

---

(19)		<b>Canadian Intellectual Property Office</b>	<b>Office de la Propriété Intellectuelle du Canada</b>	(11)	<b>CA 329335</b>	(13)	<b>A</b>
		An Agency of Industry Canada	Un organisme d'industrie Canada	(40)	<b>10.01.1933</b>		

---

(12)

(21) Application number: **329335D**

(51) Int. Cl:

(22) Date of filing: ..

(71) Applicant: **MANUFAX LTD.**(72) Inventor: **LINGWOOD FREDERICK DONALD ()**.(54) **STRUCTURAL MODEL MANUFACTURE**(57) **Abstract:**(54) **FABRICATION DE MODELES DE CONSTRUCTIONS**

*This First Page has been artificially created and is not part of the CIPO Official Publication*

329335

CANADA.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, Frederick Donald LINGWOOD, British Subject, of 81, Talgarth Road, West Kensington, London, W.14., England, having invented certain new and useful improvements in THE BUILDING UP OF GIRDER OR LIKE STRUCTURES FOR USE IN THE MAKING OF MODELS OR LIKE SMALL ARTICLES, do hereby declare that the following is a full, clear and exact description of the same:

This invention relates to the building up of girder or like structures for use in the making of models or like small articles, and has for its object to enable a structure to be produced which will be of a simple and rigid nature and will be capable of being readily assembled and have an appearance somewhat similar to larger girder structures.

To this end according to the present invention a clip device is employed for connecting together two members each of which is either a girder or of T, channel or angle section, or a bar, both these members having a laminated formation of strip or sheet metal, the clip device having parts adapted to embrace parts of the two members to be connected and to have indentations formed simultaneously in these parts of the clip device and the parts of the members which they embrace such that the indented portions of the superimposed layers of metal are pressed up out of their respective planes to such an

325335

extent that the lowermost metal layer is pressed out beyond the plane of the next adjacent layer, the second and other adjacent layers each being correspondingly pressed out beyond the plane of the layer lying immediately above it so that the indentations prevent relative movement between the parts of the clip device and the members with which these parts are in engagement.

The clip device may be formed integral or may comprise two or more parts which interengage when assembled and form a complete clip device. For example, the clip device may comprise a main or body part and integral lugs projecting in pairs from opposite edges of the main part, the latter and the lugs being adapted to cooperate in their engagement with the members to be connected by the device in such a manner that while the main part of the device locates relatively the parts of the members connected by it, each pair of lugs will embrace opposite edges of one of the said members, thus providing superimposed parts of the clip device with interposed portions of the members adapted to be simultaneously embossed in the manner described. Alternatively, the clip device may comprise two main or body portions of similar dimensions so connected that they can be folded together along their line of connection when the two parts will embrace an edge of one and lie on either side of one or both of the girder or like members to be connected by the device, one main part of the device having one or more lateral lugs adapted to be folded over an edge portion of a girder member on either side of which lie the two main parts of the device each lug thus lying on one or embrac-

329335

ing both main parts of the clip device so as to provide superimposed parts of the clip device with interposed portions of the members adapted to be simultaneously embossed in the manner set forth.

The invention may be carried into practice in various ways but a number of alternative constructions according to this invention are illustrated by way of example in the accompanying drawings, in which

Figure 1 shows a blank for forming one construction of clip device according to this invention,

Figure 2 shows a clip device formed from the blank shown in Figure 1,

Figure 3 shows how the clip device shown in Figure 2 may be employed,

Figure 4 is a similar view to Figure 1 of an alternative form of clip device,

Figure 5 is a similar view to Figure 2 of a clip device formed from the blank shown in Figure 4,

Figure 6 shows an application of the clip device shown in Figure 5,

Figure 7 shows the blank from which is formed a further form of clip device,

Figure 8 shows the clip device formed from the blank shown in Figure 7,

Figure 9 shows an application of the clip device shown in Figure 8,

Figure 10 shows a blank from which can be formed an alternative form of clip device,

Figure 11 shows a clip device formed from the blank shown in Figure 10,

329825

Figure 12 shows an application of the clip device shown in Figure 11,

Figure 13 shows a still further form of blank from which a clip device according to this invention can be formed,

Figure 14 shows a clip device formed from the blank shown in Figure 13,

Figure 15 shows an application of the clip device shown in Figure 14,

Figure 16 shows a blank for forming a further form of clip device according to this invention,

Figure 17 shows a clip device formed from a blank shown in Figure 16,

Figure 18 shows how the clip device shown in Figure 17 may be employed in practice,

Figure 19 shows a blank for forming an alternative construction of clip device,

Figure 20 shows a clip device formed from the blank shown in Figure 19,

Figure 21 illustrates how the clip device shown in Figure 20 may be employed,

Figure 22 shows a blank for forming a further construction of clip device,

Figure 23 shows a clip device formed from the blank shown in Figure 22,

Figure 24 shows how a small structure may be built up from a combination of girders with clip devices as shown in Figures 16 to 23,

Figures 25 to 32 are perspective views of various further structures employing clip devices according to

329335

this invention, and

Figure 33 shows in cross-section the form of the indentations employed in making structures according to this invention.

In the construction shown in Figures 1, 2 and 3, the clip device is formed from a blank as shown in Figure 1, comprising a main or body part A of rectangular form from one pair of opposite edges of which extend lugs  $A^1$ , while from the other pair of opposite edges extend lugs  $A^2$ .

Before the clip device is positioned between the parts which it is to connect, the lugs  $A^1$  are bent in one direction so that they lie parallel to one another in planes at right angles to the plane of the main part A, while the lugs  $A^2$  are bent in the other direction so that they also lie parallel to one another in planes at right angles to the plane of the part A as shown in Figure 2. The clip device shown in Figures 1 and 2 may be used, for example, to connect two miniature girders B and C of I-section disposed at right angles to one another as shown in Figure 3. In this arrangement one of the flanges  $B^1$  of the miniature girder B rests on one of the flanges  $C^1$  of the other girder C, with the main part A of the clip device interposed between these two flanges so that the edges of the flange  $B^1$  of the girder B lie between the lugs  $A^1$ , while the edges of the adjacent flange  $C^1$  of the girder C lie between the lugs  $A^2$ . The lugs  $A^1$  and  $A^2$  are now bent over the flanges  $B^1$  and  $C^1$  which lie between them as shown in Figure 3 so that the lugs embrace the edges of the flanges and provide superimposed parts of the clip device with interposed portions

329835

of the flanges, these superimposed parts and interposed portions being then simultaneously embossed in the manner hereinafter described as shown at D so as to provide a rigid connection.

In the alternative construction of clip device illustrated in Figures 4, 5 and 6, the device is formed from a blank the body part of which comprises three sections E,  $E^1$  and  $E^2$  from the opposite edges of which extend lugs F,  $F^1$ ,  $F^2$ . Prior to disposing the clip device between the parts it is to connect, the body parts E and  $E^2$  are bent up so as to lie parallel to one another in planes at right angles to that in which lies the body part  $E^1$ . The lugs F and  $F^2$  are then bent so as to lie parallel to one another in planes at right angles to the planes in which lie the body parts E and  $E^2$  while the lugs  $F^1$  are bent away from the parts E and  $E^2$  so as to lie parallel to one another in planes at right angles to the body part  $E^1$ . The manner in which this clip device may be used is shown in Figure 6. Thus it may be employed to connect the end of an I-section miniature girder G to a miniature girder  $G^1$  extending at right angles thereto and using the clip device in this way it is placed over the end of the girder G after the manner of a cap so that the body part  $E^1$  lies between the end of this girder and the flange  $G^2$  of the girder  $G^1$  the flanges  $G^3$  of the girder G lying between the lugs F and  $F^2$  while the flange  $G^2$  of the girder  $G^1$  lies between the lugs  $F^1$ . The lugs F,  $F^1$ ,  $F^2$  are now bent over the adjacent edges of the flanges of the girders which lie between them so as to embrace these flanges, the superimposed parts of

329825

the clip device with the girder flanges interposed between them, then being embossed as shown at D in the manner hereinafter described.

The clip device shown in Figures 7, 8 and 9 is generally similar to that shown in Figures 4, 5 and 6 except that instead of lugs  $F^1$  of dimensions such that when they are folded over the edges of the member they are to engage their adjacent edges are spaced apart, lugs  $F^3$  are provided of such dimensions that when they are folded over the edges of the member they are to engage they will overlap. This clip device is intended for connecting the end of a miniature girder such as G to a miniature tie-bar or the like  $G^4$  of flat cross-section as shown in Figure 9, the lugs  $G^3$  when they are bent over to embrace the edges of this tie-bar overlapping one another so as to provide three superimposed layers constituted by parts of the clip device with the bar  $G^4$  interposed between them, the superimposed parts and the bar between them being embossed in the manner hereinafter described as indicated at D.

The clip device shown in Figures 10 and 11 is somewhat similar to that shown in Figures 4 and 5 and comprises a body part formed in three sections H,  $H^1$ ,  $H^2$ , the sections H,  $H^1$  being similar to the sections E,  $E^1$  in the construction shown in Figure 4 and being provided with lugs J and  $J^1$  extending from their edges similar to the lugs F and  $F^1$  in the construction shown in Figure 4. The body part  $H^2$  in the construction shown in Figures 10 and 11 is, however, longer than the body part  $E^2$  and the lugs  $J^2$  extending from the opposite edges of the body part  $H^2$ .

