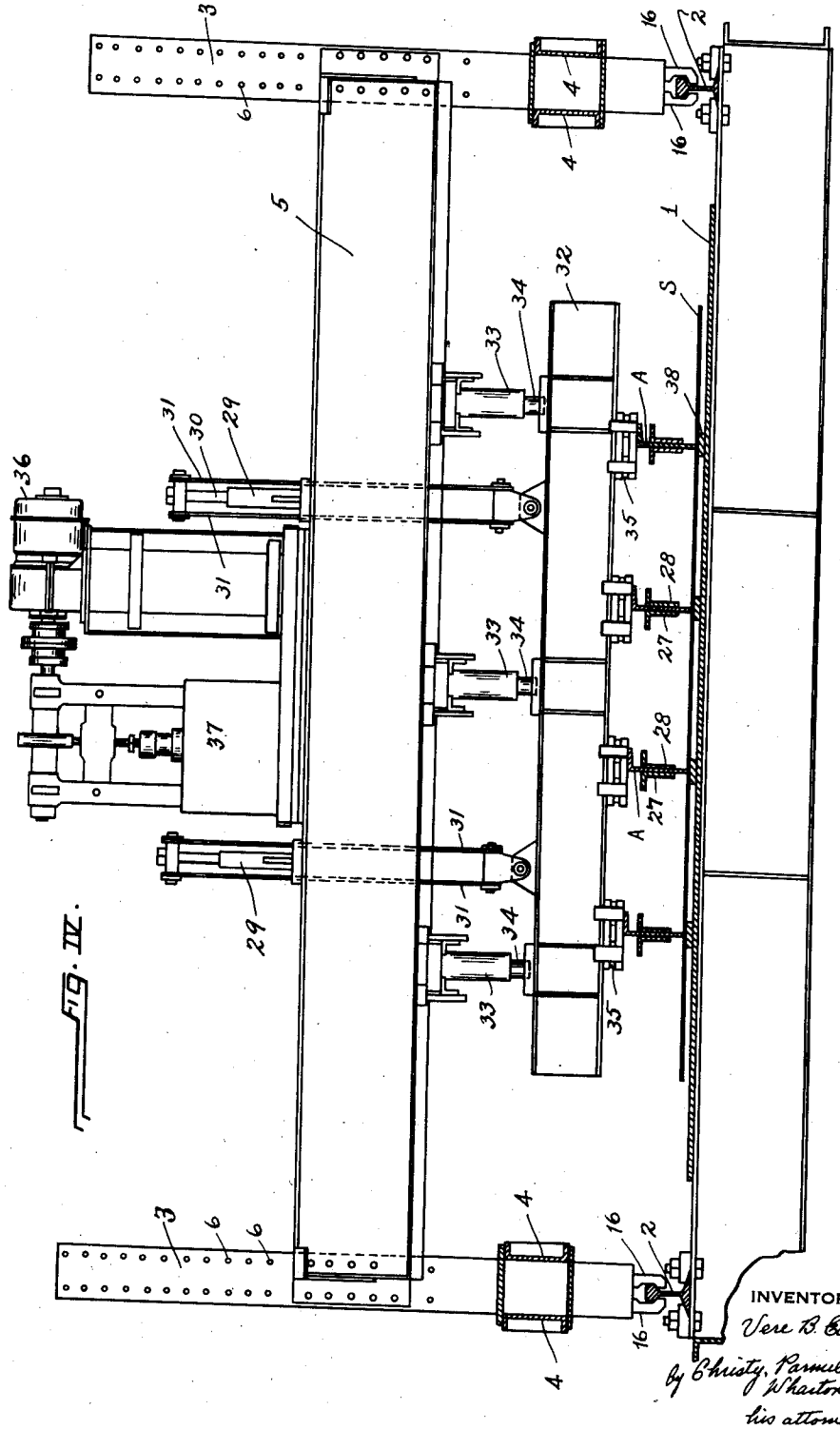
FIG III

INVENTOR
Vere B. Edwards
by Christy, Parmelee and Wharton
his attorneys

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INVENTOR
Vere B. Edwards
By Christy, Parmelee and Wharton
his attorneys

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Fig. V.

