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O. J. GROEHN

CURLING TOOL FOR AUTOMOBILE BODY CONSTRUCTION

Filed Jan. 26, 1926

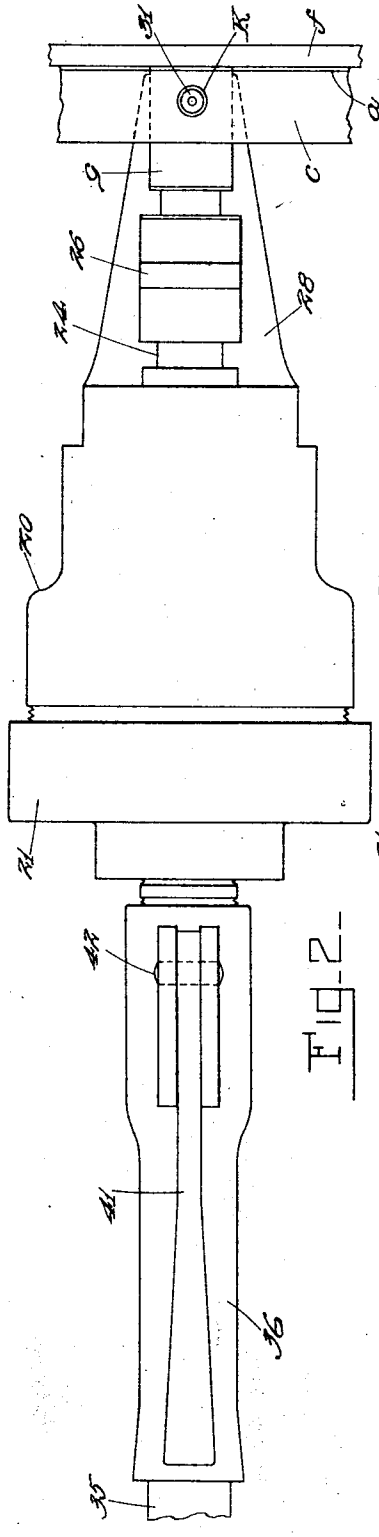


FIG. 2.

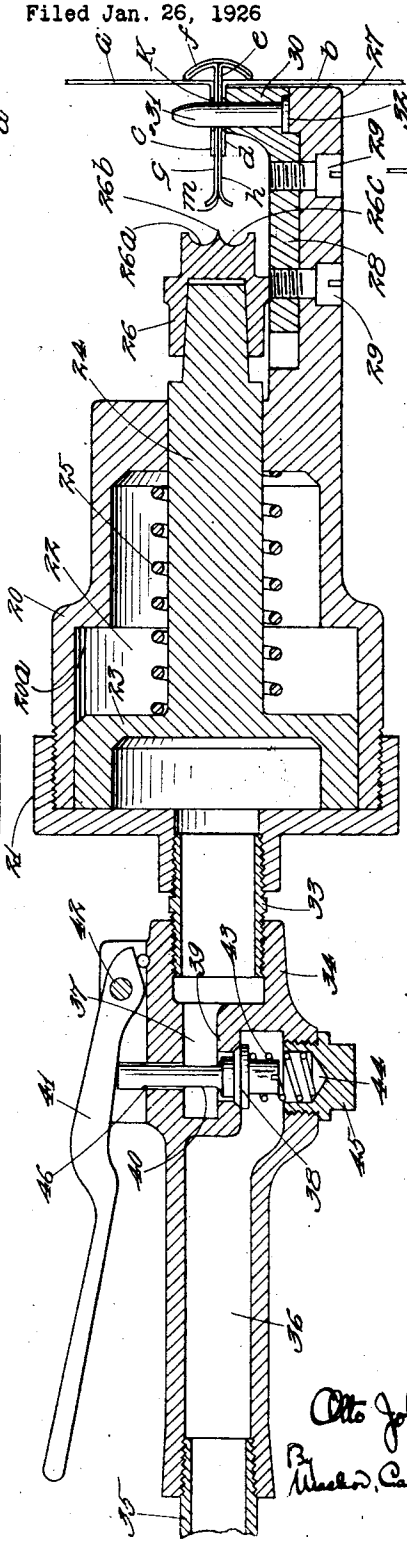


FIG. 1.