329835

are arranged to as to leave a portion  $H^3$  of this body part adjacent to the body part  $H^1$  without lugs. The blank shown in Figure 10 is, prior to being disposed between the parts it is to connect, bent as shown in Figure 11 in a similar manner to that in which the blank shown in Figure 4 is bent. The clip device shown in Figure 11 is adapted to connect the end of an I-section girder K to one flange of a second I-section girder  $K^1$  arranged at right angles to the first I-section girder K, the connection being made in a similar manner to that adopted with respect to the clip device shown in Figure 5. With the clip device shown in Figures 10 and 11, however, it will be seen that there is a portion of one flange  $K^2$  of the girder K lying adjacent to the girder  $K^1$  which is not embraced by the lugs  $J^2$  on the body part  $H^2$ . The purpose of this is to enable a clip device such as that shown in Figures 4 and 5 to be employed readily to connect one end of a further I-section girder  $K^3$  to the upper end of the girder  $K^1$  as shown in Figure 12 without providing an unduly large number of superimposed layers of sheet metal to be embossed such as would occur if the flanges  $F^1$  on the clip device F indicated in Figure 12 had to embrace also the flanges  $J^2$  on the clip device shown in Figures 10 and 11.

It will further be seen from Figure 12 that a clip device such as that shown in Figures 4 and 5 can be employed to connect the end of an I-section girder to one flange of a second girder when the two girders do not lie at right angles to one another.

The clip device shown in Figures 13, 14 and 15 is

329835

also intended for connecting one end of an I-section girder to the flange of another girder and in this construction the main part of the clip device comprises three sections L,  $L^1$ ,  $L^2$ . The section L has one pair of lugs M extending from opposite edges thereof while the part  $L^1$  has two pairs of lugs  $M^1$ ,  $M^2$  extending from the edges thereof with a space between these lugs, the part  $L^3$  having a pair of lugs  $M^3$  extending from its opposite edges.

Prior to being applied to the parts which the clip device is to connect the lugs M and  $M^3$  are bent in one direction so as to lie parallel to one another and in planes at right angles to the main parts L and  $L^2$ , while the lugs  $M^1$  and  $M^2$  are bent in the other direction so as to lie parallel to one another in planes at right angles to the main part  $L^1$ . The sections L and  $L^2$  are also bent along the dotted lines  $L^3$  so as to lie parallel to one another and out of the plane of the part  $L^1$  as shown in Figure 14.

When using this clip device to connect the end of an I-section girder N to the flange  $N^1$  of another girder  $N^2$ , as shown in Figure 15 the clip device is placed with the part  $L^1$  over the end of the girder N and the parts L and  $L^2$  lying against the flanges  $N^3$  of the girder N with the flanges  $N^3$  lying between the lugs M and  $M^3$  while the flange  $N^1$  of the girder N lies between the lugs  $M^1$  and  $M^2$ . The lugs M,  $M^1$ ,  $M^2$  and  $M^3$  are now all bent over the edges of the flanges of the girders adjacent to which they lie and the superimposed parts of the clip device with the interposed girder flanges are embossed as shown

329335

at D in the manner hereinafter described so as to connect the girders firmly together as shown in Figure 15.

In the construction shown in Figures 16, 17 and 18, the clip device is formed integral from sheet metal and comprises two main parts 0, 0<sup>1</sup> connected together for part of their lengths along the line 0<sup>2</sup> and separated by a slot 0<sup>3</sup> for the remainder of the lengths, the part 0<sup>1</sup> being provided with a laterally projecting lug 0<sup>4</sup>. The clip device is formed from the blank shown in Figure 16 by folding the main parts along the line 0<sup>3</sup> so that these main parts will be spaced apart and parallel to one another as shown in Figure 17. The lug 0<sup>4</sup> is also bent as shown in Figure 17 so as to lie at an angle to the planes in which lie the main parts 0 and 0<sup>1</sup>, while the end portions 0<sup>5</sup> of the portions of the device which are separated by the slot 0<sup>2</sup> are also bent outwards to form outwardly turned lugs.

This clip device may be employed in practice as shown in Figure 18. Thus the end portion of a tie bar or girder 0<sup>6</sup> may be interposed between the connected portions of the main parts 0 and 0<sup>1</sup> so that these portions embrace one edge of this tie bar. The lateral lug 0<sup>4</sup> is then folded over as shown so as to embrace the other edge of the tie bar 0<sup>6</sup> and the superimposed parts 0<sup>4</sup>, 0 and 0<sup>1</sup> of the clip device with the portion of the tie bar 0<sup>6</sup> between them are then simultaneously embossed in the manner described as shown at D. The lug-like end portions 0<sup>5</sup> of the main parts of the clip device lie against the flange 0<sup>7</sup> of a second girder 0<sup>8</sup>, the web of which is interposed between these end portions, and a

separate member  $O^9$ , shown in Figure 17, is folded over into a flattened C-shape as indicated by dotted lines in Figure 18 so as to embrace the edges of the flange  $O^7$  of the girder  $O^8$  and to lie over the outwardly directed lugs  $O^5$ , the superimposed parts  $O^9$ ,  $O^5$  and  $O^7$  being then simultaneously embossed as shown at D, in the manner described.

In the alternative construction of clip device shown in Figures 19, 20 and 21, the clip device is formed from the blank shown in Figure 19, comprising two main parts P,  $P^1$  having a similar Y-shape connected along the foot of the Y. The arms  $P^2$  of one, P, of the Y-shaped main parts are each provided with two laterally projecting lugs  $P^3$ ,  $P^4$ .

In forming the clip device from the blank shown in Figure 4, the two Y-shaped parts are folded together about the dotted line  $P^5$  and the lugs  $P^3$ ,  $P^4$  on each arm of the part P are bent upwards so as to lie parallel to one another and on either side of the corresponding edges of the arms of the other Y-shaped part  $P^1$  as shown in Figure 20.

A clip device as shown in Figures 19 and 20 is conveniently employed to connect together three girders or tie bars as shown in Figure 21. Thus the main parts P,  $P^1$  of the clip device embrace one tie bar Q with the arms of the Y-shaped parts extending laterally from this tie bar, the superimposed parts P,  $P^1$  of the clip device with the tie bar Q between them being simultaneously embossed in the manner described, as shown at D. Interposed between the spaced parallel arms of the two main parts of the clip device are two further girder members or tie bars  $Q^1$ ,  $Q^2$ , the lugs  $P^3$ ,  $P^4$  being folded over the edges of these tie

329335

bars so as to embrace them and lie one on top of the other as shown, the superimposed parts of the clip device with the tie bars between them then being simultaneously embossed in the manner described as shown at D to form a rigid joint.

In the alternative construction of clip device shown in Figures 22 and 23, the clip device is formed from a blank as shown in Figure 22 comprising two similar main parts  $R$ ,  $R^1$  joined together along the dotted line  $R^2$  and partly separated by a slot  $R^3$ . The part  $R$  is provided with a laterally extending lug  $R^4$ . The clip device is formed from the blank shown in Figure 22 by folding the parts together along the dotted line  $R^2$  so that the main parts lie parallel to one another with a space between them, as shown in Figure 23. The lug  $R^4$  is bent as shown and portions  $R^5$ ,  $R^6$  of the clip device are bent outwards along the dotted lines  $R^7$  so as to lie at right angles to the main parts of the clip device and form two outwardly extending lugs.

The manner in which the clip device shown in Figures 22 and 23 may be employed is shown in Figure 24, where it is employed to connect a T-section girder  $S$  to a tie bar  $S^1$ . In this arrangement the tie bar  $S^1$  is interposed between the connected portions of the main parts of the clip device so that the clip device embraces one edge of this tie bar. The lug  $R^4$  is then folded over the other edge as shown and the superimposed parts of the clip device with the tie bar between them are embossed in the manner described as shown at D. The two lugs  $R^5$ ,  $R^6$  lie against the face of the flange of the T-section girder  $S$ , whose web member is interposed between these lugs, and separate

329335

members similar to the member  $O^9$  shown in Figure 17 are bent into flattened C-shape so as to embrace the edges of the flange of the girder member S and lie over these outwardly directed lugs  $R^5$ ,  $R^6$ , so that the superimposed parts of the member  $O^9$  and lugs  $R^5$ ,  $R^6$  with the girder flange between them can be simultaneously embossed in the manner described, as indicated at D to form a rigid joint.

Figure 24 also shows how the clip devices shown in Figures 16, 17 and 18 and in Figures 19, 20 and 21 may be employed to connect together girders and tie bars to form a girder structure suitable for example for supporting the roof of a miniature building.

The structure shown in Figure 25 comprises an I-section girder T having a laminated formation of sheet metal which rests on the upper end of a similar I-section girder  $T^1$  with the edges of the flanges of the girder T resting on the ends of the flanges of the girder  $T^1$  which are cut away somewhat as shown so that the web of the girder  $T^1$  can also bear on the web of the girder T. Connecting the two girders together are two similar clip devices each of which comprises a body part  $T^2$  from one edge of which extends a lug  $T^3$  the main part of which lies against the outer face of one of the flanges of the girder T while its end portion is bent over the edge of such flange remote from the girder  $T^1$ . Extending from lateral edges of the body part  $T^2$  of each of the clip devices are two further lugs  $T^4$  which are bent round and embrace the edges of the adjacent flange of the girder  $T^1$ . Indentations D of the type indicated in Figure 33 are formed in

the superimposed parts of the clip device and the girder flanges as shown.

