July 23, 1929. C. G. CRONWALL 1,722,178

BENDING AND FORMING MACHINE

Filed Jan. 3, 1928

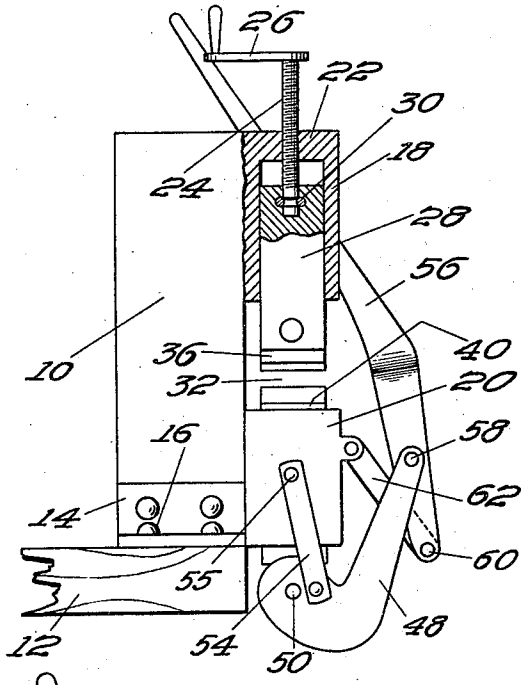


FIG. 1

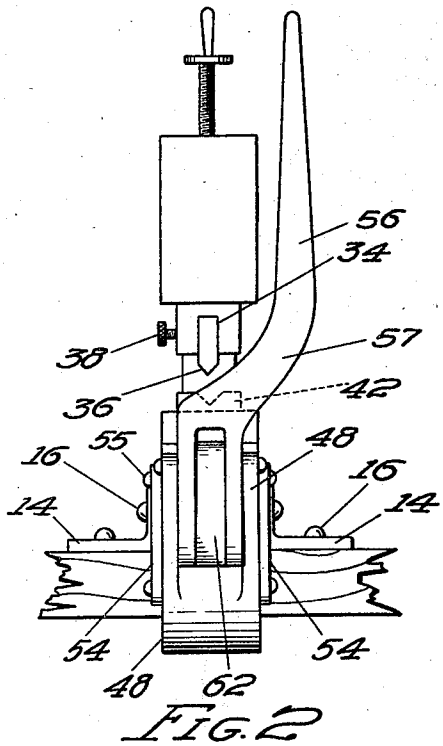


FIG. 2

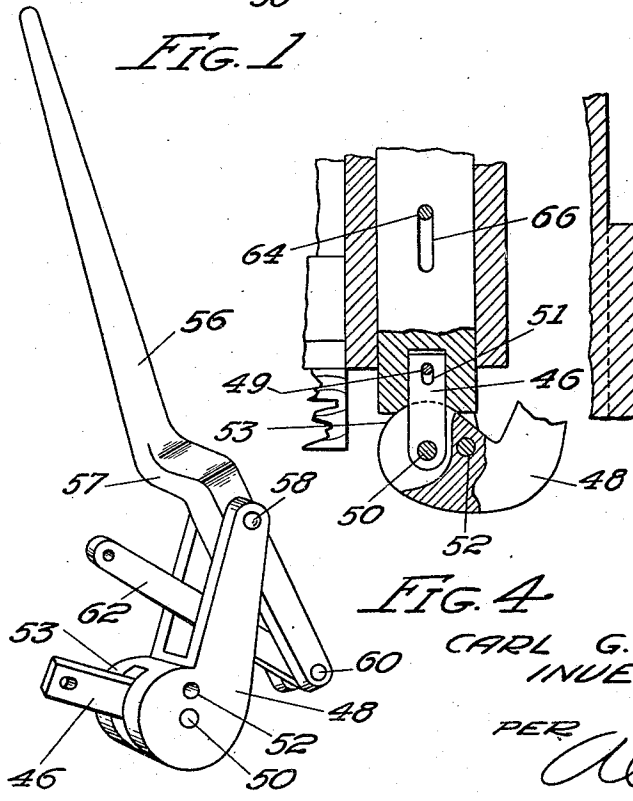


FIG. 3

FIG. 4

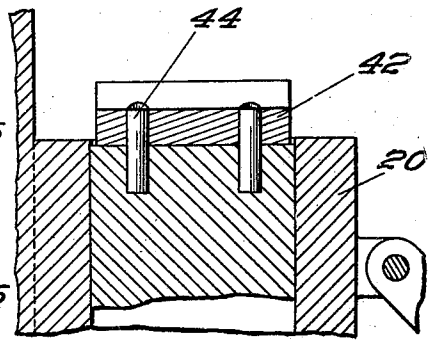


FIG. 5

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BENDING AND FORMING MACHINE.

Application filed January 3, 1928. Serial No. 244,178.

This invention relates to improvements in a stamping, bending and shearing mechanism, and has for one of its principal objects the provision of a compound acting eccentric lever devised to render a high value of mechanical advantage.

Another important object of the invention is its flexibility of use. It is adapted to be used in connection with such machines as punch presses, shearing machines, bending machines and the like, and provides a means for completing such operations both efficiently and quickly.

Another and still further important object of the invention is the provision of means for adjusting the space between the jaws or dies of such machines to allow the admission between the jaws of work of different thicknesses. Incidentally, this adjustable gap arrangement permits of readily changing and adjusting the dies used therewith.

A still further object of the invention is the provision of a simple and rugged device, easily constructed and hence cheaply manufactured.

Other and further important objects of the invention will be apparent from the disclosures in the accompanying drawing and following specification.

The invention in a preferred form is illustrated in the drawings and hereinafter more fully described.

In the drawings:

Figure 1 is a side elevation of the device, partly in section, illustrating the compression mechanism train in assembled position.

Figure 2 is a front elevation of the same.

Figure 3 is a detail perspective, illustrating the compound eccentric lever.

Figure 4 is a fragmentary sectional view, showing the vertical slidable compression element.

Figure 5 is a sectional view of the die retaining means.

As shown in the drawings:

The reference numeral 10 indicates the body portion of the device, which is preferably mounted on a supporting foundation 12 by means of the angle irons 14, and the retaining bolts or rivets 16.

Integral with the body 10 are two hollow guide portions 18 and 20 rectangular in cross section. The upper guide 18 has a cover 22 through which an adjusting screw 24 acts, rotated by a handle 26. The lower end of this screw is rotatably connected to a die support 28 by means of a socket connection 30. This die support 28 may accordingly be raised or lowered at will, increasing or decreasing the operating gap 32 between the dies. At the lower end of the member 28 an aperture 34 is provided, as shown best in Figure 2, into which a die 36 may be inserted. The die is held rigidly in position by means of a locking-screw 38.

Slidably positioned in the lower guide 20 is another die support 40, the upper portion of which is constructed to receive a die 42, said die being mounted on this member by means of pins 44, as shown in detail in Figure 5.

Mounted in the lower end of the die support 40 is a link 46, best shown in Figure 4. The upper end of the link 46 is adapted for a slight slidable movement in its socket in member 40, being provided with a slot 51 in which a retaining pin 49 acts. This arrangement allows for wear at the bearing surface 53.

The other end of the link 46 is pivotally connected to a co-operating cam link 48 at the bifurcated pivot point 50. Pivotally connected also to the lower portion of link 48, and with a bifurcated pivot point 52, eccentrically positioned with respect to the pivot point 50, are two links 54, as shown in Figures 1 and 2. The upper ends of these links are connected pivotally to the outer face of the guide member 20, at the points 55.

The upper end of the cam-link 48 is pivotally connected to a lever arm 56 by a bifurcated pivot point 58, this being located substantially above the lower end of the lever arm. Pivotally connected at 60 to the lowermost end of the arm 56 is connecting rod 62 which has its upper end pivotally connected to the guide 20.

