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1,441,047.

W. VOLLMER.
MACHINE FOR BENDING METAL.
FILED JULY 6, 1920.

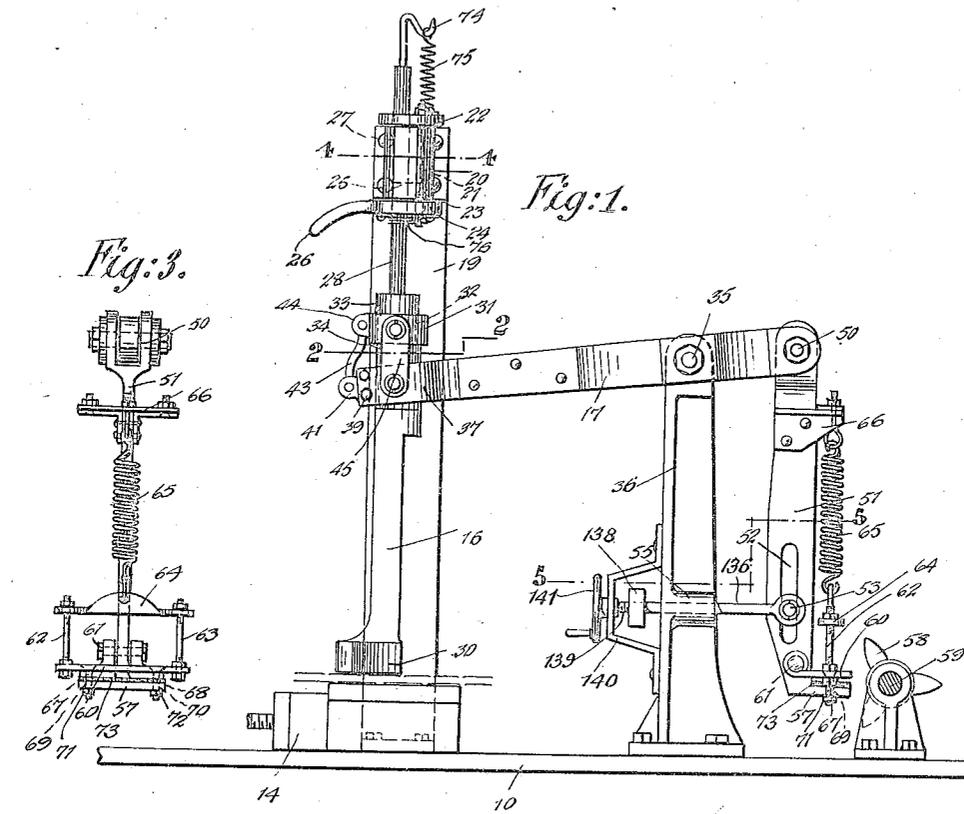


Fig. 3.

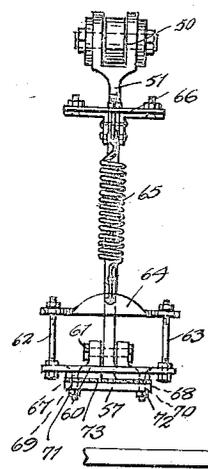


Fig. 1.

Fig. 4.

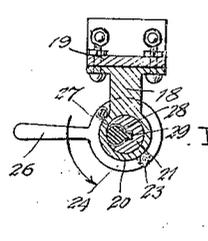


Fig. 2.