In the construction shown in Figure 26 the structure comprises a member U of T-section having a laminated formation of sheet metal disposed at right angles to a member  $U^1$  of channel section also having a laminated formation of sheet metal. Interposed between and embracing parts of these members is a clip device comprising a body part  $U^2$  of rectangular form from one pair of opposite edges of which extend lugs  $U^3$  which are bent over the adjacent edges of the member U as shown. From the other pair of opposite edges of the body part  $U^2$  extend lugs  $U^4$  which are bent as shown to embrace the sides of the member  $U^1$  of channel section. Indentations D are formed in the superimposed portions of the body part  $U^2$ , the member U and the lugs  $U^3$  and also in the superimposed parts of the lugs  $U^4$  and the sides of the member  $U^1$ , these indentations being formed as shown in Figure 33.

The construction shown in Figure 27 comprises a member V of T-section having a laminated formation of sheet metal and a similar member  $V^1$  disposed at right angles thereto with the end of the member  $V^1$  resting on the flange of the member V.

Interposed between and engaging the members V and  $V^1$  is a clip device comprising a body part  $V^2$  interposed between the end of the member  $V^1$  and the flange of the member V. Extending from one pair of opposite edges of the body part  $V^2$  are lugs  $V^3$  which, as shown, embrace the flange of the member V. Extending from the other pair of opposite edges of the body part  $V^2$  are respectively, on the one hand,

383335

a tongue-like part  $V^4$  having formed thereon lugs  $V^5$  which embrace the web of the member  $V^1$  and have parts  $V^6$  lying against the inner face of the flange of the member  $V^1$ , and, on the other hand, a part extending at right angles to the body part  $V^2$  so as to lie against the outer face of the flange of the member  $V^1$ , this part having lugs  $V^7$  which are bent over the edges of this flange and embrace this flange and the parts  $V^6$  of the clip device as shown. Indentations D of the kind shown in Figure 33, are formed in the superimposed parts respectively of the body part  $V^2$ , the flange of the member V and the lugs  $V^3$ , in the superimposed parts of the lugs  $V^5$  and the web of the member  $V^1$ , and in the superimposed parts of the lugs  $V^7$ , the parts  $V^6$  and the flange of the member  $V^1$ .

In the structure illustrated in Figure 28 a clip device similar to that shown in Figures 1, 2 and 3 is employed and this structure comprises a member  $C^2$  of T-section having a laminated formation of sheet metal on the flange of which rests a plain bar  $B^2$  also having a laminated formation of sheet metal, these members corresponding to the members B and C in Figure 3. Interposed between and engaging parts of the members  $B^2$  and  $C^2$  is a clip device similar to the device A,  $A^1$ ,  $A^2$  shown in Figures 1, 2 and 3 and comprising a body part  $A^3$  of substantially rectangular shape from one pair of opposite edges of which extend lugs  $A^4$  embracing the edges of the flange of the member  $C^2$ , while from the other pair of opposite edges of the body part  $A^3$  extend a pair of lugs  $A^5$  embracing the edges of the member  $B^2$ . Indentations D of the kind shown in Figure 33 are formed in the super-

329335

imposed parts of the lugs  $A^4$ , the flange of the member  $A^2$ , the member  $B^2$  and the lugs  $A^5$ .

The structure illustrated in Figure 29 comprises an I-section girder  $W$  and a channel member  $W^1$  each having a laminated formation of sheet metal, the member  $W^1$  being disposed at right angles to the girder  $W$  with its end resting on one of the flanges of this girder. Interposed between and engaging parts of the girder  $W$  and the channel section member  $W^1$  is a clip device comprising a body part  $W^2$  lying against the outer face of the upper flange of the girder  $W$  and having lugs  $W^3$  extending from one pair of opposite edges thereof and embracing the edges of this flange. Extending upwards from one of the other pair of opposite edges of the body part  $W^2$  is a part  $W^4$  lying against the outer face of the base of the channel member  $W^1$  and having lugs  $W^5$  extending from opposite edges thereof and embracing the sides of this channel member.

Indentations  $D$  of the kind indicated in Figure 33 are formed in the superimposed parts of the lugs  $W^3$ , the flange of the girder  $W$  and the body part  $W^2$  and in the superimposed parts of the lugs  $W^5$  and the sides of the channel member  $W^1$ .

The construction shown in Figure 30 comprises two members of channel section having a laminated formation of sheet metal and disposed at right angles to one another, one of these members comprising parts  $X$ ,  $X^1$ , while the other comprises parts  $X^2$ ,  $X^3$ . One side  $X^3$  of the channel member  $X^2$ ,  $X^3$  is cut away so that while its end rests on the uppermost edge of the adjacent side  $X^1$  of the channel member  $X^1$ ,  $X^2$ , the end of the other side  $X^2$  of the channel

329335

member  $X^2$ ,  $X^3$  can rest on the inner face of the other side  $X^1$  of the channel member  $X^1$ ,  $X^2$  as shown. Engaging parts of the two channel members is a clip device comprising a body part  $X^4$  from which extend three lugs  $X^5$ ,  $X^6$ ,  $X^7$ . The lug  $X^5$  is bent round the edge of and embraces a part of the side  $X^3$  of the member  $X^2$ ,  $X^3$ , while the lug  $X^6$  extends round and embraces a part of the other side  $X^2$  of the member  $X^2$ ,  $X^3$  as shown. The lug  $X^7$ , on the other hand, extends round the outer face of the member  $X$ ,  $X^1$  and is bent over the edge of the side  $X$  thereof as shown.

Indentations D of the kind shown in Figure 33 are formed in the superimposed parts of the clip device and the members  $X$ ,  $X^1$  and  $X^2$ ,  $X^3$ .

The construction illustrated in Figure 31 comprises a member of L-section comprising parts  $Y$  and  $Y^1$  and having a laminated formation of sheet metal, and a bar  $Y^2$ , also formed of laminated sheet metal, disposed at right angles thereto with its end resting on the edge of the side  $Y^1$  of the member  $Y$ ,  $Y^1$  as shown.

Engaging parts of the members  $Y$ ,  $Y^1$  and  $Y^2$  is a clip device comprising parts  $Y^3$ ,  $Y^4$  which are connected along one edge and lie against the opposite faces of the member  $Y^2$ . Extending from the free edge of the part  $Y^3$  is a lug  $Y^5$  which is bent round the adjacent edge of the part  $Y^2$  and lies against the outer face of the part  $Y^4$ . Extending from the lower edge of the part  $Y^4$  is a lug  $Y^6$  a part of which lies against the inner face of the side  $Y^1$  of the member  $Y$ ,  $Y^1$  while its end is bent at right angles so as to lie against the inner face of the part  $Y$ . Extending from the lower edge of the part  $Y^3$  is a lug  $Y^7$

which extends round the outside of the channel member Y,  $Y^1$  and has its end bent over the edge of the part Y thereof so as to embrace this edge and lie on the end portion of the lug  $Y^6$  as shown.

Indentations D of the kind shown in Figure 11 are formed in the superimposed parts  $Y^3$ ,  $Y^2$ ,  $Y^4$  and  $Y^5$ , in the superimposed parts  $Y^6$ ,  $Y^1$  and  $Y^7$ , and in the superimposed parts  $Y^7$ , Y,  $Y^6$ ,  $Y^7$  so as to connect the parts rigidly together.

The construction illustrated in Figure 32 comprises a member Z of T-section and a bar  $Z^1$  both having a laminated formation of sheet metal, the bar  $Z^1$  being disposed at right angles to the member Z with its end resting on the flange of the member Z. The two members Z and  $Z^1$  are connected together by a clip device comprising an angle piece  $Z^2$  having lugs  $Z^3$  which extend around and embrace the opposite edges of the member  $Z^1$  and an angle piece  $Z^4$  which lies against the lugs  $Z^3$  and itself has lugs  $Z^5$  lying against the part  $Z^2$ . Interposed between the flange of the member Z and the parts of the angle pieces  $Z^2$ ,  $Z^4$  which lie parallel to this flange is a member  $Z^6$  of rectangular form. The ends of the parts of the angle pieces  $Z^2$  and  $Z^4$  which lie parallel to the flange of the girder Z are bent over and extend underneath the end portions of the member  $Z^6$  as shown and the edges  $Z^7$  of this member  $Z^6$  are bent over and embrace the flanges of the member Z.

Indentations D of the general type indicated in Figure 33 are formed in the superimposed layers  $Z^5$ ,  $Z^2$ ,  $Z^1$ ,  $Z^3$ ,  $Z^4$  and in the superimposed layers  $Z^2$ ,  $Z^6$ , Z,  $Z^6$  so as to connect the parts rigidly together.