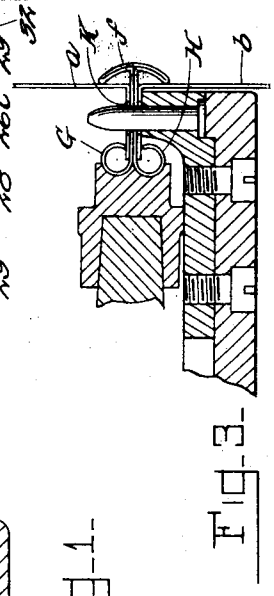


FIG. 3.

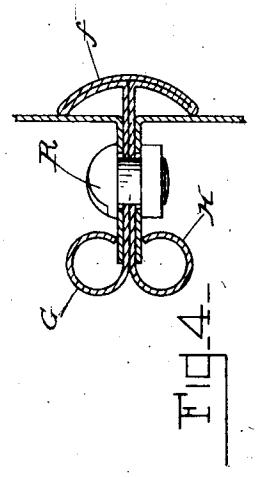


FIG. 4.

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UNITED STATES PATENT OFFICE.

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CURLING TOOL FOR AUTOMOBILE BODY CONSTRUCTION.

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This invention relates to a curling tool, particularly, although not exclusively, adapted for use in automobile body construction for curling or bending the juxtaposed free edges of superimposed metal strips. In the construction of certain types of closed automobile bodies formed from shaped metal panels, the adjacent or proximate edges of contiguous metal panels are formed with inturned flanges and the joints between the panels at the outer side are finished by means of molding strips constructed to form a bead or enlarged head concealing the joint between the panels and having inturned superimposed flanges or plates interposed between the inturned flanges of the panels. The free edges of the molding strips project beyond the free edges of the panel flanges and are bent or curled thereover to form a rigid interlocking connection. An object of the present invention is to provide a tool adapted to readily and effectively bend the projecting free edges of the molding strips over the edges of the inturned panel flanges, and preferably by a curling operation adapted to form beads or tubular resilient portions at opposite sides of the panel flanges, as a result of which a stronger and more rigid interlocking connection between the flanges and molding strips is provided.

One of the important features of the present improved tool or curling die resides in the provision of means for curling or bending the edges of the superimposed molding strips over the edges of a pair of plates or flanges between which the strips are held and in which the tool is provided with a hook adapted to penetrate the molding, or to hook or catch behind a portion thereof so as to hold the tool in operative position. In addition, this hook serves the purpose of exerting an inward reaction to the outward thrust of the bending die, tending to draw the parts tightly into position, and, if desired, after the curling operation all of the superimposed strips and flanges may be secured together by rivets or bolts inserted through alined holes previously formed therein.

Other objects of this invention will appear in the following description and appended claims, reference being had to the accompanying drawings forming a part of this specification, wherein like reference characters designate corresponding parts in the several views, and wherein:

Fig. 1 is a longitudinal section illustrating a curling tool embodying my invention and in operative position.

Fig. 2 is a plan view, partly broken away, illustrating the construction shown in Fig. 1.

Fig. 3 is a fragmentary sectional view illustrating the parts at the completion of the curling operation.

Fig. 4 is a fragmentary sectional view illustrating a panel construction with a molding interlocked and secured thereto.

Before explaining in detail the present improvement and mode of operation thereof, I desire to have it understood that the invention is not limited to the details of construction and arrangement of parts which are illustrated in the accompanying drawings, since the invention is capable of other embodiments, and that the phraseology which I employ is for the purpose of description and not of limitation.

In certain types of closed automobile bodies, the enclosed body portions thereof are constructed of sheet metal panels which are finished and reenforced by moldings at the joints between the adjacent panel sections. As illustrated in the drawings, the panels *a* and *b* of the automobile body are formed at the adjacent edges thereof with inturned flanges *c* and *d*, respectively. The molding may be of any suitable form and is preferably T-shaped in cross section and may be formed by folding a strip of sheet metal upon itself to form a curved bead or head *f* and inwardly turned superimposed flanges or a two-ply flange *g* and *h* which are held between the flanges *c* and *d* of the panels. It will be seen that the bead or head *f* of the molding strip overlaps the adjacent marginal portions of the panels engaging the outer surfaces thereof and provides a means for concealing and finishing the joint therebetween. The flanges *g* and *h* of the molding preferably project a substantial distance inwardly beyond the free edges of the panel flanges *c* and *d*, and these edges of the molding are bent or curled in opposite directions so as to embrace and enclose the free edges of the flanges *c* and *d*, thereby providing a strengthened interlocking connection between the parts.