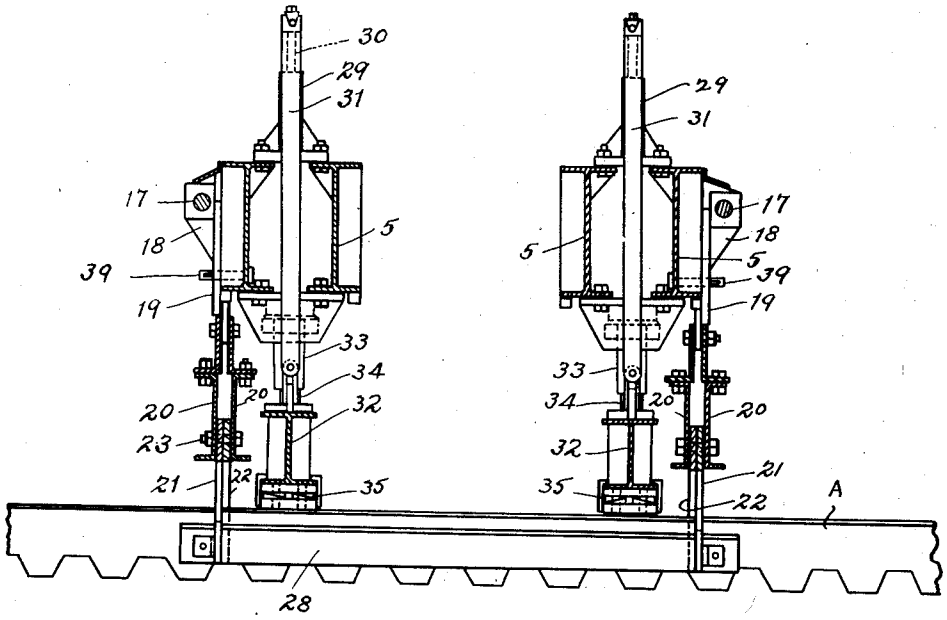
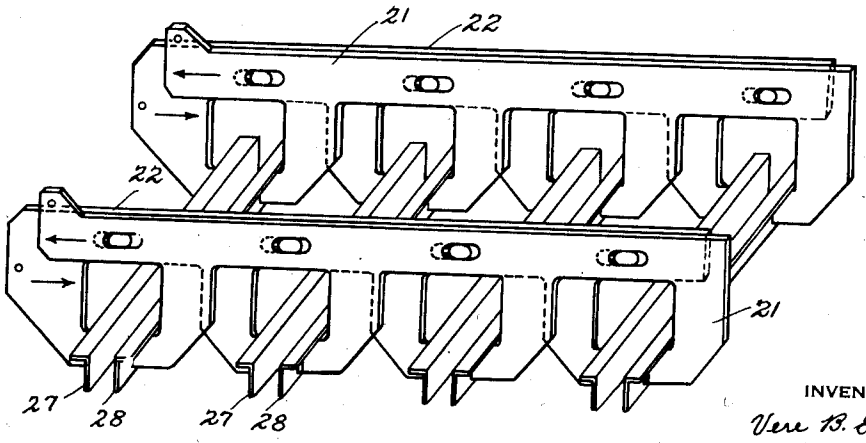


Fig. VI.



INVENTOR

Vere B. Edwards

by Christy, Parmelee and Wharton

his attorneys

Patented July 7, 1942 2,288,796

UNITED STATES PATENT OFFICE

2,288,796

FIT AND TACK MACHINE

Vere B. Edwards, Coraopolis, Pa., assignor to Dravo Corporation, a corporation of Pennsylvania

Application October 12, 1940, Serial No. 360,919

6 Claims. (Cl. 29—89)

This invention concerns the re-inforcement of steel plates. It finds practical application in the re-inforcement of plates that form the walls of steel barges. It has been found that, by re-inforcement such as hereinafter described, a plate may be rendered serviceable in barge-building of equal efficacy with a plain un-reinforced plate of appreciably greater weight. Therein is saving in cost and gain in utility; for a lighter barge will carry a greater load. The invention consists in an assembling machine, for bringing a steel plate and its re-inforcement into accurate assembly and holding the parts in place while their union is being effected—ordinarily, by welding.