329335

Figure 33 merely shows the general form of the indentations D employed in structures according to this invention as shown for example in the preceding figures of the accompanying drawings, the indentation D being shown in Figure 33 as formed in superimposed parts comprising in all five layers  $D^1$ ,  $D^2$ ,  $D^3$ ,  $D^4$  and  $D^5$  of sheet metal. It will be seen that the layer  $D^1$  is pressed up at D out of its plane to a point beyond the plane in which lies the main part of the layer  $D^2$ , while similarly, each of the other layers  $D^2$ ,  $D^3$ ,  $D^4$  is pressed up at D out of its plane to a point beyond the plane in which lies the main part of the layer immediately above it, the form of the indentation in the layer  $D^5$  being such that its outer convex surface  $D^6$  resembles a miniature rivet head or bolt head. Thus the indentations tend to give to the structures an appearance of having the various parts constituting them riveted or bolted together.

It is to be understood that the constructions illustrated in the accompanying drawings are given by way of example only and that the form of the clip devices or the manner in which they are employed may vary according to the type of members to be connected or the manner in which these members are to be connected.

WHAT I do claim as my invention, and desire to secure by Letters Patent, is:-

329335

1. A model or like small structure including in combination two members each having a laminated formation of strip or sheet metal, a clip device connecting these members by parts of the clip device embracing parts of the respective members, and indentations in each of the parts of the clip device and the part of a member embraced thereby, each of these indentations being such that the indented portions of all the superimposed layers of metal are pressed up out of their respective planes to such an extent that the lowermost metal layer is pressed out beyond the plane of the next adjacent layer, the second and other adjacent layers being correspondingly pressed out in the manner and for the purpose described.

2. A model or like small structure including in combination two girder members each having a laminated formation of strip or sheet metal, a clip device connecting these girder members by parts of the clip device embracing parts of the respective members, and indentations in each of the parts of the clip device and the part of the girder which is embraced by such parts of the clip device, each of these indentations being such that the indented portions of all the superimposed layers of metal are pressed up out of their respective planes to such an extent that the lowermost metal layer is pressed out beyond the plane of the next adjacent layer, the second and other adjacent layers being correspondingly pressed out in the manner and for the purpose described.

3. A model or like small structure including in combination two members each having a laminated formation of strip or sheet metal, a clip device formed integral and having a body part and at least two pairs of lugs, the lugs of each pair extending from opposite edges of the body part and being folded over so as to embrace the edges of the two members, and indentations in the parts of the clip device which thus embrace parts of the said members, and in the parts of the said members which lie between such embracing parts of the clip device, each indentation being such that the indented portions of all the superimposed layers of metal are pressed up out of their respective planes to such an extent that the lowermost metal layer is pressed out beyond the plane of the next adjacent layer, the second and other adjacent layers being correspondingly pressed out in the manner and for the purpose described.

4. A model or like small structure including in combination two girder members each having a laminated formation of strip or sheet metal, a clip device formed integral and comprising a body part and at least two pairs of lugs, the lugs of each pair extending from opposite edges of the body part and being folded over so as to embrace the edges of the two girders, and indentations in the parts of the clip device which thus embrace parts of the said girders, and in the parts of the said girders which lie between such embracing parts of the clip device, each indentation being such that the indented portions of all the superimposed layers of metal are pressed

229335

up out of their respective planes to such an extent that the lowermost metal layer is pressed out beyond the plane of the next adjacent layer. the second and other adjacent layers being correspondingly pressed out in the manner and for the purpose described.

5. A model or like small structure including in combination two members each having a laminated formation of strip or sheet metal, a clip device connecting these members and comprising at least two parts which inter-engage to form the clip device and have parts which embrace parts of the two members, and indentations in each of the parts of the clip device and the part of a member which is embraced thereby, each of these indentations being such that the indented portions of all the super-imposed layers of metal are pressed up out of their respective planes to such an extent that the lowermost metal layer is pressed out beyond the plane of the next adjacent layer, the second and other adjacent layers being correspondingly pressed out in the manner and for the purpose described.

6. A clip device for connecting together without perforation the parts of models or like small structures built up from miniature girder members each having a laminated formation of strip or sheet metal, the clip device being formed integral of sheet metal and comprising two flat main portions of similar dimensions which can be folded together to lie face to face with a space between them in which a flat portion of each of the members to be

379235

connected can be placed, and at least one lug on one of the main portions, which lug can be folded over the other main portion so as to lie on the latter and thus lock one main portion to the other and provide superimposed parts of the clip device with interposed portions of the members to be connected adapted to be simultaneously embossed without perforation in the manner described, thereby forming a rigid joint.

7. A clip device for connecting together without perforation the parts of models or like small structures built up from miniature girder members each having a laminated formation of strip or sheet metal, the clip device being formed integral and comprising two main portions having a width substantially equal to that of a girder member which they are adapted to embrace, the connection between the two main portions extending from one end thereof over only a portion of their length so that when folded along their line of connection, parts of the two main portions will lie spaced apart and parallel to one another, permitting the interposition between them of a part of a second girder member, a lateral lug on one of the main portions which, when folded over, will embrace the edge portion of the first girder member so that the superimposed parts of the clip device with the interposed portion of the first girder member can then all be embossed in the manner described, and an outwardly turned lug formed on each of the unconnected end portions of the clip, these lugs being adapted to lie against the faces of the flanges of the second girder member whose

020025

web is interposed between the said end portions of the clip device, whereupon a C-shaped embracing clip can be folded over the edges of the flange of the second girder member and the outwardly turned lugs, the superimposed layers of metal thus formed being embossed in the manner described.

8. A clip device for connecting together without perforation the parts of models or like small structures built up from miniature girder members each having a laminated formation of strip or sheet metal, the clip device being formed integral and comprising two flat Y-shaped main portions with their line of connection along the foot of the Y so that they can embrace and extend from one edge portion of an interposed girder member while the arms of the two main Y-shaped portions of the clip will project laterally from the girder so that they can have interposed between them two other and separate girder members, and a lateral lug on each arm of one of the main portions of the device which, when folded over on to the corresponding arm of the other main portion, will embrace the adjacent edge of the interposed girder member, thus providing superimposed parts of the clip device with interposed portions of the girder members which can be simultaneously embossed in the manner described.

9. A clip device for connecting together without perforation the parts of models or like small structures built up from miniature girder members each having a laminated formation of strip or sheet metal, the clip

320005

device being formed integral and comprising a body portion the intermediate part of which is adapted to lie in contact with the outer surface of a flange of a miniature girder while the end portions lie parallel to one another but inclined to the body portion so as to engage the end portions of the opposite flanges of a second girder member, two pairs of lugs extending from opposite edges of the intermediate part of the main portion and adapted to be folded over the edges of the flange of the first girder, and a pair of lugs extending from the opposite edges of each of the end parts of the main portion adapted to be folded over the edges of the flanges of the second girder.

10. A clip device for connecting together without perforation the parts of models or like small structures built up from miniature girder members each having a laminated formation of strip or sheet metal, the clip device being formed integral and comprising a body portion the intermediate part of which is adapted to lie in contact with the outer surface of a flange of a miniature girder while the ends of the body portion lie parallel to one another and at right angles to the intermediate part, one of these ends being shorter than the other, a pair of lugs extending from the edges of the intermediate part and adapted to be folded over the edges of the girder flange with which this intermediate part lies in contact, a pair of lugs extending from the opposite sides of the shorter of the two ends of the body portion and adapted to be folded over the adjacent flange of the second girder,

329235

and a pair of lugs spaced from the intermediate part and extending from opposite edges of the longer of the two ends of the body portion and adapted to embrace the edges of the adjacent pair of flanges.

11. A model or like small structure including in combination two miniature girder members each having a laminated formation of strip or sheet metal, these girder members lying at right angles to each other and one on top of the other, a sheet metal clip device comprising a flat body part interposed between the flanges of the two girders which lie adjacent to one another, and pairs of lugs extending from opposite edges of this clip device, one pair of lugs being folded over the edges of one girder flange while the other pair of lugs is folded over the edges of the other girder flange, and indentations in each of the superimposed parts of the clip device with the interposed portions of the girder members, these indentations being such that the indented portions of all the superimposed layers of metal are pressed up out of their respective planes to such an extent that the lowermost metal layer is pressed out beyond the plane of the next adjacent layer, the second and other adjacent layers being correspondingly pressed out in the manner and for the purpose described.

12. A model or like small structure including in combination two girder members each having a laminated formation of strip or sheet metal, the end of the first girder member abutting against one of the flanges of the

325535

second girder member, a sheet metal clip device for connecting the girder members comprising a flat rectangular main body part interposed between the end of the second girder member and the adjacent flange of the first girder member, a pair of lugs extending from one pair of opposite edges of the main body part and bent over the edges of the flange of the second girder member, secondary body parts formed integral with and extending from the other pair of opposite edges of the main body part and each lying in a plane at right angles to such main body part and in contact with the outer face of one of the flanges of the first girder member, lugs extending from the opposite edges of each of these secondary body parts and bent over the edges of the adjacent flange of the first girder, and indentations in each of the superimposed parts of the clip device comprised by a body part and a lug and in the part of the girder member embraced thereby, each of these indentations being such that the indented portions of all the superimposed layers of metal are pressed up out of their respective planes to such an extent that the lowermost metal layer is pressed out beyond the plane of the next adjacent layer, the second and other adjacent layers being correspondingly pressed out in the manner and for the purpose described.

