Sept. 16, 1969 P. S. BUKER ET AL 3,466,727

CRIMPING TOOL

Filed Dec. 7, 1966

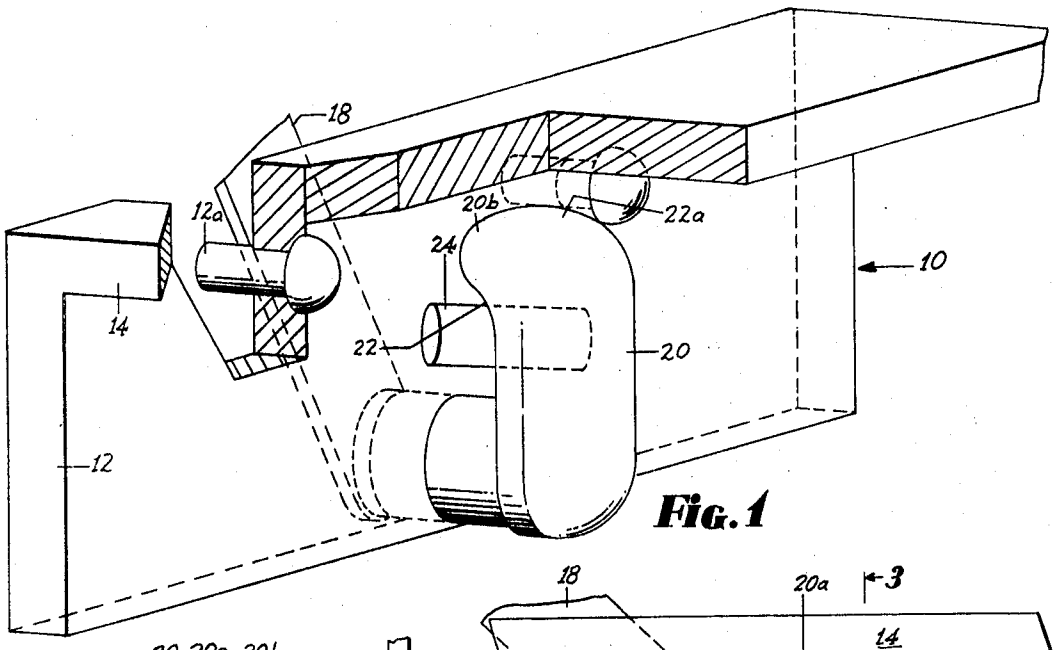


Fig. 1

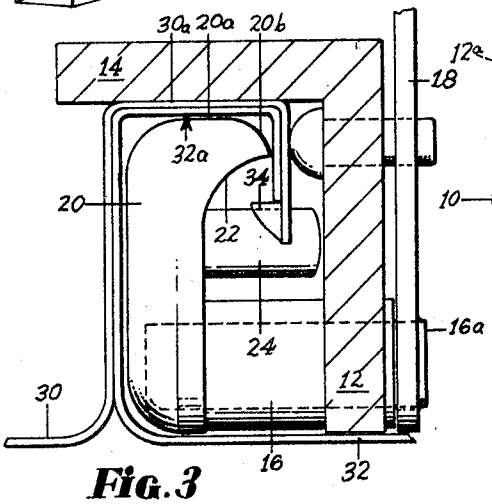


Fig. 3

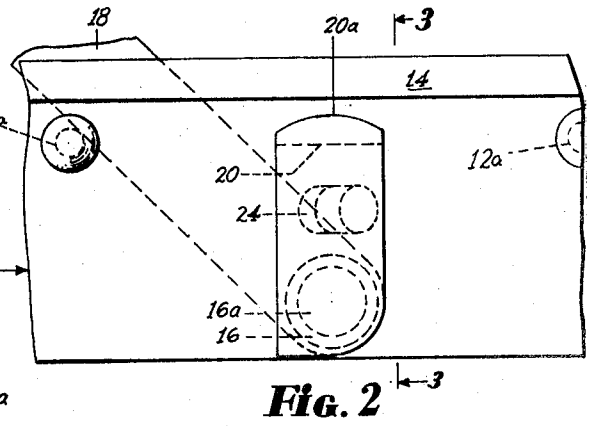


Fig. 2

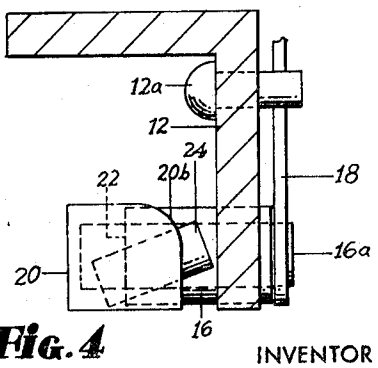


Fig. 4

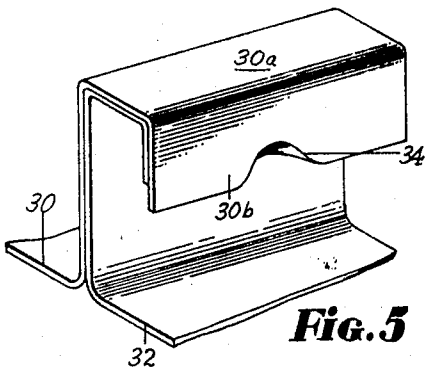


Fig. 5

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CRIMPING TOOL

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U.S. Cl. 29—200 14 Claims

ABSTRACT OF THE DISCLOSURE

An apparatus for insuring proper engagement and then securely interlocking the overlapping ribs of adjacent steel panels. A rotatable cam member will force the mating ribs of adjacent panels into engagement with a frame member, and a crimping pin carried by the cam will deform at least one of the engaged ribs so as to securely hold the adjacent panels together.

Background of the invention

The invention has particular utility in conjunction with a popular steel building panel which includes a surface portion and an upstanding rib along each longitudinal edge of the surface portion. These ribs are configured to mate with the corresponding rib of an adjacent panel. For example, each of the ribs on a given panel may include an inverted U portion; the rib along one edge of the panel, the female rib, will be arranged with the U portion extending outwardly of the surface portion of the panel, while the U portion of the opposite rib, the male rib, will extend inwardly, being disposed above the surface portion of the panel. Thus, when mating ribs of adjacent panels are engaged together, the surface portions of the adjacent panels will abut one another in a single plane.

According to the prior art, there is no fully satisfactory way of securing adjacent panels together. Therefore, in many cases, the prior art simply does not secure adjacent panels together. In certain cases, wherein extra rigidity is required, or wherein the seams between adjacent panels have been caulked, screws are used through the portions of the ribs which are parallel to the surface portion of the panels. This of course is a time consuming and hence expensive operation; and in addition, greatly increases the possibility of leaks in the panel system.

Keeping the foregoing comments in mind, it is a primary object of this invention to provide a tool which will simultaneously engage the rib portion of adjacent panels, force them into their proper relationship, and crimp to secure them in that position.

A further object of the invention is to provide a device for securing adjacent steel panels together without the use of screws or other piercing elements.