In the accompanying drawings, Fig. I is a fragmentary view in perspective of the re-inforced plate: the article whose production is facilitated and rendered more perfect by the use of the machine of the invention. Fig. II is a view in side elevation (with detail in vertical section) of the machine of the invention, having work in place within it. Fig. III is a view of the machine in end elevation, as seen from the left, Fig. II. Fig. IV is a view in vertical and transverse section, on the plane indicated by the line IV—IV, Fig. II. Fig. V is a fragmentary view in vertical and longitudinal section, on the plane indicated at V—V, Fig. III. Fig. VI is a fragmentary view in perspective of the clamping members of the machine.

Referring, first, to Fig. I a plate S is shown, which may be understood to be a plate of steel suitable for use in forming the side wall of a barge. To this plate re-inforcement is secured in the form of a succession of lengths A of steel angle, set in parallelism and united to the plate along one edge. The edge of the angle that meets the plate is conveniently cut away in a succession of notches, leaving an intermittent line of union. It is along this intermittent line that the angle is united to the plate, and, as here shown, it will be understood that union is effected by welding. The serration of the edge of the angle is advantageous; for the resultant structure is equally strong, as though the web of the angle were uncut and continuous at the edge; reduction in weight and saving of material are effected; and (the re-inforced face of the plate being the inner face in the completed barge) the spaces between the serrations afford passageway for liquid, whether the liquid be accumulated water in an open barge or the liquid (such as oil) of the cargo of a closed one.

In handling such heavy articles it manifestly is desirable to provide machinery for assembling; and the machinery of the invention is effective, not merely to carry weight, but also to bring the parts to be united accurately to position and to hold them in accurate positions of assembly while permanent union is being effected.

A table 1, suitably supported, is flanked with rails 2. The rails are of the conventional shape of railway rails, with wide base, slender web, and enlarged head. Upon the rails moves a carriage. The carriage frame consists of vertically standing posts 3, four in number, and formed of lengths of I-beam; horizontally and longitudinally extending compound side bars 4, formed of lengths of rolled channel; and horizontally and transversely extending compound cross-bars 5, formed of lengths of I-beam. In Figs. III and IV lines of bolt holes 6 in the flanges of posts 3 indicate that the cross-bars 5 of the carriage are adjustable in height. By providing for such vertical adjustment of the cross-bars of the frame, the machine is (as will be understood upon considering the ensuing description) rendered adaptable to the handling of angles having webs differing in width.

To the ends of the side bars 4 heavy blocks 7 are secured, in which turn the axles 8 of wheels 9 upon which the carriage rests and moves along the rails 2. One of the cross-bars 5 carries a motor 10; and from this motor, through the pinion 11, countershaft 12, pairs of turned bevel-gears 13, pairs of shafts 14, and pairs of bevel-gears 15, two opposite wheels 9 are turned, to drive the carriage in desired direction along the rails. Each of the two shafts 14 and the encircling member of the cooperating bevel-gear 13 are connected by a spline, that the cross-bar 5 may be adjusted in height without disturbance of the carriage drive. The posts 3 at their lower ends are equipped with pairs of hooked blocks 16 that extend around and beneath the heads of the rails 2, and, while permitting free travel of the carriage on the rails, secure the carriage against stress tending to lift it upward from the rails when the machine is in service. And in this connection it will be noted that the rails are shown to be securely bolted to the structure that carries the table 1.