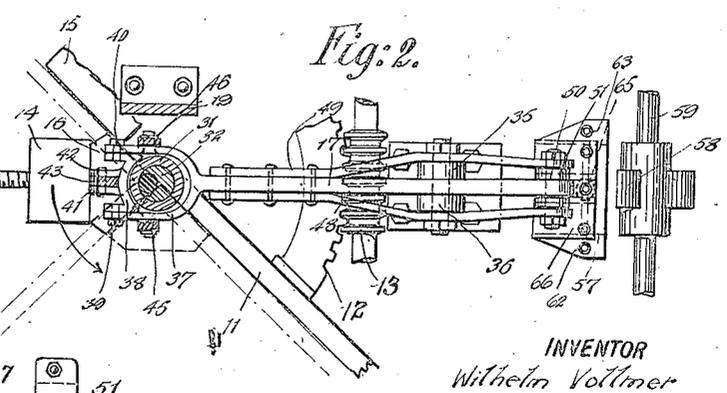
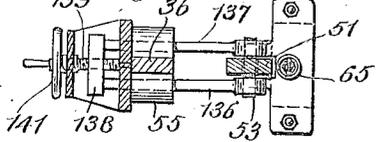


Fig. 5.



INVENTOR
Wilhelm Vollmer
BY *E. P. Geipel.*
ATTORNEY

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UNITED STATES PATENT OFFICE.

WILHELM VOLLMEER, OF BROOKLYN, NEW YORK.

MACHINE FOR BENDING METAL.

Application filed July 6, 1920. Serial No. 394,035.

To all whom it may concern:

Be it known that I, WILHELM VOLLMEER, a citizen of the United States, and a resident of the borough of Brooklyn, in the city of New York, county of Kings, and State of New York, have invented certain new and useful Improvements in Machines for Bending Metal, of which the following is a description.

The present invention relates to improvements in machines for bending metal, and more especially angle iron, and constitutes an improvement upon the machine disclosed in my U. S. Patent No. 1,080,309, dated December 2, 1913.

An object of the invention is to provide a hammer mechanism, adapted to cooperate with the bending mechanism, and which is so designed as to produce a positive application of the hammer blow to the metal, and particularly a blow in the direct line of force of the hammer during its movement.

I further propose to provide improved means for regulating the hammer as the metal is bent, to the end that the machine will be operated with facility.

It is a further object to provide improved actuating means for the hammer, and which, as will more fully hereinafter appear, will be shock absorbent, and will eliminate to a very great extent, rack and tear upon the machine.

With these and other objects in view, an embodiment of my invention is shown in the accompanying drawings, and this embodiment will be hereinafter more fully described with reference thereto, and the invention will be fully pointed out in the claims.

In the accompanying drawings:

Figure 1 is a front elevation of parts of the machine constituting my improvements.

Figure 2 is a plan view thereof, partly in section along the line 2—2 of Figure 1, and showing parts of the bed plate and the metal bending mechanism.

Figure 3 is an end view of the hammer-actuating mechanism.

Figure 4 is a sectional view taken along the line 4—4 of Figure 1, and

Figure 5 is a horizontal sectional view taken on the line 5—5 of Figure 1.

Similar reference characters indicate corresponding parts throughout the several figures of the drawings.

Referring to the drawings, the metal bend-

ing machine comprises generally a bed plate 10, a metal bending arm 11, pivoted thereon, and adapted to be oscillated about its pivot by means of a circumferential rack 12 engaged by a worm 13, a clamp 14 adapted to clamp the metal strip against the support 15, and a vertical reciprocating hammer 16, adapted to be operated by the oscillation of the lever arm 17. In operation the bending arm 11 is gradually moved about its pivot, thereby bending the metal strip about the clamp 14, and at the same time the hammer falls in quick succession upon the upper side of the metal, thereby maintaining the cross sectional transverse dimension of the metal at the bend, and keeping the horizontal flange of the metal in the case of the bending of angle iron, from buckling up or down at the point of bending.