A further and very important object of the invention is to provide a tool of such design that the crimping is accomplished by a controlled deformation of at least a portion of the female panel rib, rather than just a buckling or wrinkling action.

Still another object of the invention is the provision of a tool which enables the user to secure adjacent panels in position, and yet permit them to be disengaged by rotating the panels along an axis which is parallel to the ribs.

Still a further object of the invention is to provide a tool which enables the user to engage and crimp adjacent, mating panel ribs in a simple, single stroke of the tool.

Summary of the invention

Very briefly considered, this invention contemplates a crimping tool which includes a frame having a top portion and a side wall secured together at substantially right angles. Means are provided for camming the ribs of adjacent panels into engagement with both the top portion and the side wall of the frame, whereby to insure proper alignment of the respective panels. Substantially simultaneously with the camming action briefly noted above, the device will positively deform at least a portion of one of the adjacent panels so that the two panels are secured together in the proper position, but can still be disengaged.

Description of the drawings

FIGURE 1 is a cut away perspective view of the tool of this invention;

FIGURE 2 is a partial side elevational view of the tool of this invention;

FIGURE 3 is a cross sectional view along the line 3—3 of FIGURE 2;

FIGURE 4 is a cross sectional view from the same position as FIGURE 3, but showing the tool in its initial position; and

FIGURE 5 is a partial perspective view showing the crimp formed by the tool of this invention.

Preferred embodiment of the invention

As shown in FIGURE 1, the frame of the crimping tool is indicated generally at **10**, and includes the side wall **12** and the top portion **14**. The side wall **12** carries the rivets **12***a*, which serve a dual function. The rivet heads are disposed inside the side wall **12**, and act as an abutment and spacer against which the ribs of the panels to be joined are aligned. In addition, a portion of each of the rivets extend outside the side wall **12** and serve to limit the motion of the components described presently. The side wall **12** may include the bushing **16**, which supports shaft **16***a* and serves to pivotally mount the handle **18** on the outside of the base and the cam block **20** on the inside of the frame. The cam block **20** and handle **18** are fixed to rotate together through an angle of about 90°. Thus it will be seen by comparing FIGURES 3 and 4 that the cam block **20** is rotatable from the generally horizontal position seen in FIGURE 4 to the generally vertical position seen in FIGURE 3.

