Dec. 2, 1941. J. W. GLEASON 2,264,520

BENDING MACHINE FOR METAL CONSTRUCTION MATERIAL

Filed Jan. 6, 1940

Fig. 1.

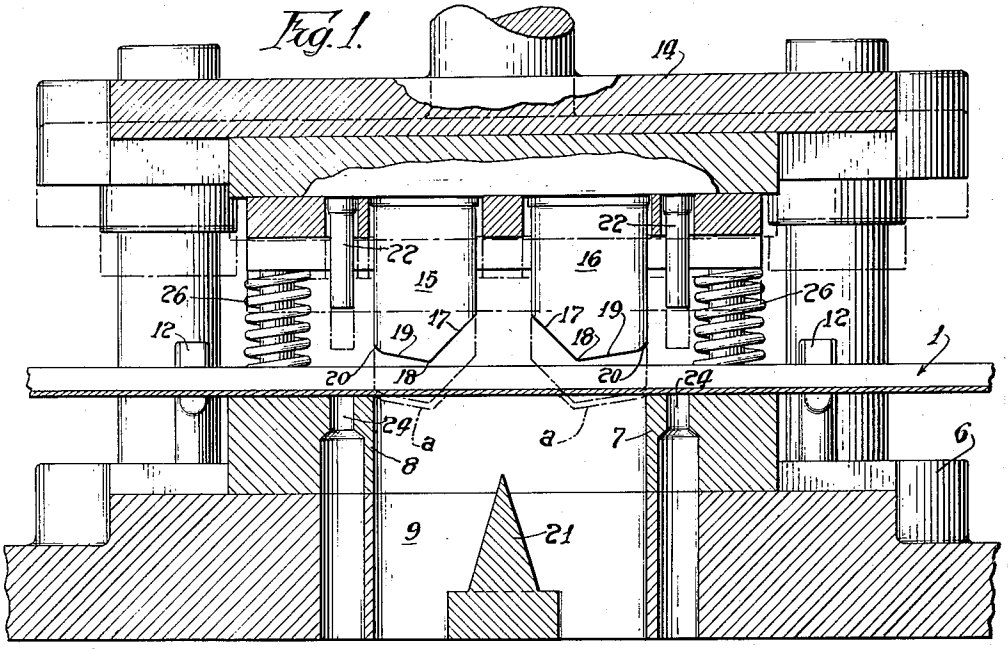


Fig. 2.

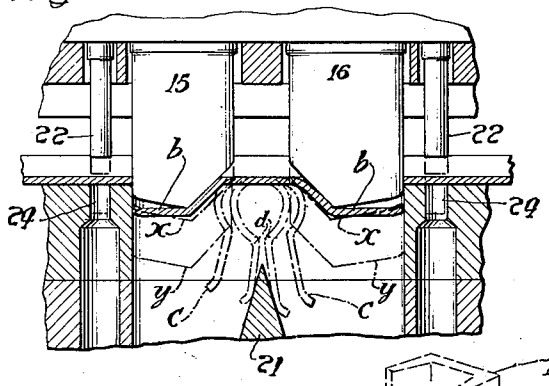


Fig. 4.

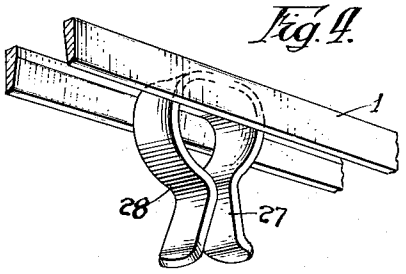
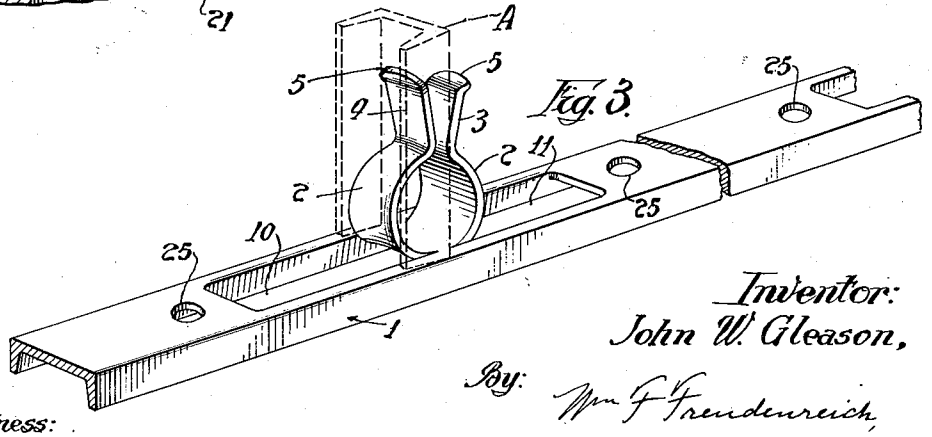


Fig. 3.



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2,264,520

BENDING MACHINE FOR METAL CONSTRUCTION MATERIAL

John W. Gleason, Chicago, Ill.