In accordance with the present invention I have provided a tool particularly adapted for the purpose of curling or bending back the projecting edges of the superimposed molding flanges *g* and *h*, these edges by means of the present improved tool being curled to

form tubular beads or rolled edges G and H (see Figs. 3 and 4) at opposite sides of the panel flanges. Referring to Fig. 1, the present improved tool comprises a chambered support or casing 20 closed at one end by means of a cap 21 threaded thereto and having a central chamber 22 within which operates a piston 23. This piston is provided with a forwardly projecting piston rod 24 and surrounding the piston rod is a compression spring 25 which is interposed between the piston 23 and a wall of the chamber 22. Mounted on the end of the rod 24 is a curling hammer or die member 26 which is constructed at the working face thereof to bend back or curl the free edges of the molding flanges *g* and *h*. The working end of the hammer or die member 26 is provided with a pair of tangential arcuate surfaces or grooves 26^a and 26^c separted by means of a tapered rib or wedge 26^b. As clearly seen from Fig. 1, the tapered relatively sharp rib or wedge 26^b of the die is adapted to enter between and separate the free edges of the molding flanges *g* and *h*, as shown at *m*, and these edges will be curled rearwardly over the edges of the panel flanges *c* and *d*, forming beads G and H concentric with the curved die faces 26^a and 26^c.

The casing or support 20 of the tool is provided with a forward extension 27 located at one side of the path of movement of the die or hammer 26. Mounted on the upper face of the extension 26 is a holder or block 28 terminating at its forward end in an upward guide 30 drilled to receive a stud 31 forming a hook. This hook at its lower end is provided with a flange 32 housed within a counterbore of the member 30, and the latter is immovably secured to the extension 27 by means of set screws 29. From this construction it will be seen that the forward ends of the extension 27 and the guide 30 form a continuous vertical face adapted to abut against the panel *b*, and the upper end of the guide 30 is formed with a horizontal face adapted to fit against the inturned flange *d* of the panel *b*. Thus, the forward end of the guide 30 is so formed as to fit into the angle of the panel *b* and its inturned flange *d*, thereby properly positioning the tool with respect to the molding flanges *g* and *h*. The superimposed flanges *c*, *d*, *g* and *h* of the panels and molding strip are previously provided with vertically alined holes K therethrough through which may be inserted bolts or tubular rivets R (see Fig. 4) after the curling operation so as to secure the parts together. The hook 31 is adapted to be inserted through the alined holes K in the molding and panel flanges, thereby enabling the tool to be held against the work during operation and causing the molding flanges to be bent or curled between the die 26 and the hook 31.

In the present instance, the piston 23 is operated to shift the die or hammer 26 forwardly by pneumatic means. The cap 21 of the supporting casing 20 is connected by means of a suitable threaded coupling 33 with a tubular handle 34 to the rear end of which is connected a fluid or air conduit 35. The handle 34 is provided with a main inlet passage or chamber 36 and an outlet passage or chamber 37 separated by means of a partition 39. This partition has a passage therethrough controlled by means of a suitable valve 38 provided with a stem 40 projecting through a hole drilled in the wall of the handle 34. The outer end of the valve stem 40 is engaged by a lever 41 pivoted at 42 to the handle support, and by swinging the lever 41 inwardly the valve 38 will be opened against the action of the compression spring 43 interposed between a shoulder formed on the valve and the bottom of a chamber 44 in a removable plug 45.

In the operation of the present improved tool, it will be seen that the projecting stud 31 forms a hook which may be inserted by the operator through the vertically alined holes K in the panel flanges *c* and *d* and the molding flanges *g* and *h*, with the angular guide 30 fitting into the corresponding angular corner formed by the panel *b* and its inturned flange *d*. Thereupon the operator presses down the handle lever 41 so as to open the valve 38 and admit fluid under pressure from the passage 36 into the passage 37, resulting in shifting the piston 23 forwardly against the action of spring 25. The forward movement of the piston will shift the hammer or die 26 forwardly causing the V-shaped rib or wedge 26^b of the die to separate the free edges of the molding flanges *g* and *h*. The continued forward movement of the die 26 will curl the molding strips rearwardly in the manner shown in Figs. 3 and 4. It will also be noted that the hook 31 acts to hold the flanges *g* and *h* of the molding strip against the action of the die or hammer 26, thereby exerting an inward reaction to the outward thrust of said die or hammer and drawing the head *f* of the molding into close engagement with the outer faces of the panels, this operation being permitted by making the holes K in the panel flanges slightly larger than the corresponding holes in the molding flanges, as shown. Upon completion of this operation, the holes K through the several flanges *c*, *d*, *g* and *h* will be properly alined to permit reception of a bolt or rivet R by means of which the parts are secured together.