According to my improvements a hammer supporting head 18 is mounted upon the upper end of a supporting standard 19, said head being provided with a cylindrical portion 20, having a cylindrical bore extending vertically therethrough, and within the bore there is rotatably mounted a cylindrical head 21 provided at its upper end with a flange 22, connected by vertically disposed tie rods 23 to a flange 24 of a cylindrical portion 25 extending upwardly into the head portion 21, so that the members 21 and 25 are adapted to be rotated together within the portion 20. For this purpose a lever or handle 26 is provided upon the flange 24. A vertically disposed cylindrical passage 27 is provided through the members 21 and 25, and is positioned eccentrically with its periphery passing through the axis of rotation of the members 21 and 25, a vertically disposed reciprocating shaft 28 being provided in said passage 27, the said shaft being keyed, as at 29, to prevent its relative turning movement within the passage. To the lower end of the shaft 28 there is connected the hammer 16. The head 30 of the hammer has two vertical faces at right angles to each other, the apex formed by the intersection of these faces being aligned with the vertical axis of rotation of the members 21 and 25, so that as the said members are rotated within the portion 20 of the head, the head of the hammer will swing about said apex as a center, while at the same time the weight of the hammer is directly beneath the shaft 28, so that as the hammer is raised, and drops,

as will hereinafter more fully appear, the blow upon the metal is positive, and in the direct line of force created by the shaft 28.

In spaced relation above the hammer 16 there is provided upon the shaft 28 a collar 31, in which a cylindrical and eccentric enlargement 32 of the shaft 28 is rotatably mounted, said collar being fixed against longitudinal movement upon the said enlargement by shoulders 33 and 34 above and below the collar. The enlargement, it will be noted, corresponds in its relation to the shaft, to the relation between the shaft and the members 23 and 25. The lever 17 is pivotally mounted at 35 at the upper end of a supporting standard 36, and at its forked portion there is provided a U-shaped brace 38 connected thereto by bolts 39 and 40, the intermediate portion of the brace being circumferential of the enlargement 32 of the shaft 28, and provided with spaced forwardly projecting ears 41 and 42, between which is pivotally connected one ear of a link 43, connected at its other end to ears 44 provided upon the collar 31, said collar being also connected at its sides by links 45 and 46 to the sides of the forked end of the lever.

The lever 17 is provided with braces 48 and 49 extending longitudinally along the opposite sides thereof, and the short arm of said lever is pivotally connected to a link bar 51 by means of a bolt 50 extending through the lever and the ends of the braces 48 and 49. The lower end of the link 51 is provided with a longitudinal slot 52, in which a bolt 53 is slidably engaged. This bolt connects the rods 136 and 137 to each other at one of their ends, said rods being slidably engaged in the guides 55 on the standard 36. The other ends of the rods are connected by a head block 138.

A bracket member 140 is fixed at its ends to the standard 36, and an adjusting screw 139 is rotatably mounted in this bracket. This screw has threaded engagement in the head block 138, and has a bearing at one of its ends in the standard 36. Upon the other end of said screw a suitable hand wheel 141 is fixed. It will be readily seen that by turning the screw 139, the link 51 may be angularly adjusted with respect to the lever 17. This particular adjusting means for the link 51 is disclosed in my prior Patent No. 1,800,309, hereinbefore referred to. A lip at the lower end of the link 51 projects in the path of a trip wheel 58, rotatably mounted in a bearing 59, adapted to be turned from any suitable source, the trip wheel in the present embodiment being illustrated as having three trip fingers equally spaced, adapted as the wheel is rotated, to engage the lip, forcing the link 51 downwardly, thereby raising the hammer 60, and, as the finger passes from engagement with the lip,

releasing the link and permitting the hammer to fall.

Above the lip 57 there is provided a plate 60, pivoted at the sides of the link 51, as at 61, and connected at its ends by tie rods 62 and 63, to a cross bar 64, to which is connected one end of a helical spring 65, the other end of said spring being connected to a bracket 66, mounted upon the link 51, said spring exerting an upward force upon the plate 60. A pair of depending guide rods 67 and 68 are provided at the under side of the plate 60, and extend through openings 69 and 70 in the lip 57, nuts 71 and 72 being respectively provided upon the ends of the rods 67 and 68 to limit the upward movement of the plate 60 away from the lip. A facing 73, of leather or other suitable material, is provided upon the upper side of the lip 57 in spaced relation to the inner side of the plate 60. This construction provides a yieldable contact of the fingers 58 of the trip wheel with the end of the link 51, which will absorb shock, and, as above pointed out, will relieve, to a great extent, rack and tear upon the machine.