Application January 6, 1940, Serial No. 312,630

4 Claims. (Cl. 153—2)

A common method of constructing partitions in buildings is to set up a framework of light channels and facing the framework with suitable materials. In one form of construction a horizontal or foot channel is provided with upwardly-projecting lugs with which vertical channels or studs are adapted to be engaged. The present invention relates to such lug-carrying members and has for its object to improve such members and, particularly, the means for manufacturing the same.

The various features of novelty whereby my invention is characterized will hereinafter be pointed out with particularity in the claims; but, for a full understanding of my invention and of its objects and advantages, reference may be had to the following detailed description taken in connection with the accompanying drawing, wherein:

Figure 1 is a vertical section through a set of dies for forming pairs of lugs on a channel member, the dies being shown open in full lines and partway closed in dotted lines so as to illustrate the preliminary drawing action on the metal in the bottom of the channel, as shown in dotted lines; Fig. 2 is a view similar to Fig. 1, showing only a fragment of the die structure, with the plunger members lowered farther than in either full or dotted lines in Fig. 1, and various other stages of the plunger movements and in the shaping of the lugs being illustrated in dotted lines; Fig. 3 is a perspective view of a fragment of a completed channel member ready for use; and Fig. 4 is a perspective view of a fragment of a channel which has lugs projecting therefrom in the opposite direction from those in Fig. 3.

Referring to Fig. 3 of the drawing, 1 represents a small structure channel iron member, the bottom wall or web of which has been mutilated to provide pairs of elongated finger-like lugs projecting therefrom at right angles to the plane of said bottom wall or web. The two lugs of each pair are similar to each other, each comprising a semi-cylindrical base section 2 terminating in a relatively straight section, indicated at 3 and 4, respectively; the section 4 being preferably longer than the section 3 so as to project beyond the free end of the latter. The concave sides of the two curved sections 2 face each other, whereas the comparatively straight sections 3 and 4 may flare a little so as to be farthest apart toward their free ends. The free end of each of the sections 3 and 4 is made to curve outwardly away from the other section, as indicated at 5, thereby forming the lips of a widened mouth. In assembling the member 1 with a vertical channel such as indicated in dotted lines at A, the lower end of the member A need only be brought directly above the entrance between the forwardly-projecting sections or legs of a pair of lugs, with its bottom wall or web abutting against the upwardly-projecting part of the longer leg 4. Then the member A need only be pressed down so that the longer lug lies within the channel of the member A and causes the two channel members to be interlocked against relative movements lengthwise of the member 1 or crosswise of the member A. It will be seen that it is a very simple matter to interlock a stud with a base or foot channel, since the workman need not stoop over in order to register the lugs with the stud, and since the flaring mouth between each pair of lugs effectively guides the lower end of the stud with the free end of the long lug positioned in the trough or channel of the stud.

The means for and method of forming the lugs is illustrated in Figs. 1 and 2. Referring to these figures, 6 represents a bed or base on which rests a stationary lower die 7 having a rectangular opening 8 extending through the same and registering with a similar opening 9 in the member 6. The opening 8 is as wide as the internal width of the bottom of the groove or channel in the member 1, and its length is as great as the entire section of the member 1 from which a pair of lugs is to be cut. Rising from the bed 6 at opposite ends of the member 7 are two pins 12 that rise above the top of the die member 7 and serve as stops against which the side of a channel member 1 is placed when that member is slid lengthwise upon this die member; the pins serving to place the longitudinal center of the member 1 directly above the longitudinal center of the slot or opening 8.

The movable die comprises a head 14 and two plunger members 15 and 16 projecting downwardly therefrom in registration with the slot or opening 8; the thickness of each plunger being equal to the width of the die opening, and the distance between the two vertical edges of the plungers that are farthest from each other being equal to the length of the die opening. The plungers are made from stock which is rectangular in cross section. The width of each plunger determines the length of the lug which is to be fashioned thereby. Therefore, since one

of the lugs should be longer than the other, one of the dies is made wider than the other die.

I have found that by constructing the dies so as to cause them to draw the metal of the channel member before severing it to produce a lug, I am enabled to form a pair of completed lugs by a single downward stroke of the movable die member. I accordingly cut away the lower inner corner of each plunger, as indicated at 17, on an angle of about forty-five degrees, from a point beginning at about the center of the narrower plunger, and from a point located at the same distance from the inner edge of the wider plunger. From the points 18 at the lower edges of the edge faces 17, the lower edges of the plungers or male dies slope upwardly at a small angle to the horizontal, to the outer edges, as indicated at 19; the extreme outer corners being rounded on a small radius, as indicated at 20.