13. A model or like small structure including in combination at least two members having a laminated formation of sheet metal, a sheet metal clip device connecting these members and comprising two flat main portions of similar dimensions folded together so as to lie face to

329335

face with a space between them in which flat portions of the two members to be connected are placed, at least one lug extending from an edge of one of such main portions and adapted to be folded over the edge of one of the members to be connected and to lie on the other main portion, and indentations in the superimposed parts of the clip device with the interposed portions of the members, each of these indentations being such that the indented portions of all the superimposed layers of metal are pressed up out of their respective planes to such an extent that the lowermost metal layer is pressed out beyond the plane of the next adjacent layer, the second and other adjacent layers being correspondingly pressed out in the manner and for the purpose described.

14. A model or like small structure including in combination two girder members each having a laminated formation of strip or sheet metal, the end of the first girder member abutting against a side of the second girder member so that their adjacent flanges lie in the same plane, a sheet metal clip device connecting each flange of one girder member to the adjacent flange of the other and comprising a main or body part lying in contact with the outer faces of the two adjacent girder flanges, lugs extending from the opposite sides of one end portion of this body portion and bent around so as to embrace the end portions of the edges of the flange of the first girder and a part of the other end of the body portion bent over that edge of the flange of the second girder member which lies remote from the first girder member,

329035

40

and indentations in each of the superimposed parts of the clip device with the interposed portions of the girder flanges, each of these indentations being such that the indented portions of all the superimposed layers of metal are pressed up out of their respective planes to such an extent that the lowermost metal layer is pressed out beyond the plane of the next adjacent layer, the second and other adjacent layers being correspondingly pressed out in the manner and for the purpose described.

15. A model or like small structure including in combination a girder member and a channel member each having a laminated formation of strip or sheet metal, the flange of the girder lying in contact with the outer face of the base of the channel and at right angles to such channel, a sheet metal clip device connecting the girder member to the channel and having a main part of rectangular form lying between the adjacent faces of the girder flange and the base of the channel, lugs extending from one pair of opposite edges of the main part and embracing the edges of the girder flange and a second pair of lugs extending from the opposite edges of the main part and extending along the sides and embracing the edges of the channel, and indentations in each of the superimposed parts of the clip device and the interposed portions of the channel and girder members, each of these indentations being such that the indented portions of all the superimposed layers of metal are pressed up out of their respective planes to such an extent that

329335

31  
the lowermost metal layer is pressed out beyond the plane of the next adjacent layer, the second and other adjacent layers being correspondingly pressed out in the manner and for the purpose described.

IN TESTIMONY whereof I have signed at ~~the~~ *London,*  
*of England* this fourth day of *April* A.D.1932.

*Federick Donald Thompson*

320635

FIG. 1.

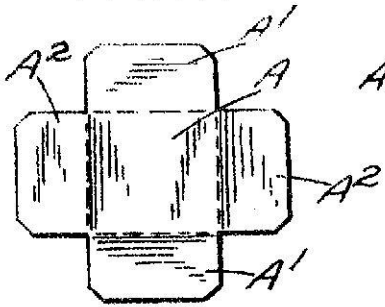


FIG. 2.

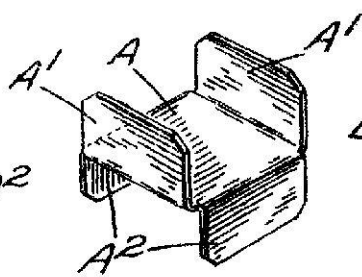


FIG. 3.

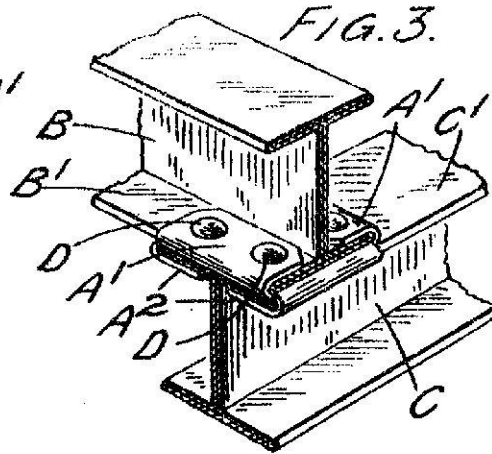


FIG. 4.

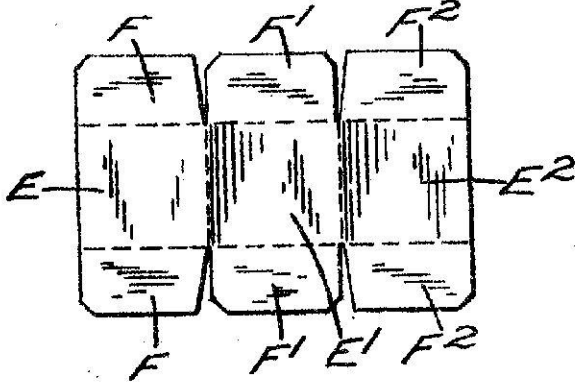


FIG. 5.

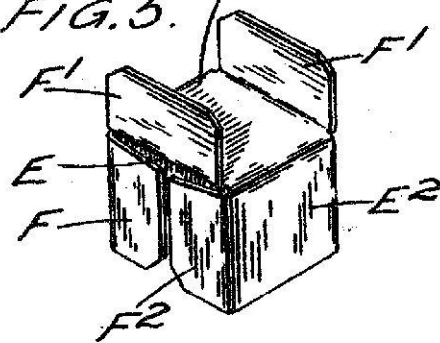


FIG. 6.

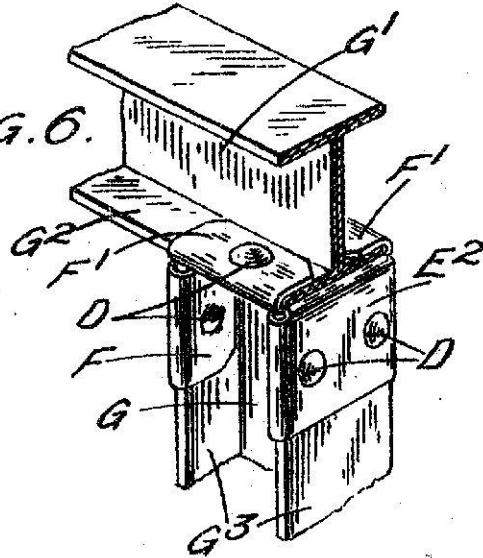


FIG. 7.

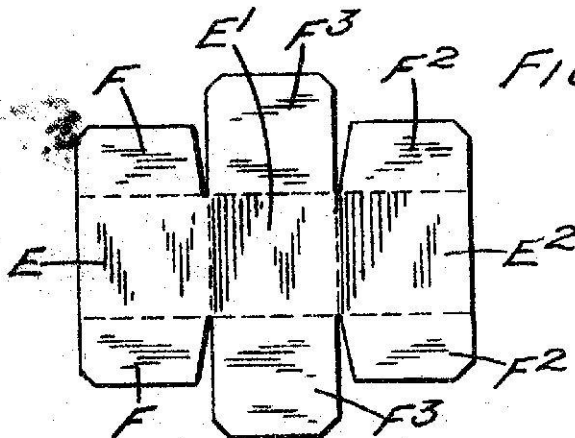


FIG. 8.

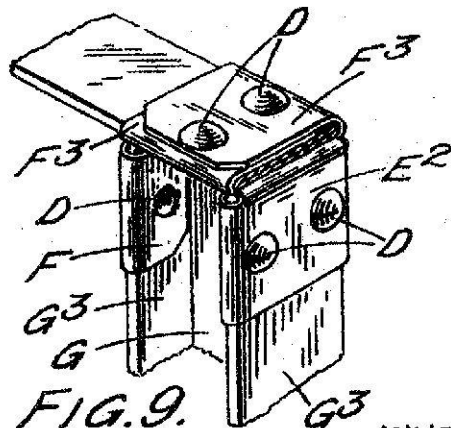
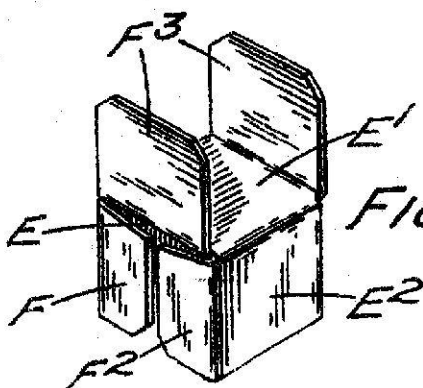


