Feb. 7, 1956 J. F. RANDALL 2,734,117

BEAM MEMBER

Filed Jan. 23, 1953 2 Sheets-Sheet 1

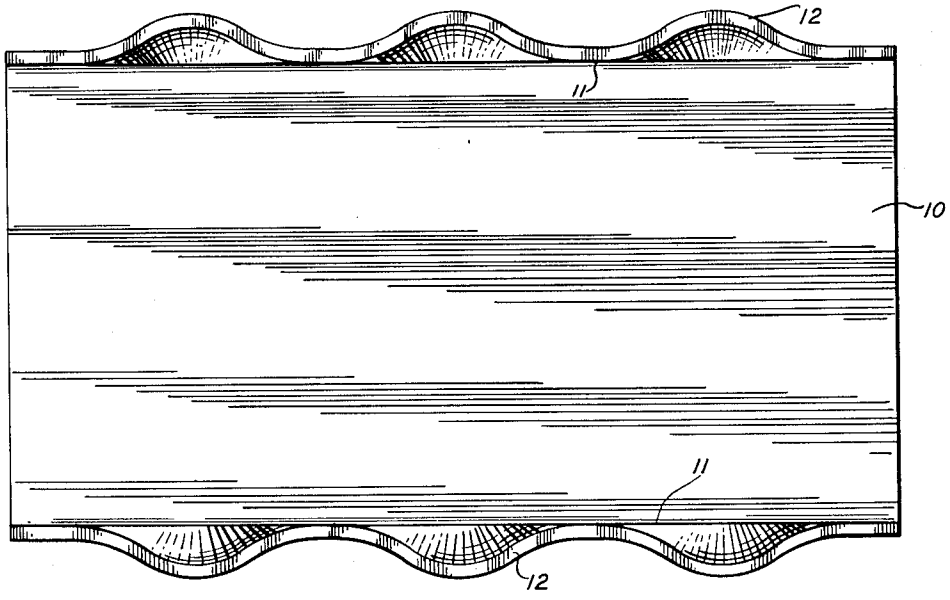


FIG. 1

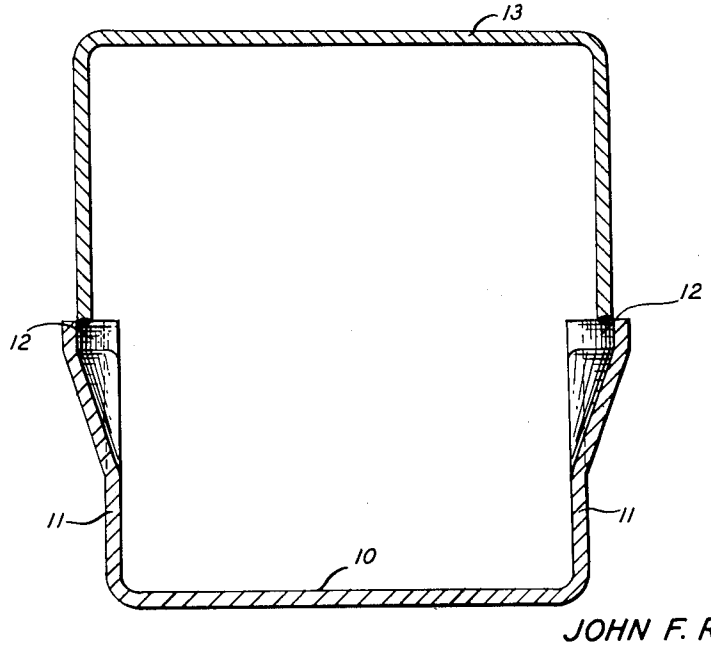


FIG. 2

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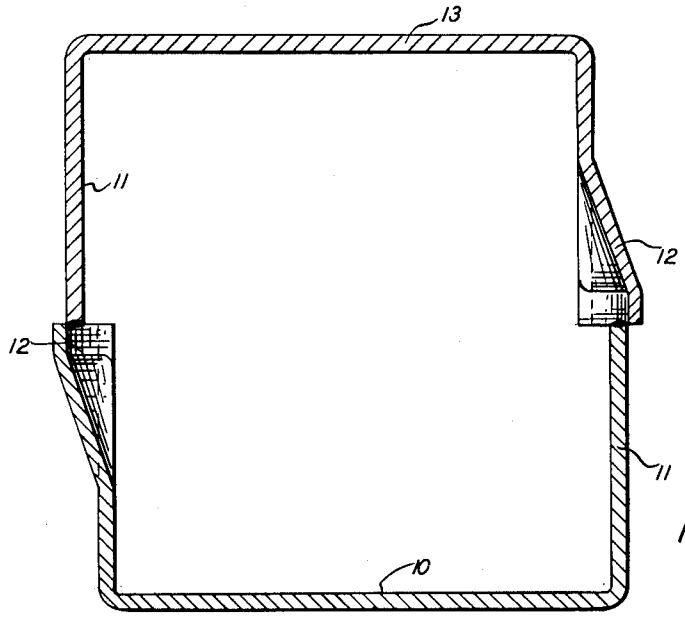


FIG. 3

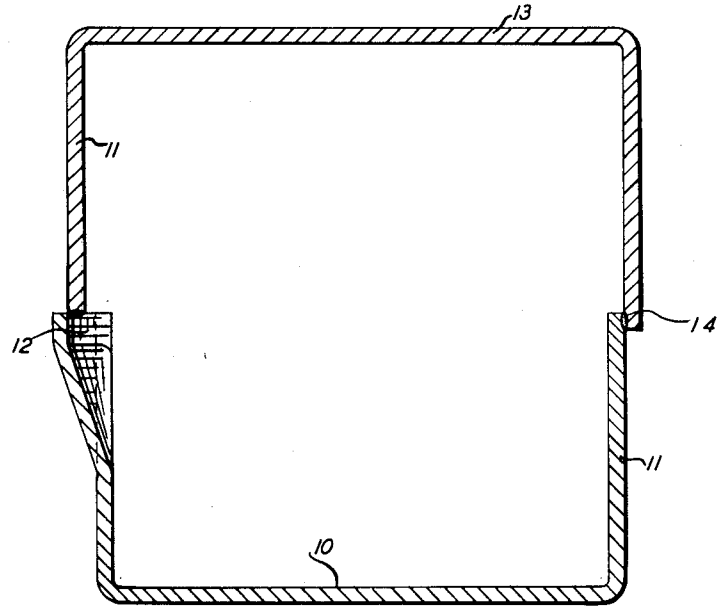


FIG. 4

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3 Claims. (Cl. 219—10)

This invention is concerned with the science of working metal and more particularly with a process for the fabrication of sheet steel into a hollow rigid structural member having a high ratio of strength and rigidity to weight. This member has been particularly designed as a portion of a vehicular frame but its utility is by no means so limited as it may be employed in any situation where a strong, light and rigid structural member is necessary. This invention is probably best understood by reference to the drawings in which:

Figure 1 is a plan view of one section of a beam prior to assembly.

Figure 2 is a cross section of a completed beam after assembly.

Figure 3 is a cross section of another form of the invention and Figure 4 is a cross section of another form of the invention.

In the production of automobile frames it has become customary to produce the side rail member by bending two complementary halves of the rail into U-shaped members in a conventional press. These two members are then jigged with the open sides together and secured in this position by arc welding. A so-called box rail is produced in this manner which has excellent structural and weight characteristics but which has required the use of large amounts of hand labor for the manual arc welding of the two complementary sections. In an endeavor to produce a more economical frame rail this invention has been developed.

Figure 1 represents a plan view of a portion of the rail. This portion constitutes a U-shaped member drawn from hot rolled low carbon open hearth steel. In cross section this piece approximates the letter U. Figure 2 represents the rail shown in Figure 1 assembled with the complementary U-shaped member going to make up a completed frame rail. As can be seen best from Figure 2, the rail section illustrated in plan view in Figure 1 comprises a bottom section **10** and two side sections **11**, the side section **11** being periodically pushed out to provide scallops **12**. Typical practice would involve such scallops having a width of about 1⅛ inch set on 2 inch centers. These scallops are about 1⅛ inch deep.

