Oct. 18, 1938. H. E. SCHADE 2,133,477

PLATE BENDING PRESS

Filed June 23, 1937 3 Sheets-Sheet 1

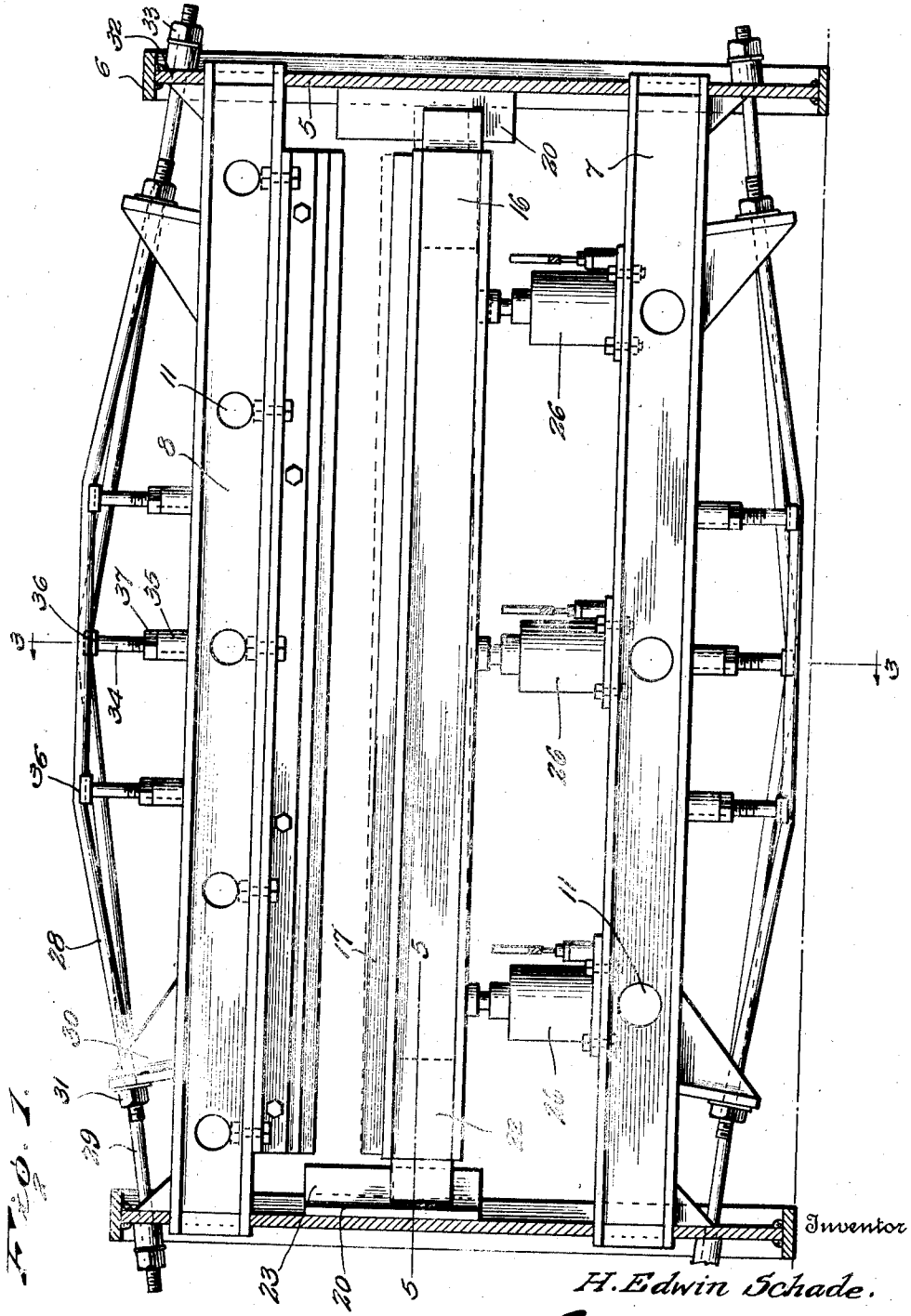


Fig. 1.

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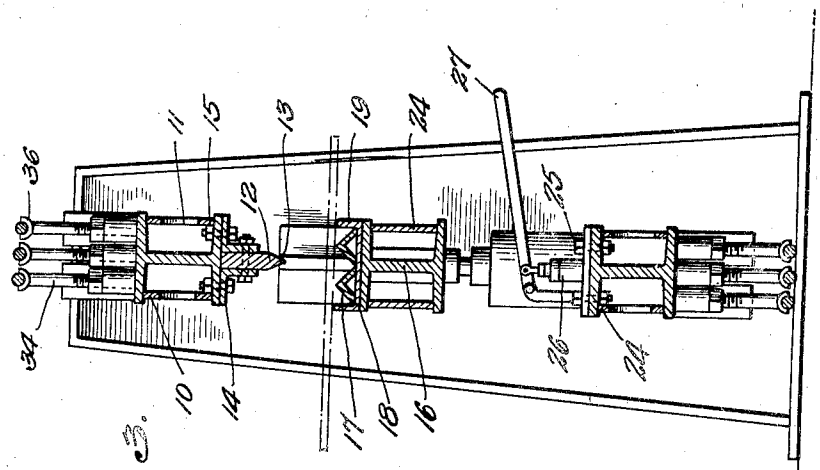


Fig. 3.