It will be noted that the several parts of this construction are entirely adjustable. In order to vary the throw of the hammer, and also the frequency of the blows, the link 51 may be adjusted inwardly or outwardly about the pivot 50 by turning the screw 54, it being seen that when moved outwardly there is contact with the fingers 58 for a longer period than when the link is moved inwardly, and consequently the link will be moved further downwardly, and the throw of the hammer will be proportionately increased.

At the upper end of the shaft 28 there is provided a hook 74 connected by the spring 75 to the upper end of the member 21, this spring being adapted to increase the force of the hammer, the same being tensioned as the hammer is lifted, and contracted as the hammer is dropped. At the under side of the member 25 there is secured a coil spring 76 against which the enlargement 32 moves as the hammer is raised, and prevents jarring upon the under side of said member 25, and also reacts when expanded to increase the force of the downward dropping movement of the hammer.

With my present improvements a machine is provided in which the blow of the hammer is directed with great force, in a positive manner, and without any dissipation of power through divergence of the lines of force between the source and the point of application.

I have described a preferred and satisfactory embodiment of my invention, but it is obvious that changes may be made therein within the spirit and scope thereof, as defined in the appended claims.

I claim:

1. In a metal bending machine, a hammer mechanism consisting of a vertically reciprocating shaft, a hammer supported upon the lower end of said shaft, a rotatable bearing for said shaft, a support for said bearing, said bearing being provided with an eccentrically positioned, vertically disposed passage, through which said shaft is adapted to reciprocate, means for reciprocating said shaft, and means for turning said bearing, whereby said hammer is turned about the axis of rotation of said bearing.
2. In a metal bending machine, a hammer mechanism consisting of a vertically reciprocating shaft, a hammer supported upon the lower end of said shaft, a rotatable bearing for said shaft, a support for said bearing, said bearing being provided with an eccentrically positioned, vertically disposed passage through which said shaft is adapted to reciprocate, the periphery of said passage passing through the axis of rotation of said bearing thereon.
3. In a metal bending machine, a hammer mechanism consisting of a vertically reciprocating shaft, a hammer supported upon the lower end of said shaft, a rotatable bearing for said shaft, a support for said bearing, said bearing being provided with an eccentrically positioned, vertically disposed passage through which said shaft is adapted to reciprocate, the periphery of said passage passing through the axis of rotation of said bearing thereon, and a head on said hammer having vertically disposed faces at right angles to each other, and intersecting in line with the axis of rotation of said bearing,

said head being directly beneath said reciprocating shaft.

4. In a metal bending machine, a vibrating hammer, a lever connected thereto, a link also connected to said lever, intermittent means for moving said link and lever, and means for adjusting said link toward and from said intermittent means.

5. A metal bending machine consisting of a vertically reciprocating hammer; a tripping lever of the first-class, a support for the fulcrum of said tripping lever, means connecting one end of said lever to said vertical reciprocating member, a depending link at the other end of said lever pivotally connected thereto, a lip on said lever, cushioning means carried by said lip, and a trip wheel adapted to intermittently engage said lip to lift and release said lever, whereby said hammer is raised and dropped.

6. A metal bending machine consisting of a vertically reciprocating hammer, a tripping lever of the first-class, a support for the fulcrum of said tripping lever, means connecting one end of said lever to said vertical reciprocating member, a depending link at the other end of said lever pivotally connected thereto, a lip on said lever, cushioning means carried by said lip, a trip wheel adapted to intermittently engage said lip to lift and release said lever, whereby said hammer is raised and dropped, and means for adjusting said link to regulate the period of engagement of said trip wheel with said lever.

In testimony that I claim the foregoing as my invention I have signed my name.

WILLIAM VOLLMER.