To form the completed frame rail a complementary upper section **13** is superimposed upon bottom section **10**. It will be noted that upper section **13** is a plain U-shaped member devoid of the scallops which distinguish bottom section **10**. When superimposed upon bottom section **10**, the intersection of the edges of upper section **13** and the scallops **12** of bottom section **10** provide a series of uniformly spaced disconnected welding areas of limited extent. The particular configuration given the upper edges of scallop **12** has been developed to provide as nearly uniform welding areas as possible despite relative sideward displacement of bottom section **10** and upper section **13**.

Bottom section **10** and upper section **13** are assembled as shown in Figure 2 and welded together by applying

simultaneous pressure and a low potential alternating current to the two remote faces of the box section so produced. By so doing the area represented by the intersection of the two sections are effectively welded together and to some extent upset by the combined mechanical pressure and electrical energy. By virtue of this upsetting action it is necessary that all of the welds in a given section of the rail be made simultaneously.

Because of the length of a conventional automobile frame and the fact that all welds in a given section must be made simultaneously, resort may be had to welding the rail in two distinct sections separated by a sizeable portion of unwelded rail. In this way the investment in the welding machine and the heavy momentary demand upon the power system may be avoided. For example, a 5 foot section on either end of the rail could be projection welded as described and the intermediate section completed by arc welding according to present practice.

Without departing from the scope of the invention resort may be had to scalloping one edge of upper section **13** and leaving one edge of bottom section **10** plain as shown in Figure 3 which is a cross section of such a member. It is to be understood of course that the edges scalloped are to be chosen in this case so that a plain edge abuts a scalloped edge. Similarly, both edges of both members may be scalloped and assembled together with the scallops out of phase to produce welding intersections of the desired extent. It is within the scope of the invention that the scallop in the one rail and those of the other may not have identical curves but such curves may be adjusted to give the desired spacing and size of projection welding areas.

Figure 4 shows an alternative structure in which only one edge of one member is scalloped and the joint on the other side of the box is made by arc weld **14**.

I claim as my invention:

1. The process of manufacturing hollow steel structural members comprising forming sheet steel into two separate complementary U-shaped members, scalloping the edges of one of said complementary U-shaped members, the metal at the said scalloped edges being displaced at the peaks of the scallops so formed a distance substantially greater than the thickness of the metal whereby upon assembly of the separate complementary U-shaped members a series of spaced disconnected welding areas of limited extent are formed, assembling said complementary members with the open sides together and with their edges abutting to form a box-like structure and projection welding said members together by passing a large electrical current through said disconnected welding areas.

2. The process of manufacturing hollow steel structural members comprising forming sheet steel into two separate complementary U-shaped members, scalloping one edge of each of said complementary U-shaped members, the metal at the said scalloped edges being displaced at the peaks of the scallops so formed a distance substantially greater than the thickness of the metal whereby upon assembly of the separate complementary U-shaped members a series of disconnected welding areas of limited extent are formed, assembling said complementary members with the open sides together and with their edges abutting with the scalloped edge of one member adjacent the unscalloped edge of the other to form a box-like structure and projection welding said members together by passing a large electrical current through said disconnected welding areas.

3. The process of manufacturing hollow steel structural members comprising forming sheet steel into two separate complementary U-shaped members, scalloping at least one edge of each of said complementary U-shaped members, the metal at the said scalloped edges being displaced

at the peaks of the scallops so formed a distance substantially greater than the thickness of the metal whereby upon assembly of the separate complementary U-shaped members a series of disconnected welding areas are formed, assembling said complementary members with the open sides and scalloped edges together and with the scallops out of register to form a box-like structure and projection welding said members together by passing a large electrical current through said disconnected welding areas.

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