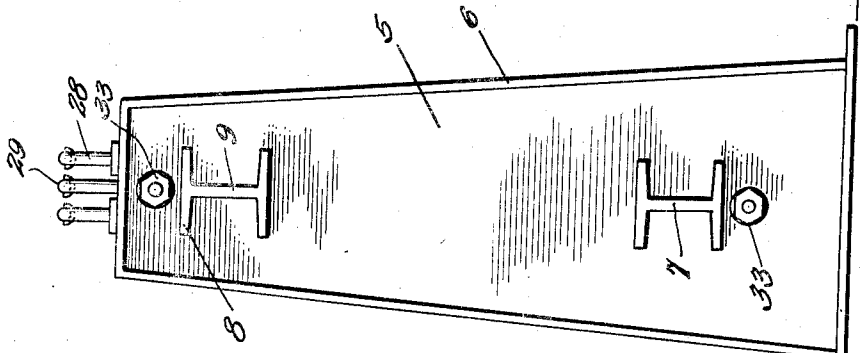


Fig. 2.

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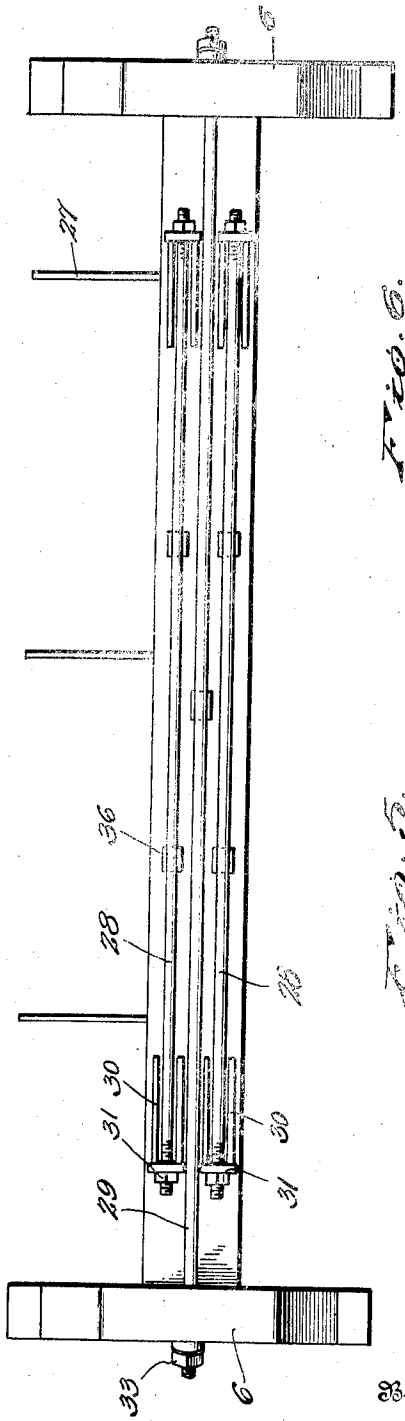


Fig. 4.

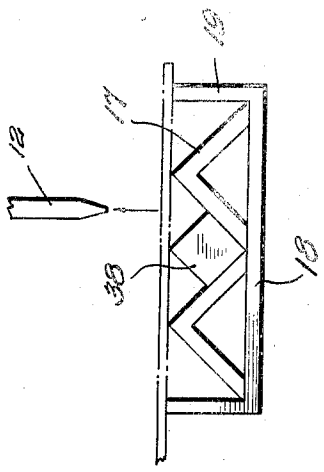


Fig. 6.

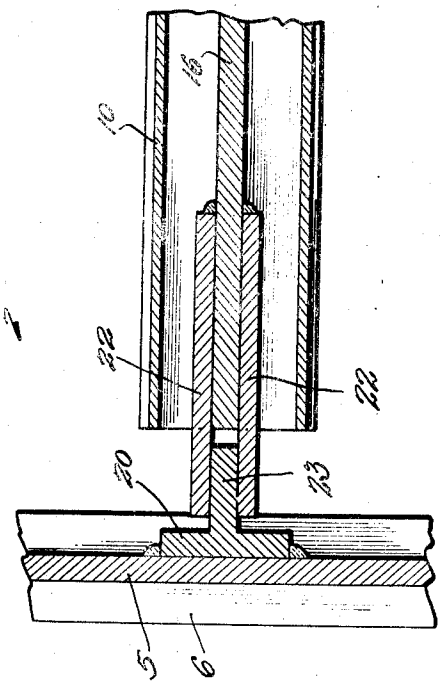


Fig. 5.