Throughout the length of one of the I-beams of each of the two cross-bars of the frame extends a rod 17, suitably supported at its ends in flanges 18 made integral with the beam. Hangers 19 rotatably mounted upon each rod 17 carry two lengths of channel 20 arranged back to back and forming a slideway. Within this slideway two slides 21, 22 are sustained upon pins, in the form of bolts 23,

The slides are slotted, as best shown in Fig. VI, that they may be shifted longitudinally within the slideway through small but sufficient range. The two slides are linked to arms borne by a shaft 24 that is rotatably borne in the supporting structure; and, in response to rotation of the shaft the slides are oppositely shifted (cf. Fig. III). An arm 25 borne by shaft 24 is engaged by the stem of a double-acting ram 26. The ram also is borne by the structure that is hung from rod 17. As the stem of the ram is driven in one direction and the other the shaft is turned and the slides 21, 22 are shifted. The slides carry, each one member of a set of pairs of clamping jaws (in this instance there are four pairs). The jaws take the form of lengths of angle iron, and two lengths, 27, 28, make up each pair. The slides 22 (there are two of them) carry all the clamp parts 27, and the slides 21 all the parts 28. By the right to left thrust of the ram 26 and the counter-clockwise turning of shaft 24 (Fig. III) the slides are shifted in the directions indicated by arrows, Fig. VI, and clamps are closed; by the left to right thrust of the ram the clamps are opened.

Each cross-bar carries two hydraulic cylinders 29, and from the piston stems 30 of the pair of hydraulic cylinders of each cross-bar is hung by suspension straps 31 a beam 32 that extends transversely above the assembled lengths A of angle iron clamped in the set of jaws 27, 28. The beams 32 are removable from their mounting in the suspension straps 31. The straps 31 extend between the two I-beams 5 that form each cross-bar, as best seen in Fig. V. The cross-bars also carry, secured to their nether faces, hydraulic cylinders 33, whose pistons 34 bear from above upon the beams 32. A plurality of the cylinders 33 is provided, engaging the beams 32 at longitudinally successive points, and in this instance three are provided for each beam (Fig. IV). Each beam 32 carries on its nether face a succession of resilient cushion members adapted severally to engage the set of angles A when clamped between the set of jaws. The effective resilient member of these cushion devices may conveniently be a flat coiled spring 35, resembling a split ring shaped to spiral form.

A motor 36 drives a pump 37, that affords a supply of oil under pressure, available to drive in ordered sequence and under controls not shown (but whose character and positions may be conventional) the ram 26, the pistons 34 and the pistons 30.

Upon the table 1 may be laid strips 38, upon which the plate S immediately rests. These strips preferably, though not necessarily, immediately underlie the angles A along their lines of bearing upon sheet S from above.

In operation a sheet S, to be re-inforced after the manner shown in Fig. I, is laid upon table 1 and rests upon the strips 38. These strips have previously been set in predetermined and properly spaced positions upon the table; and it is manifest that, if conditions of service justify, they may have been removably or permanently secured in their positions. The jaws 27 and 28 are then, by the operation of ram 26, opened, and a set of angles is introduced between the pairs of open jaws, and brought into transverse alignment, their discontinuous edges resting upon the surface of sheet S. Comparing Figs. IV and V, it will be seen that the jaws may be of less length than the angles. The initial clamping may be at one end (the left end, as seen in Fig. I) of the assembly of angles A. The jaws 27, 28 are then, by the shifting of ram 26, closed, with the angles A, resting on edge on the sheet S, clamped in accurately spaced-apart relation.

The cylinders 33 are then brought into action while cylinders 29 are open to pressure relief. The beams 32 are, by pistons 34, driven powerfully downward. They engage from above, through the cushioning springs 35, the angles A. Under the thrust thus exerted, the lower notched edges of the angles A are, throughout the extent of the carriage, pressed forcefully into engagement with the surface of the sheet S, the effective thrust of the pistons 34 forcing the clamped angles downward between the jaws of the clamps, to eliminate (if need be) such irregularities and unevennesses as may exist in individual pieces. The bottom edges of the angles A are brought throughout the extent of the carriage to accurate and continuous abutment upon the surface of sheet S. In this truing operation the carriage is held to the rails and the stress made effective by the hooks 16 engaging the heads of the rails.