By comparing FIGURES 2, 3, and 4, it will be apparent that the cam block **20** is of generally rectangular configuration. As seen in FIGURE 2, the lowermost end of the cam block **20** may be rounded so that the handle **18** and cam block **20** may be rotated in the event that the lowermost edge of the side wall **12** rests against a portion of one of the panels being engaged. It will also be noted that the top edge of the cam block **20** (as seen in FIGURE 2) is rounded. In particular, the rounded portion **20***a* acts as a camming surface to force the portions **30***a* and **32***a* of the adjacent ribs tightly together and against the top portion **14** of the frame, as will be described in more detail hereinafter.

It is also important to note that the face of the cam block **20** adjacent the side wall **12** is provided with a recess **22**. This recess is so arranged that its axis will be substantially parallel to the top portion **14** when the cam block **20** is in the generally vertical position seen in FIGURES 2 and 3.

Finally, it will be observed that the crimping pin **24** is fixedly secured to the cam block **20** in the recess **22**. The angle of the crimping pin **24** is of considerable importance. It will be observed that the crimping pin is substantially horizontal when the cam block **20** is in the vertical position of FIGURES 2 and 3, but that the longitudinal axis of the pin **24** is inclined upwardly from the horizontal at an angle of approximately 30° when the cam block is in the generally horizontal position shown in

FIGURE 4. Because of the inclination of the pin and its gradual transition during rotation from a 30° inclination to a horizontal position, a controlled inward deformation of at least the female panel rib edges will be accomplished, rather than just a buckling or wrinkling action.

The deformed portion of the female rib must extend inwardly far enough to retain the male rib edge.

Considering now FIGURES 3, 4, and 5, the operation of this device will be described. The handle **18** and cam block **20** are rotated with respect to the frame **10** so that the cam block **20** is in the generally horizontal position, substantially parallel to the surface portion or face of the panel as shown in FIGURE 4. A pair of conventional panels such as indicated at **30** and **32** in FIGURES 3 and 5 are placed together in the approximately proper position. The crimping tool of this invention is then placed so that the top portion **14** will rest on the top surface **30***a* of the upstanding rib, and the spacers **12***a* are against the vertical portion **30***b* of the rib. The spacers insure that the end of crimping pin **24** extends beyond the edge of the panel to be crimped, to effect proper crimping. (In the case of coated panels, it will be desirable to provide the underside of the top portion **14** with a layer of low friction material, such as high density polyethylene to allow the device to slip on the panel rib without marring the paint.) The handle is then rotated in a counter-clockwise direction (as seen in FIGURE 2) until the cam block **20** is brought to the generally vertical position shown in FIGURE 3. The surface **20***a* of the cam block will force the top portions of the ribs of adjacent panels into intimate contact between the top surface of the cam block and the bottom surface of the top portion **14**. Similarly, the surface **20***b* will cam the vertical portions of the adjacent panel ribs into proper contact between the spacers **12***a* and the cam block. In proper sequence, the crimping pin **24** will, as described before, deform at least a portion of the female panel rib inwardly, thereby effecting a crimp which will securely hold the two panels in the proper positions. The finished crimp is shown at **34** in FIGURES 3 and 5.

It will be apparent to the skilled worker in the art that numerous modifications can be made in this invention without departing from its scope and spirit. For example, the side wall **12** of the frame can be provided with an arcuate slot, and the crimping pin **24** can be made to extend through this slot and be secured to the handle **18**. In such an embodiment, there is no possibility of the panel edge getting caught between the frame and the end of the crimping pin, and accordingly, the spacers **12***a* can be eliminated.

Accordingly, no limitations are intended except insofar as specifically set forth in the claims which follow.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In a tool for assembling metallic construction panels:

(a) a frame having a top member and a side member secured together along their longitudinal edges at substantially a right angle;

(b) a handle journaled to the outside of said side member adjacent the free longitudinal edge thereof for rotation in a plane substantially parallel to said side member;

(c) a cam block one end of which is journaled to said side member adjacent the free longitudinal edge thereof, said cam block being rotatable beneath said top member in a plane substantially parallel to the plane of rotation of said handle and secured to said handle for rotation therewith, having an engaged position wherein its longitudinal axis is substantially perpendicular to the top member and the free or camming end of the cam block is at the point in its arc closest to said top member and a disengaged position wherein the cam block is pivoted on the order of 90° from its engaged position, and being of such radial length that its free or camming end is substantially two thicknesses of said panels distant from the lower surface of said top member when the cam block is in its engaged position;

(d) a crimping pin for crimping and securing said panels together, said pin being fixedly secured to said cam block and extending toward said handle.