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UNITED STATES PATENT OFFICE

2,133,477

PLATE BENDING PRESS

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Application June 23, 1937, Serial No. 149,950

4 Claims. (Cl. 153—21)

This invention relates to metal working machines and more particularly to a shaping or forming press especially designed for bending metal sheets, plates, bars and the like.

The object of the invention is to provide a press of comparatively simple and inexpensive construction which will occupy very little space when installed in a machine shop and which is manually operable to effect bending of sheet metal plates into any desired angular form with very little labor on the part of the operator.

A further object of the invention is to provide a metal bending machine or press comprising relatively stationary and movable members carrying coacting shaping dies and a stationary base member forming a support for a plurality of jacks for exerting the desired pressure on said dies to effect the bending operation.

A further object is to so construct and mount the movable female die carrying member or bar on the supporting frame as to permit a slight canting or tilting movement thereof with respect to the male die carrying member whereby one end of a sheet metal plate may be bent into angular form without effecting the other end thereof.

A further object is to reinforce and strengthen the upper and lower stationary members of the supporting frame by the provision of tie or truss rods having adjusting screws associated therewith for regulating the tension of said rods.

A still further object of the invention is generally to improve this class of presses so as to increase their utility, durability and efficiency.

In the accompanying drawings forming a part of this specification and in which similar numerals of reference indicate corresponding parts in all the figures of the drawings:

Figure 1 is a side elevation of a plate bending press embodying the present invention,

Figure 2 is an end elevation,

Figure 3 is a vertical sectional view taken on the line 3—3 of Figure 1 and looking in the direction of the arrows,

Figure 4 is a top plan view,

Figure 5 is an enlarged transverse sectional view taken on the line 5—5 of Figure 1, and

Figure 6 is an enlarged detail view of the female die showing how said die can be used for making different angular bends.

The improved press forming the subject-matter of the present invention consists of a supporting frame including spaced end plates 5 having marginal reinforcing flanges 6 welded or otherwise rigidly secured thereto, said end plates being connected by a lower stationary member 7 and an upper stationary member 8. The members 7 and 8 are preferably in the form of I-beams, the opposite ends of which extend through correspondingly shaped openings 9 formed in the adjacent end plates 5 and to which they are welded or otherwise rigidly secured so as to impart the desired strength and stability to the supporting frame. The opposite sides of the stationary members 7 and 8 are provided with reinforcing plates 10 preferably welded to the I-beams and provided with a series of spaced openings 11 for the purpose hereinafter referred to. Secured to the lower face of the I-beam constituting the upper stationary member 8 is a male die 12 preferably in the form of a longitudinal bar having its lower end tapered, as indicated at 13. The die 12 is secured in position on the stationary member 8 by angle bars 14 which bear against the male die 12 and I-beam 8, respectively, and are secured thereto by bolts or similar fastening devices 15. It will here be noted that the openings 11, previously referred to, are arranged opposite the bolts 15 so that by inserting the fingers through the openings 11 the nuts of the bolts may be loosened to permit removal of the male die when necessary or the substitution of a different kind of die according to the nature of the work to be performed. Slidably mounted between the stationary members 7 and 8 is a movable member 16 also preferably in the form of an I-beam and this movable member carries a female die, indicated at 17. The female die consists of a bed plate 18 having upstanding retaining flanges 19 between which are fitted the angular dies and which angular dies coact with the male die for the purpose of bending a sheet of metal into angular form, as will be readily understood. Secured to the inner faces of the end plates 5 are vertical guides 20 and welded or otherwise secured to the web of the I-beam 16 at the opposite ends thereof are spaced plates 22 which receive the vertical ribs 23 of the adjacent guides, thereby to permit vertical sliding movement of the member 16 with respect to the upper stationary member 8. Attention is here called to the fact that there is a slight movement or play between the projecting ends of the guide plates 22 and the guides 20 so as to allow a slight tilting or canting of the movable member 16 with respect to the stationary member 8 when it is desired to press one end of the plate into angular form without effecting the other.

The lower stationary bar 7 is also preferably in the form of an I-beam and this lower I-beam as well as the movable I-beam 16 is provided with reinforcing side plates 24 similar in construction

to the side plates of the upper stationary member 8, with the exception that no openings are formed in the side plates of the movable bar 16. Mounted on the upper face of the I-beam constituting the lower stationary bar 7 and secured thereto by bolts 25 are a plurality of hydraulic jacks 26 having operating handles 27 by manipulating which the desired pressure may be exerted on the movable member 16 to force the female die of the latter in cooperative relation with the male die to effect the bending of a sheet metal plate. It will be understood, however, that instead of employing hydraulic jacks, any standard type of mechanically or manually operated jack may be employed.