It can be readily observed that from this lever arrangement the member 40 has only one degree of freedom, namely, an up and down motion in a vertical line. On pulling the lever arm 56 forwardly and downwardly, the upper end of the link 48 is given a similar downward and outward motion, the outward motion being taken up by the link 54, hence only one motion remains to the point 50, namely an upward motion along a vertical line, the longitudinal axis of the guide members 18 and 20. The lever arm is offset

as shown at 57 to allow of a proper action with respect to the body 10.

The pin 64 acting in the slot 66 merely restrains the downward motion of the compression member 40, in turn maintaining the lever arm 56 in a substantially upright position when the jaws 36 and 42 are open, and overthrow of the handle positively is prevented. The lower part of the slot 66 never comes in contact with the pin 64 as the upward motion of the compression member 40 is governed by the distance between the centers of the pivot points 50 and 52, which is a shorter distance than the distance between the centers of curvature of the upper and lower portions of the slot 66. Thus the pin 64 is in no danger of being sheared.

It will be apparent from the above disclosure that herein is provided a lever arrangement which may be used in combination with various types of machines requiring compressive force for shearing, bending, etc., a mechanism which acts quickly, conveniently and with great force, a mechanism which is of comparatively simple construction and at the same time is strong and rugged.

I am aware that many changes may be made and numerous details of construction varied throughout a wide range without departing from the principles of this invention, and I therefore do not purpose limiting the patent granted hereon otherwise than as necessitated by the prior art.

I claim as my invention:

1. In a machine using compressive force, a body, a plurality of guides on the body, a plurality of compression members slidably positioned in the guides, and means for imparting vertical motion to the lower compression member, said means comprising a system of compound levers, one of said levers having a rounded end which makes sliding contact with the lower end of the said compression member.

2. In a machine using compressive force, a body, a plurality of hollow guides integral with the body, each of said guides being rectangular in cross-section, a plurality of compression members slidably positioned in the guides, and means for imparting a vertical motion to the lower compression member, said means comprising a system of compound levers, one of said levers having a rounded end in the form of an arc of a circle which makes contact with the lower end of the said compression member, and additional means for restraining lateral motion of the said rounded end lever, said additional means including a link pivotally connected to the rounded end link at one end and slidably pinned in a socket in the lower compression member.

3. A machine using compressive force, including a body, a plurality of guides integral with the body, a plurality of compression members slidably positioned in the guides, and means for bringing the compression members together in operating position with each other, said means comprising a lever arm, a floating fulcrum link pivotally connecting the guide and the end of the lever arm, a second link, forked and substantially L shaped, pivotally connected to the lever arm substantially above its end, a third link pivotally connected to the other end of the L shaped second link, said third link having its other end slidably mounted in a compression member, a fourth link pivotally connected to the second link and having its point of connection eccentrically placed with respect to the pivotal connection between the third link and the L shaped link, the other end of the fourth link being pivotally connected to the outside of the guide.

4. A machine using compressive force, comprising a body, a plurality of guides integral with the body, a plurality of compression members slidably positioned in the guides, a system of compound eccentric levers for producing the compressive force, said system including an operating lever arm, and means for maintaining the lever arm in a substantially vertical position when the compression members are disengaged, said means including a pin rigidly fixed in one guide and a slot in the corresponding compression member in which the pin acts.

5. In a machine using compressive force, a body, a plurality of hollow guides integral with the body, each of said guides being rectangular in cross-section, a plurality of compression members slidably positioned in the guides, and means for imparting a vertical motion to the lower compression member, said means comprising a system of compound levers, one of said levers having a rounded end in the form of an arc of a circle which makes contact with the lower end of the said compression member, and additional means for restraining lateral motion of the said rounded end lever, said additional means including a link pivotally connected to the rounded end link at one end and slidably pinned in a socket in the lower compression member, said pivotal connection including a pin at the center of curvature of the rounded end of the lever.

In testimony whereof I affix my signature.

CARL G. CRONWALL.