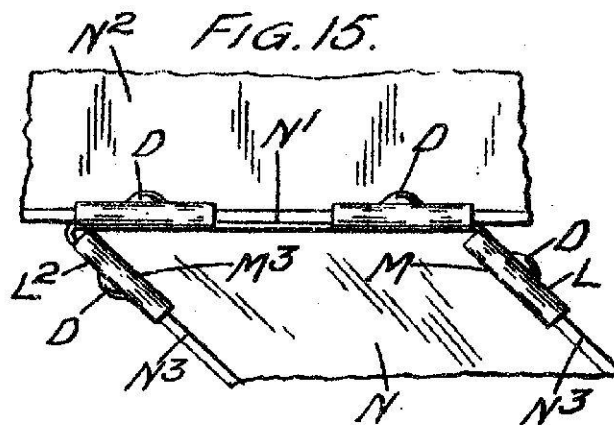
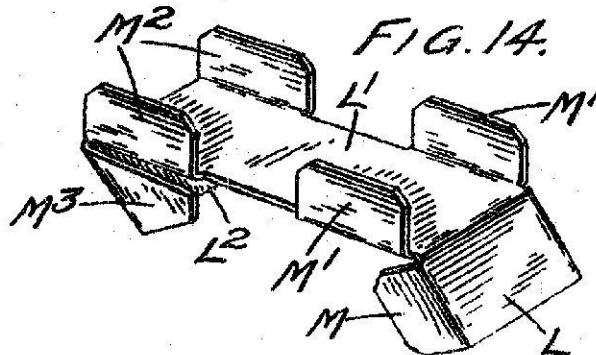
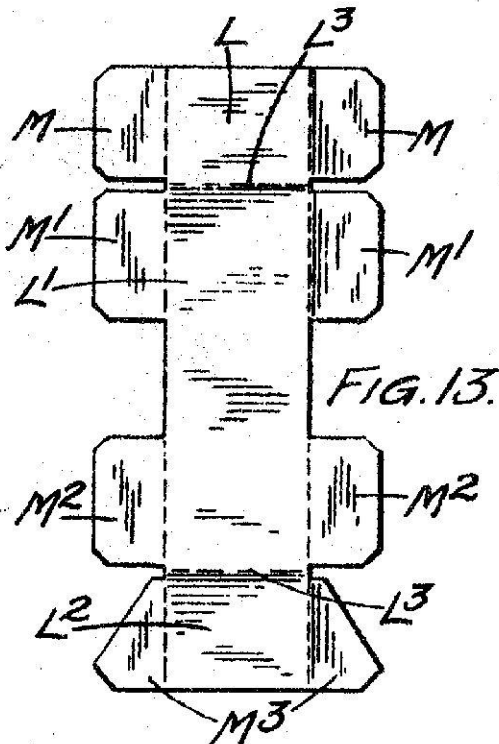
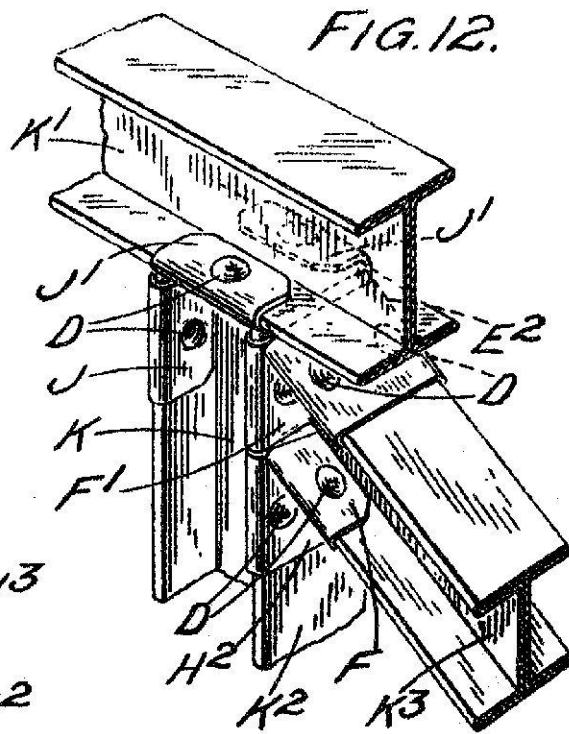
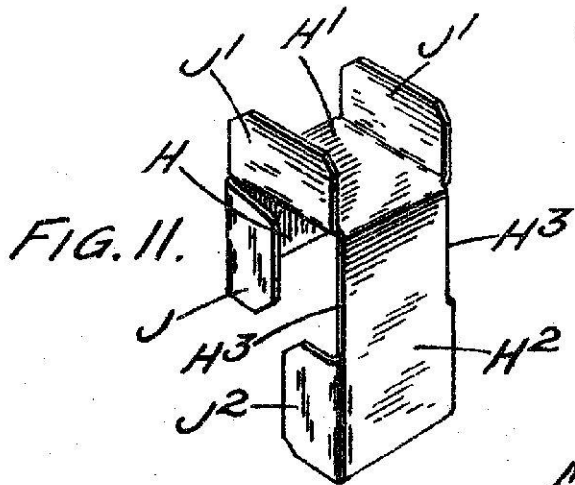
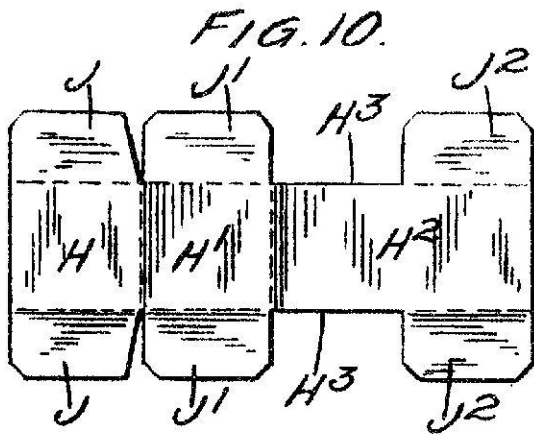
FIG. 9.

Certified to be the drawing referred to  
in the specification hereto annexed

OTTAWA, APRIL, 14<sup>TH</sup> 1932

INVENTOR  
FREDERICK D. LINGWOOD

BY *Arthur D. Lingwood*  
ATTY.

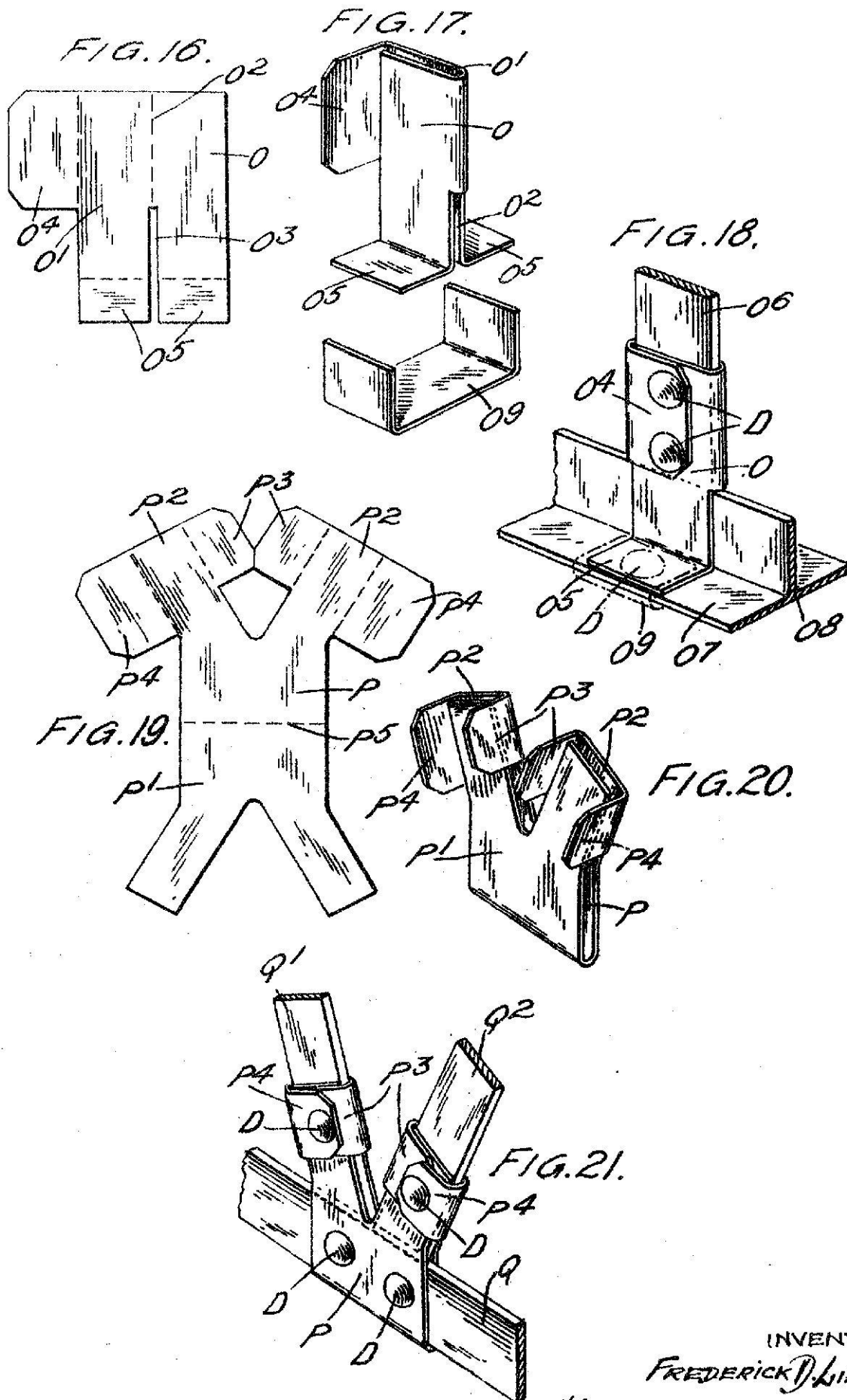


Certified to be the drawing referred to  
in the specification hereto annexed  
Ottawa, APRIL, 14<sup>th</sup> 1932

INVENTOR  
FREDERICK D. LINGWOOD

BY *Richard D. Lingwood*  
ATTY.