The upper and lower portions of the supporting frame are reinforced and strengthened by the provision of a plurality of spaced tie rods 28 and 29, the tie rods 28 being disposed on opposite sides of the tie rods 29 and having their opposite ends threaded through suitable anchoring lugs 30 secured to the stationary member 8 for engagement with securing nuts 31 while the intermediate tie rod is preferably longer than the side tie rods 28 and extends through openings 32 in the end plates for engagement with clamping nuts 33. As a means for regulating the tension of the tie rods 28 and 29, there are provided a plurality of adjusting screws 34 having their lower ends threaded in suitable sockets 35 and their upper ends provided with saddles 36 in which are seated the adjacent tie rods, there being nuts 37 mounted on the adjusting screws and bearing against the sockets 35 whereby the screws may be locked in adjusted position.

In operation, a sheet metal plate or bar is introduced laterally between the stationary and movable members 8 and 16 and allowed to rest on the apexes of the female die sections, after which the jacks 26 are operated to force the female dies of the movable member 16 upwardly in engagement with the male die of the stationary member, thereby pressing the sheet or bar of metal between the angular faces of the female die to give the plate the desired angular formation. The jack is then operated to lower the movable member 16 when the bent plate or bar may be readily removed laterally from the press. By operating one of the end jacks without operating the other end jack, the movable member 16 will be canted or tilted at a slight angle with respect to the stationary member 8 so as to press or bend one end of a sheet metal plate without effecting the other end, the slight play between the plates 22 and guide rib 23 permitting this angular adjustment of the movable member 16, as previously stated. When it is desired to make a relatively small angular bend in a sheet metal plate or bar, a suitable reducing die 38 may be positioned between the angular faces of the female die, as best shown in Figure 6 of the drawings.

A press constructed in accordance with the present invention is not only strong and durable but will occupy very little space in a machine shop and can be operated without the employment of skilled labor to effect the bending of any kind of metal sheets or bars at a minimum expense and with very little labor on the part of the operator.

As the male and female dies are detachable, various types of dies may be employed according to the nature of the work to be performed. It will, of course, be understood that the presses may be made in different sizes and shapes and constructed of any desirable material without departing from the spirit of the invention.

Having thus described the invention, what is claimed as new is:

1. A machine of the class described comprising a supporting frame, a stationary member mounted on the frame, a movable member slidably mounted on the frame adjacent the stationary member and having a limited longitudinal tilting movement with respect thereto, coacting shaping dies carried by said members, a fixed bar coacting with the movable member, and pressure exerting jacks mounted on the fixed bar and adapted to be individually operated for forcing the movable member towards the stationary member and selectively tilting the movable member upwardly at one end.

2. A machine of the class described comprising a supporting frame, a stationary member mounted on the frame, guides secured to the frame beneath the stationary member, a movable member having its ends spaced from the guides and carrying terminal plates engaging opposite side faces of the guides, coacting shaping dies carried by the stationary and movable members, a stationary bar disposed beneath the movable member, pressure exerting jacks mounted on the bar and bearing against the movable member and adapted to be individually operated for actuating the coacting dies, and longitudinal truss members extending above the stationary member and below the bar and operatively connected with the supporting frame.

3. A machine of the class described comprising a supporting frame including flanged end plates, upper and lower I-beams connecting the end plates and having their terminals projecting through openings in said end plates, a male shaping die carried by the upper I-beam, guides extending laterally from the end plates between said I-beams, a movable member slidably mounted on the guides and having a limited vertical tilting movement with respect thereto to permit tilting movement of said movable member with respect to the male shaping die, pressure exerting jacks mounted on the lower I-beam and individually operable for forcing the movable member towards the upper I-beam, anchoring lugs secured to the upper and lower I-beams, outer tie rods disposed at the upper and lower ends of the supporting frame and engaging said anchoring lugs, and central tie rods connecting the end plates of the supporting frame.

4. A machine of the class described comprising a supporting frame including end plates, upper and lower stationary I-beams connecting the end plates and supported thereby, reinforcing plates secured to and disposed at opposite sides of the I-beams and provided with spaced openings, a male shaping die carried by the upper I-beam, bolts for detachably securing the male shaping die to the lower face of the I-beam and disposed adjacent said openings and accessible therethrough, a movable member slidably mounted on the frame between the upper and lower I-beams and having a limited vertical tilting movement with respect to the male shaping die, a female shaping die carried by the movable member and coacting therewith, and pressure exerting jacks mounted on the lower I-beam for supporting and vertically shifting the movable member.

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