While the parts are so held in position the angles are welded, by temporary or permanent welding to the sheet. When the welding has been effected the beams 32 are by the pistons 30 raised. The ram 26 is operated, and the jaws opened. The carriage is shifted (to the right, Fig. I), the jaws are closed again upon a still unwelded portion of the extent of the angles A, and the operation is repeated on a succeeding portion of the work. When operation is in such step-by-step manner completed, the work may be removed; and, if the welding has been but temporary, it may then be completed and made permanent.

Such is the utility of the machine in the assembling of angles, or other elongate reinforcing members, on steel plates. In performing certain other types of work on steel plates, the carriage and its clamping devices are not needed, the table 1 alone being used; that is, the table is used as a flat work support. In order that the carriage will offer the least possible obstruction to the workmen, when the machine is thus used as a simple work support, provision has been made that the clamping devices may be readily moved out of the way. Specifically, the bolts 23 are arranged for ready removal from the beams 20, 20, so that the clamping plates 21, 22, together with their jaw-forming members 27, 28 may be withdrawn from the machine. Then, the pins 39 that anchor the hangers 19 to the beams 5 (to prevent the hangers from swinging upon their supporting rods 17) are withdrawn; the beams 20, 20 and the hangers 19 on each rod 17 are then swung to position above the rod, in which position they are sustained, out of the way of workmen on the table 1. Additionally, the beams 32 may be quickly disconnected from the lower ends of straps 31 and removed, whereby clearance is provided for workmen to pass beneath the beams 5. The entire area of the table 1 is thus rendered available for service.

I claim as my invention:

1. In a machine for the assembling of structural elements in position for union, the combination of a table, a framework surmounting the table, a clamping device including a plurality of pairs of clamps borne by the framework, the members of the pairs being relatively movable for engagement with and release of a structural element, and a powerfully operated pressure mem-

ber mounted in the framework and movable in a direction perpendicular to the table and adapted to engage a structural element when held in position by said clamping device and to hold it under pressure in abutment upon a structural element in position upon said table.

2. In a machine for the assembling of structural elements in position for union, the combination of a table, a framework surmounting the table, a clamping device including a plurality of pairs of clamps borne by the framework, a hydraulic ram for shifting the members of the pairs relatively to one another for engagement with and release of a structural element, and a powerfully operated pressure member mounted in the framework and movable in a direction perpendicular to the table and adapted to engage a structural element when held in position by said clamping device and to hold it under pressure in abutment upon a structural element in position upon said table.

3. A machine for the assembling of structural elements, said machine including a plurality of clamps, one of the jaw-forming members of each clamp being carried by a pair of spaced-apart slides, and the other jaw-forming member of each clamp being carried by a second pair of spaced-apart slides, and means for shifting one pair of slides relatively to the other pair, with the effect that the jaws of the several clamps may be opened and closed in unison.

4. In a machine for the assembling of structural elements in position for union, the combination of a table, a framework surmounting the table, a clamping device including a plurality of pairs of clamps borne by the framework, the members of the pairs being relatively movable for engagement with and release of a structural element, and powerfully operated means adapted to force a structural element engaged in the clamping device toward a structural element borne upon the face of the table.

5. In a machine for the assembling of structural elements in position for union, the combination of a table provided with rails along opposite sides, a carriage borne upon said rails and bridging the surface of said table, said carriage including a clamping device comprising a plurality of clamps, means for closing and opening the jaws of said clamps in unison for engagement with and release of a structural element, and mean for powerfully forcing a structural element engaged in said clamping device to cooperative position relatively to a structural element positioned on said table.

6. In a machine for the assembling of structural elements in position for union, the combination of a table, a framework surmounting the table, a clamping device borne by the framework, and means borne by the framework for exerting pressure upon a structural element when in position in the clamping device, the clamping device including a slideway rotatably mounted in the framework and adapted to be swung to and from operative position and a pair of slides mounted in the slideway, and the pressure exerting means including a beam and suspension means mounted in the framework and engaging the beam, said beam being removably borne by said suspension means.

VERE B. EDWARDS.