329335



INVENTOR

FREDERICK D. LINGWOOD

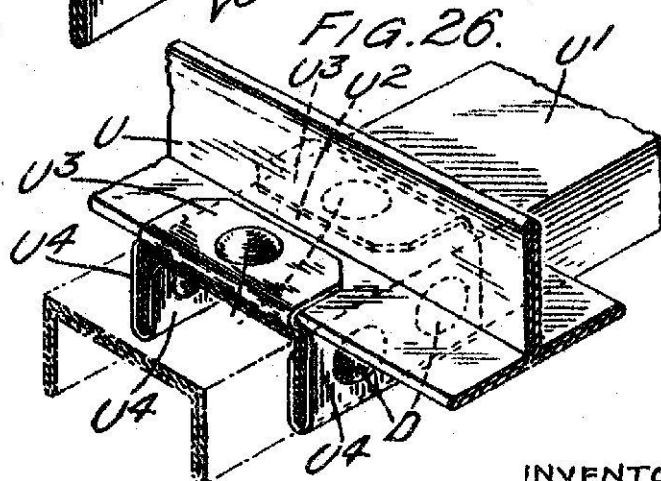
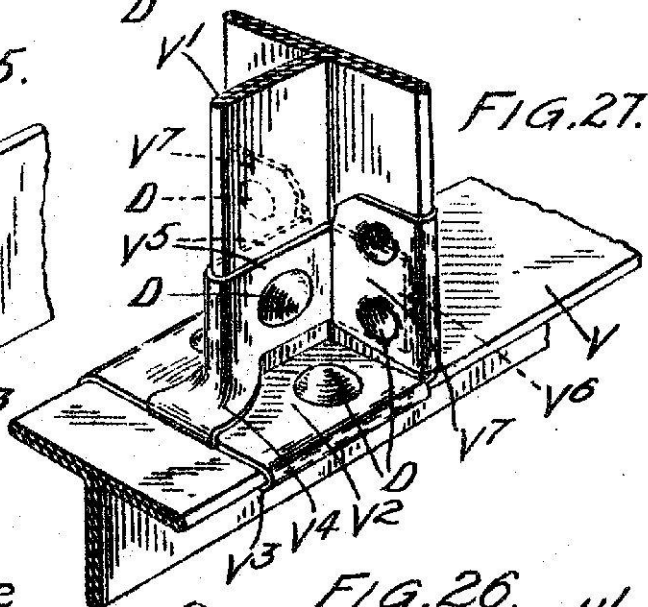
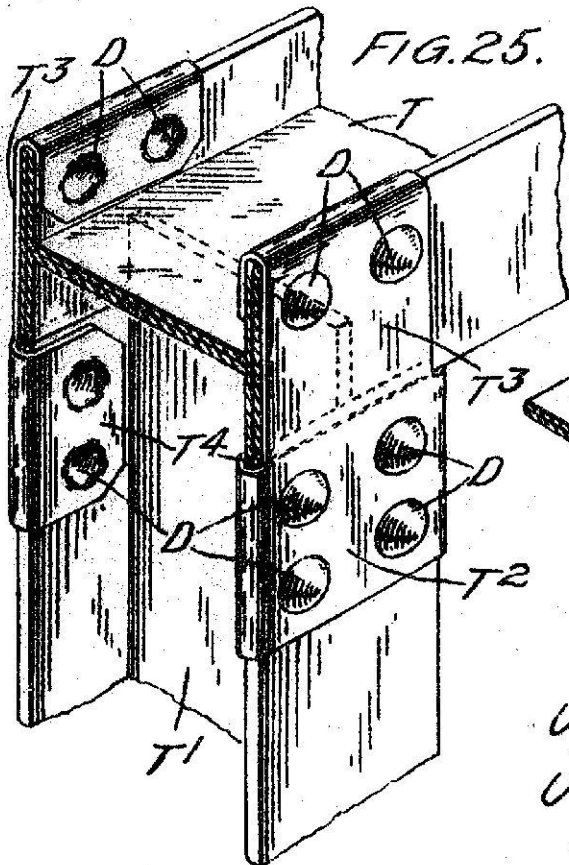
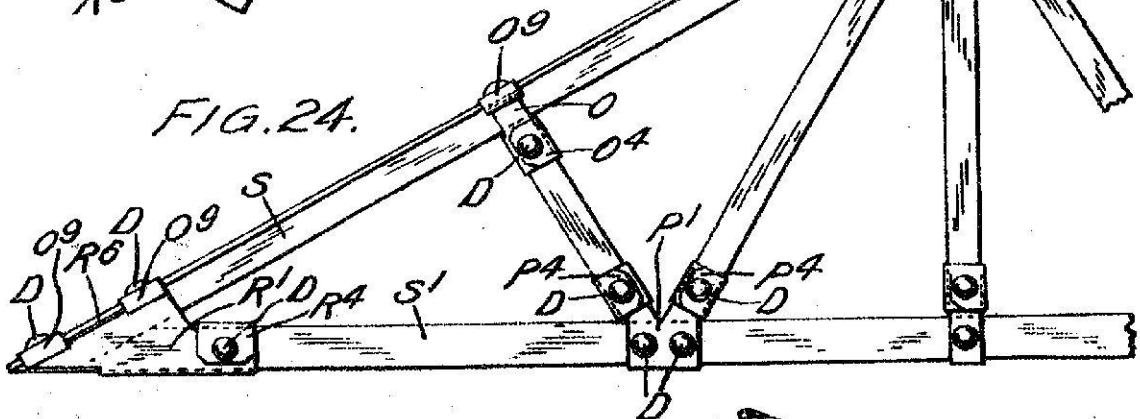
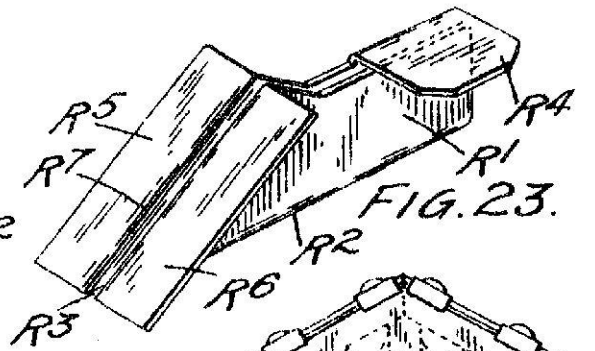
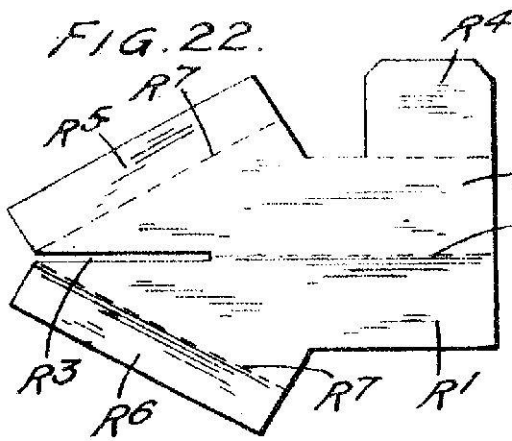
Certified to be the drawing referred to  
in the specification hereon annexed

OTTAWA, APRIL, 14<sup>TH</sup> 1932

BY

*Seeherstorff*  
ATTY'S.