2. The tool claimed in claim **1** including means for limiting the arc of rotation of said handle and said cam block.

3. The tool claimed in claim **1** wherein the longitudinal axis of said crimping pin is in a plane substantially parallel to said top member when said cam block is in its engaged position and said longitudinal axis is inclined upwardly from its secured end when said cam block is in its disengaged position.

4. The tool claimed in claim **3** wherein said crimping pin is inclined upwardly from said parallel plane by an angle on the order of 30°.

5. The tool claimed in claim **1** including a layer of a low friction material secured to the underside of said top member.

6. The tool claimed in claim **1** including spacer means projecting inwardly from said side member and arranged to contact and position at least a portion of said panels being crimped.

7. The tool claimed in claim **1** wherein said cam block is of a generally rectangular configuration, the face of said cam block adjacent said side member having a recess, the axis of said recess being generally parallel to said top member when said cam block is in its engaged position.

8. In a tool for assembling metallic construction panels which include surface portions and interlocking inverted channel-shaped ribs along the abutting edges of said panels adapted to form rib joints, each said rib joint having an inverted channel-shaped female member secured along the edge of one panel and a corresponding inverted channel-shaped male member secured along the abutting edge of the adjacent panel, said male and female members having corresponding upstanding members projecting from said abutting edges, corresponding upper portions, and flanges extending downwardly from said upper portions toward but not contacting the surface portion of one of said panels, said female member flange being longer than said male member flange, and the outer surface of the male member being adapted to mate with the corresponding inner surface of the female member throughout its length;

(a) a frame comprising a top member adapted to rest on said rib joint and a side member extending downwardly adjacent the female member flange and beyond the free edge thereof;

(b) a cam block one end of which is journaled to said side member adjacent the bottom edge thereof so as to pivot within the rib joint in a plane substantially parallel to said side member, having an engaged position wherein the free or camming end of the cam block is at the point in its arc closest to said top member and a disengaged position when said free or camming end is at a point in its arc on the order of 90° from its engaged position, and being of such radial length as to bring its free or camming end to a distance from the lower surface of the top member substantially equal to the combined thicknesses of said upper portions when the cam block is in its engaged position, whereby to cam said upper portions together as the cam block is pivoted to its engaged position;

(c) means for pivoting said cam block to and between its engaged and disengaged positions;

(d) a crimping pin fixedly secured to said cam block, said crimping pin positioned on said cam block so as to project beneath the free edge of said female

member flange when the cam block is in its disengaged position, and disposed along the radial length of the cam block so as to engage and deform a portion of at least the female member flange as the cam block is pivoted to its engaged position so as to secure said panels together.

9. The tool claimed in claim **8** wherein the longitudinal axis of said crimping pin is in a plane substantially parallel to said top member when said cam block is in its engaged position and said longitudinal axis is inclined upwardly from its secured end when said cam block is in its disengaged position.

10. The tool claimed in claim **8** wherein said cam block is of a generally rectangular configuration, the face of said cam block adjacent said side member having a recess arranged to receive said deformed portion of one of said panels.

11. The tool claimed in claim **6** wherein said spacer means extend through said side member and protrude to the outside thereof and the outside protrusions thus formed limit the arc of rotation of said handle and said cam block.

12. The tool claimed in claim **8** wherein, when said cam block is in its engaged position, at least a portion thereof is positioned substantially two panel thicknesses from said side member so as to cam said male and female member flanges together against said side member.

13. The tool claimed in claim **6** wherein, when said cam block is in its engaged position, at least a portion thereof is positioned substantially two panel thicknesses from the portion of said spacer means contacting said

panels so as to cam said male and female member flanges together against said portion of said spacer means.

14. The tool claimed in claim **9** including

(a) means extending through said side member for limiting the arc of rotation of said handle and said cam block and for contacting and positioning at least a portion of said panels being engaged and crimped;

(b) a layer of low friction material secured to the underside of said top member; and

(c) a recess in the face of said cam block adjacent said side member, said recess being arranged so as to receive said deformed portion; and wherein

(d) when said cam block is in its engaged position, at least a portion thereof is positioned substantially two panel thicknesses from the portion of said means extending through said side member contacting said panels, whereby to cam said male and female member flanges together.

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U.S. Cl. X.R.

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