When a channel is to be provided with lugs, it is placed between the dies, as shown in Fig. 1, while the upper die member is raised. Then, upon pressing the upper die member down, the points 18 on the plungers are the first to engage with the bottom of the channel, pressing down and stretching or drawing the metal, as indicated in dotted lines at *a* in Fig. 1. As the upper die member continues to descend, a gradual shearing process along the long edges of the die opening 8 takes place so that two strips are cut from the bottom of the channel but still remain attached to the channel at their ends. When the rounded corners 20 of the plungers reach the bottom wall of the channel, the corresponding ends of the tongues or strips are severed so that rudimentary lugs such as indicated at B in Fig. 2 result. At this time both strips or tongues are shorter than they will eventually be, because a portion of each of the inclined cutting edges 17 still lies above the plane of the bottom of the channel, as shown in full lines in Fig. 2. As the plungers move down farther, the inclined cutting edges 17 perform two functions, namely, they bend the two tongues downwardly toward each other and lengthen them by making further shearing cuts. By the time that the plungers have moved down only a short distance from the position shown in full lines in Fig. 2, namely to the broken line *x*, the tongues *b* have been swung down and lengthened, as indicated by the dotted line formation *c*. During the remainder of the downward movement of the plungers to the broken line positions marked *y*, the tongues are brought into the positions and shapes indicated at *d*; the lugs now having taken their final shapes. In order that the two lugs shall not be brought into actual contact with each other, I place within the opening 9 in the base 6 a vertical wedge-shaped piece 21 having its pointed end directed upwardly and located midway between the two plungers 15 and 16. The final thrust of the plungers bends the tongues or strips until they contact with opposite sides of the wedge 21 which holds the straight sections 3 and 4 in the desired spaced relation to each other.

Upon lifting the upper die member, the channel is left free to be raised so as to carry the lugs that have just been completed out of the die opening; whereupon the channel may be shifted ahead far enough to permit the next pair of lugs to be cut and formed at the proper distance from the first pair.

The upper die member is provided with a pair of small punches in the form of pins, while the stationary die member is provided with round openings 24 in registration with these punches. The lower ends of these auxiliary punches are at a considerable distance above the lower ends of the punches 15 and 16, so that only during the final portion of the downward stroke of the upper die do the punches 22 pass through the bottom wall of the channel member and thus form therein the holes indicated at 25 in Fig. 3.

Between the upper and lower die members is a suitable stripper device including compression springs 26, that cause the upper die to rise whenever downward pressure on the same is released, and thus carry the punches clear of the work.

In Fig. 4 there is illustrated a modification in which pairs of lugs 27 and 28, similar to those heretofore described, are punched from the bottom wall of the channel in the opposite direction from those in Fig. 3. Consequently, by employing a channel member of the type shown in Fig. 3 for the base or foot element of the framework, any channel member such as shown in Fig. 4 for the top element, the studs may be channel members of the same size as the two horizontal channel members, because the projecting portions of the tongues or lugs on the upper member are sufficient to secure the upper ends of the studs even though the latter do not extend clear to the bases of the tongues or lugs.

I claim:

1. A pair of dies for punching a pair of complementary tongues from a metal strip or bar, comprising a stationary horizontal lower die having an elongated die-opening or slot, a vertically-movable upper die having thereon two parallel punches adapted to move into and out of said slot, said punches being spaced apart from each other and each being a sliding fit in the corresponding end of said slot, each punch having a lower edge face comprising an inner section extending upwardly and inwardly at a considerable angle to the horizontal and an outer section extending upwardly and outwardly at a much smaller angle and terminating at a much lower level than does the other section.

2. A pair of dies for shearing and punching a pair of complementary tongues from a metal strip or bar, comprising a stationary horizontal lower die having an elongated die-opening or slot, a vertically-movable upper die having thereon two parallel punches adapted to move into and out of said slot, said punches being spaced apart from each other and each being a sliding fit in the corresponding end of said slot, each punch having a bottom face forming with the front and back faces shearing edges, each bottom face comprising an inner section extending upwardly and inwardly at a considerable angle to the horizontal and an outer section extending upwardly and outwardly at a much smaller angle and terminating at a much lower level than does the other section.

3. A pair of dies for shearing and punching a pair of complementary tongues from a metal strip or bar, comprising a stationary horizontal lower die having an elongated die opening or slot, a vertically-movable upper die having thereon two parallel punches adapted to move into and out of said slot, said punches being spaced apart from each other and each being a sliding fit in the corresponding end of said slot, each punch having a bottom face forming with the front and back faces shearing edges, each bottom face comprising an inner section extending upwardly and inwardly at a considerable angle to the horizontal and an outer section extending

upwardly and outwardly at a much smaller angle and terminating at a much lower level than does the other section, the extreme outer end of the outer section of each of said bottom faces curving sharply upward and forming a rounded corner at the juncture of the same with the adjacent vertical edge face of the corresponding punch.

4. A pair of dies for shearing and punching a pair of complementary tongues from a metal strip or bar, comprising a stationary horizontal lower die having an elongated die opening or slot, a vertically-movable upper die having thereon two parallel punches adapted to move into and out of said slot, said punches being spaced apart from each other and each being a sliding fit in the corresponding end of said slot, each punch having a bottom face forming with the front and back faces shearing edges, each bottom face comprising an inner section extending upwardly and inwardly at a considerable angle to the horizontal and an outer section extending upwardly and outwardly at a much smaller angle and terminating at a much lower level than does the other section, and a stationary wedge-shaped bar extending across the opening in the lower die midway between said punches, the sharp edge of the wedge facing upwardly and lying a considerable distance below the top of the lower die.

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