329835

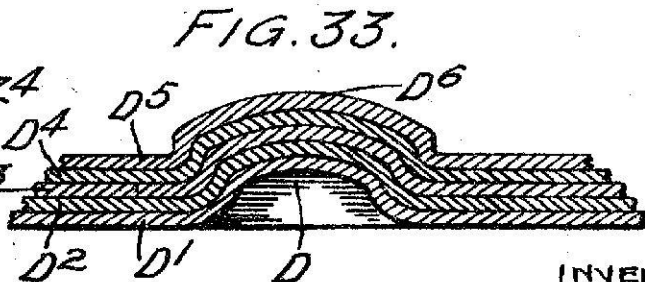
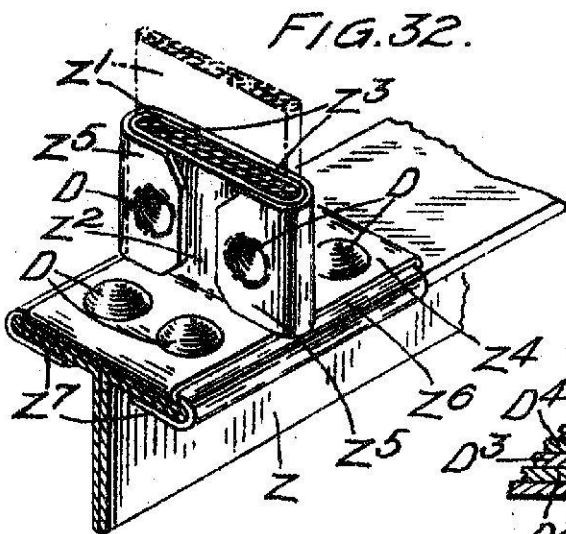
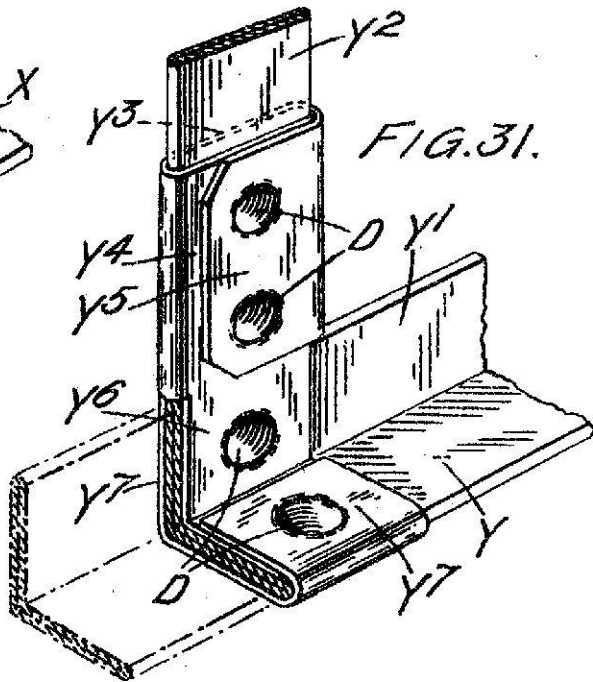
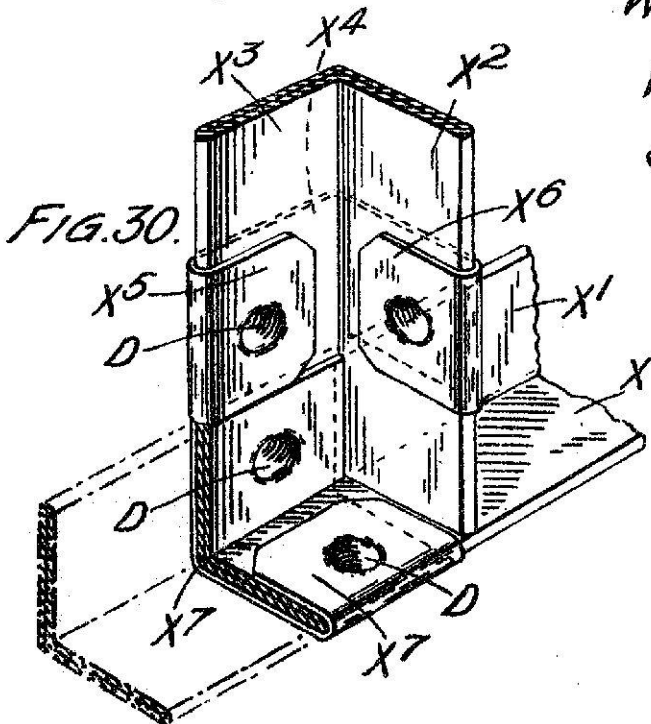
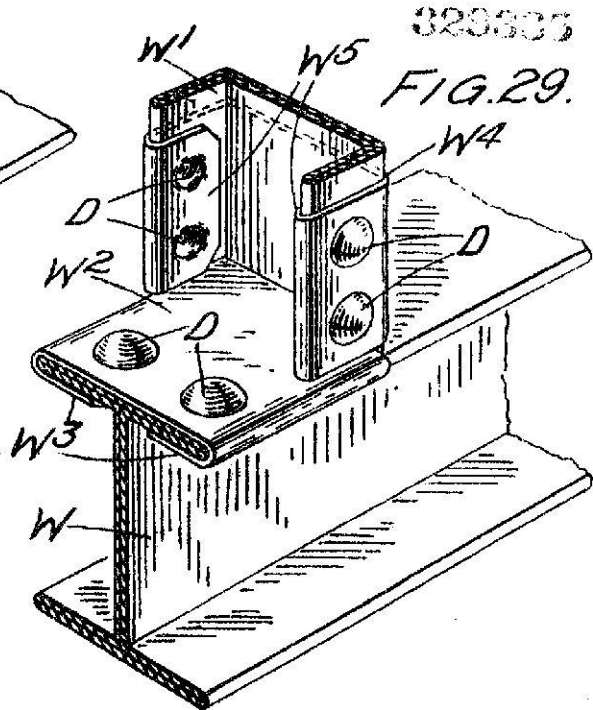
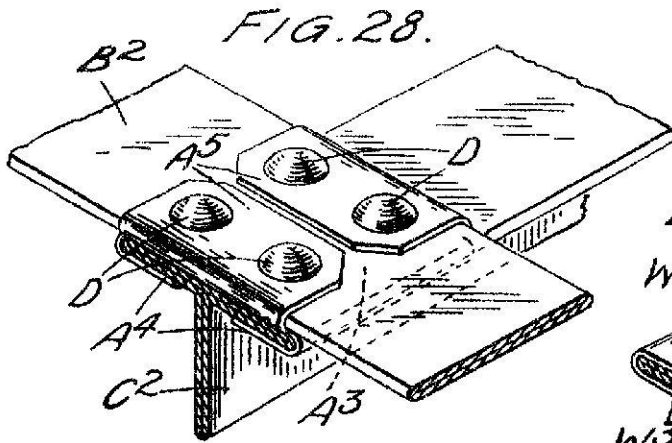


Certified to be the drawing referred to  
in the specification hereto annexed  
OTTAWA, APRIL, 14<sup>th</sup> 1932

INVENTOR  
FREDERICK J. LINGWOOD

BY *Dekeston & Co.*  
ATTYS.

320835



Certified to be the drawing referred to  
in the specification herewith annexed  
Ottawa, April, 14<sup>th</sup> 1932

INVENTOR  
FREDERICK D. LINGWOOD

BY *Johnston & Co.*  
ATTYS.

---

(19)		<b>Canadian Intellectual Property Office</b>	<b>Office de la Propriété Intellectuelle du Canada</b>	(11) <b>CA 331678</b>	(13) <b>A</b>
		An Agency of Industry Canada	Un organisme d'industrie Canada	(40) <b>11.04.1933</b>	

---

(12)

(21) Application number:	<b>331678D</b>	(51) Int. Cl:	
(22) Date of filing:	..		

---

(71) Applicant:	<b>MANUFAX LTD.</b>	(72) Inventor:	<b>LINGWOOD FREDERICK DONALD ().</b>
-----------------	---------------------	----------------	--------------------------------------

---

(54) <b>EMBOSSING TOOL</b>	(57) <b>Abstract:</b>
(54) <b>OUTIL A RELIEFS</b>	

*This First Page has been artificially created and is not part of the CIPO Official Publication*

---

(19)		<b>Canadian Intellectual Property Office</b>	<b>Office de la Propriété Intellectuelle du Canada</b>	(11) <b>CA 329335</b>	(13) <b>A</b>
		An Agency of Industry Canada	Un organisme d'industrie Canada	(40) <b>10.01.1933</b>	

---

(12)

(21) Application number: **329335D**

(51) Int. Cl:

(22) Date of filing: ..

(71) Applicant: **MANUFAX LTD.**(72) Inventor: **LINGWOOD FREDERICK DONALD ().**(54) **STRUCTURAL MODEL MANUFACTURE**(57) **Abstract:**(54) **FABRICATION DE MODELES DE CONSTRUCTIONS**

*This First Page has been artificially created and is not part of the CIPO Official Publication*

---

(19)		<b>Canadian Intellectual Property Office</b>	<b>Office de la Propriété Intellectuelle du Canada</b>	(11) <b>CA 315477</b>	(13) <b>A</b>
		An Agency of Industry Canada	Un organisme d'industrie Canada	(40) <b>22.09.1931</b>	

---

(12)

(21) Application number: **315477D**

(51) Int. Cl:

(22) Date of filing: ..

(71) Applicant: **MANUFAX LTD.**(72) Inventor: **LINGWOOD FREDERICK DONALD ().**(54) **LIGHT GIRDER**(57) **Abstract:**(54) **POUTRE LEGERE**

*This First Page has been artificially created and is not part of the CIPO Official Publication*

---

(19)		<b>Canadian Intellectual Property Office</b>	<b>Office de la Propriété Intellectuelle du Canada</b>	(11) <b>CA 309937</b>	(13) <b>A</b>
		An Agency of Industry Canada	Un organisme d'industrie Canada	(40) <b>31.03.1931</b>	

---

(12)

(21) Application number:	<b>309937D</b>	(51) Int. Cl:	
(22) Date of filing:	..		

---

(71) Applicant:	<b>MANUFAX LTD.</b>	(72) Inventor:	<b>LINGWOOD FREDERICK DONALD ().</b>
-----------------	---------------------	----------------	--------------------------------------

---

(54) <b>PUNCHING OR CUTTING PLIERS</b>	(57) <b>Abstract:</b>
(54) <b>PINCES A POINCONNER OU A COUPER</b>	

*This First Page has been artificially created and is not part of the CIPO Official Publication*