The piston 23 is returned by means of the compression spring 25, and a suitable bleeding port 46 around the valve stem 40 may be provided. It will also be seen that the piston chamber 22 is provided with a shoulder 20^a limiting the forward movement of the piston, and inasmuch as the die 26 is spaced a predetermined distance from the hook 31

when in inoperative position, the piston will shift the die the proper distance forwardly to form the complete curl or bend G and H in the free edges of the molding strip.

It is to be understood that by describing in detail herein any particular form, structure, or arrangement, it is not intended to limit the invention beyond the terms of the several claims or the requirements of the prior art.

What I claim is:

1. The combination of a die, means for holding the work against the thrust of said die, said means comprising a hook adapted to penetrate a plate presented edgewise to said die, and means for moving the die relatively to the hook to bend the edge of said plate.

2. A curling tool comprising, in combination a support, a reciprocating die having means for curling the free edges of a pair of superimposed plates over the edges of a pair of panel flanges, and means carried by said support for holding said plates in position between said flanges during the operation of the die.

3. A curling tool comprising, in combination a support, a reciprocating die having means for curling the free edges of a pair of superimposed plates, and means carried by said support and projecting through said plates for holding the same in position relatively to said die.

4. A tool for bending the free edges of a pair of superimposed molding strips over the edges of a pair of panel flanges between which the molding strips are interposed, and comprising a tool support having a hook insertable through a hole in said strips and flanges, and a die member movable toward said hook for bending the edges of said strips.

5. A tool for bending the free edges of a pair of superimposed molding strips over the edges of a pair of panel flanges between which the molding strips are interposed, and comprising a tool support having a hook insertable through a hole in said strips and flanges, a die member movable toward said hook for bending the edges of said strips, and pneumatic mechanism for operating said die member.

6. A tool for oppositely bending the free ends of a pair of superimposed plates having a hole therethrough located in rear of said free ends and comprising a fixed member insertable through said hole and a die member movable relatively thereto for bending over said free ends.

7. In a tool of the class described, the combination of a support, a projecting member carried thereby and adapted to extend through alined holes in two pairs of superimposed plates, a die carried by said support and shiftable toward said member for bending the edges of the intermediate pair of plates over the edges of the outer pair of plates, and means for operating said die.

8. In a tool of the class described, the combination of a support, a projecting member carried thereby and adapted to extend through alined holes in two pairs of superimposed plates, a die carried by said support and shiftable toward said member for oppositely bending the edges of the intermediate pair of plates over the edges of the outer pair of plates, said die having a wedge for separating the edges of the plates, and means for operating said die.

9. The combination of a tool support, a shiftable die member carried thereby and having means for bending over in opposite directions the free ends of a pair of superimposed plates, and a stationary hook carried by said support and comprising a stud projecting at right angles to the path of movement of said die member and in advance thereof and adapted to engage said plates.

10. A pneumatic tool comprising a reciprocating hammer having means for separating and curling in opposite directions the free edges of a pair of plates, and a stationary means in advance of said hammer for holding said plates in position and comprising a stud extending transversely to the path of operation of said die member.

11. A tool for bending the free edge of a molding strip over the edges of a pair of panel flanges between which a portion of said molding strip is interposed, said tool comprising, in combination a bending die, means engaging the interposed portion of said strip for holding the latter against the thrust of said die, and means for relatively moving said die and member toward one another.

12. A tool for forming a panel joint including a pair of panels having inturned flanges and a molding strip having a head engaging the outer faces of said panels and a flange interposed between said panel flanges and extending inwardly beyond the same, said tool comprising, in combination a bending die, means engaging said molding flange for holding the latter against the thrust of said die, and means for relatively moving said die and engaging means toward one another to bend portions of said molding flange outwardly over the inner edges of said panel flanges and simultaneously exert an inward reaction upon said molding to draw the head thereof into close engagement with said panels.

In testimony whereof I affix my signature.

OTTO JOHN GROEHN.