March 17, 1931. M. R. HATCH 1,796,786

METAL DRAWING PRESS

Filed Dec. 16, 1927 2 Sheets-Sheet 1

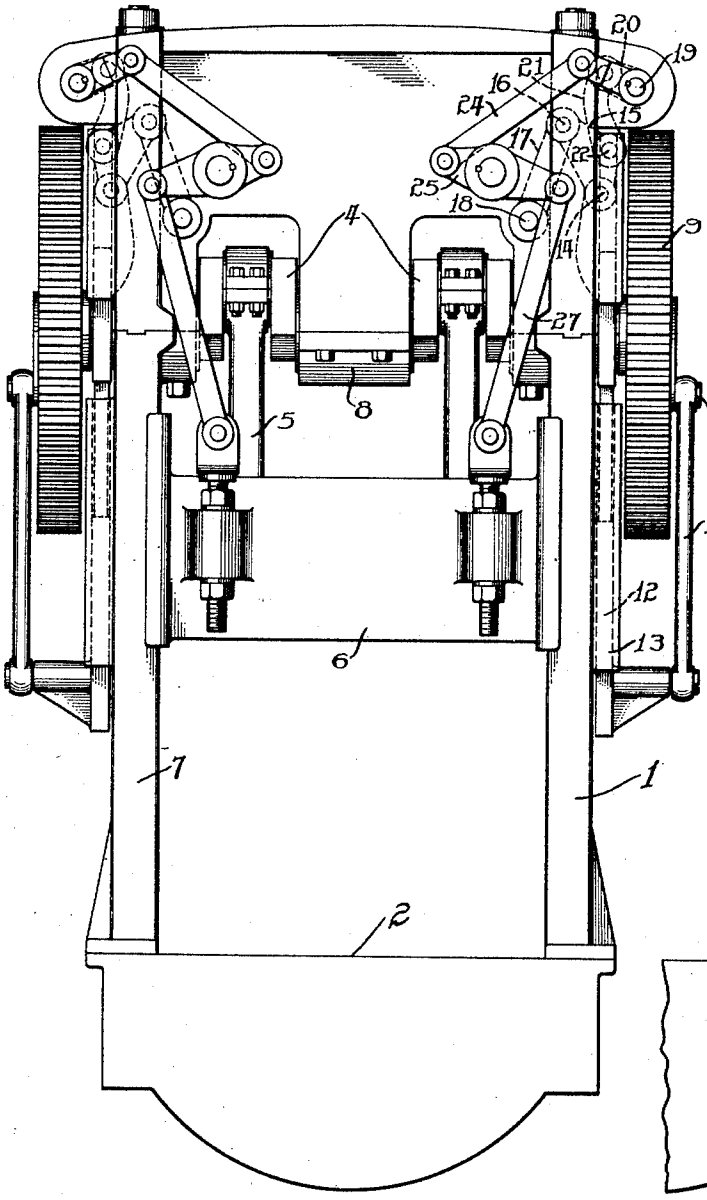


Fig. 1

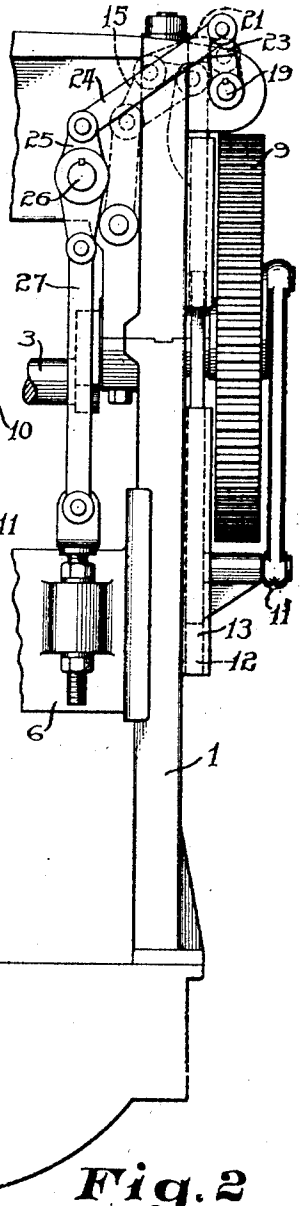


Fig. 2

Inventor

Meredith R. Hatch

By Owen & Owen

Attorneys

March 17, 1931. M. R. HATCH 1,796,786

METAL DRAWING PRESS

Filed Dec. 16, 1927 2 Sheets-Sheet 2

Fig. 3

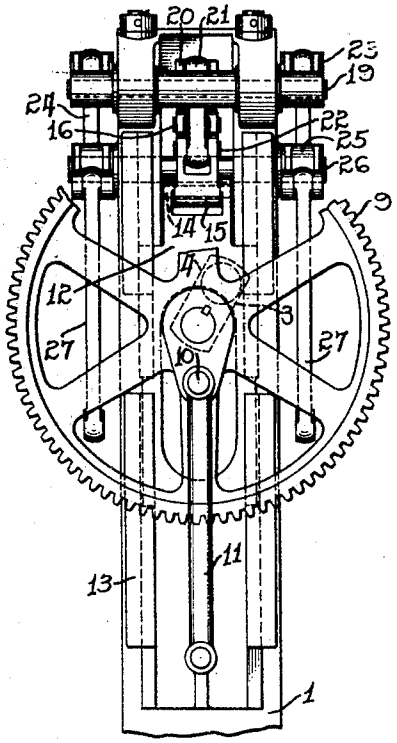
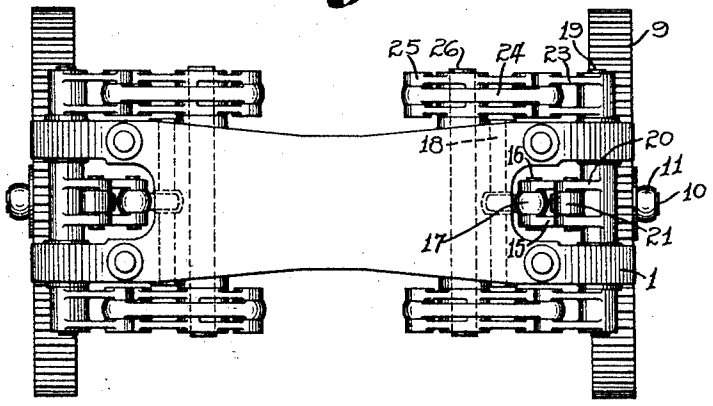


Fig. 4



Inventor

Meredith R. Hatch

By Owen & Owen

Attorneys

Patented Mar. 17, 1931 1,796,786

UNITED STATES PATENT OFFICE

MEREDITH R. HATCH, OF TOLEDO, OHIO, ASSIGNOR TO THE TOLEDO MACHINE & TOOL COMPANY, OF TOLEDO, OHIO, A CORPORATION OF OHIO

METAL-DRAWING PRESS

Application filed December 16, 1927. Serial No. 240,357.

This invention relates to metal drawing presses of the type having a reciprocatory blank-holder, in the inside of which is a metal deforming or shaping plunger.

An important object of this invention is to provide mechanism for so operating the blank-holder that a substantial dwell is produced when the blank-holder is moved to holding position so that the work is properly held for a considerable period of time, during which the plunger may continue its movement.

Other objects and advantages will hereinafter appear.

In one aspect the invention resides in the provision of a metal drawing press having a vertically disposed reciprocable member which may be flexibly connected to a rocker member. The rocker member is operatively connected to a blank-holder in such a manner that upon movement of the rocker member, reciprocatory movement is imparted to the blank-holder. Means are provided for causing the rocker member to remain stationary toward the end of the movement of the reciprocable member in one direction, but while the rocker member remains stationary, continued movement of the reciprocable member may take place. This enables the blank-holder to remain in work-holding position for a substantial period of time during the further movement of the deforming plunger, and by this arrangement the blank-holder actually holds the work without any movement whatsoever.

The invention is shown by way of illustration in the accompanying drawings, in which:

Fig. 1 is a front elevation of a metal drawing press embodying the invention and showing the blank-holder in elevated position;

Fig. 2 is a fragmentary elevation of one side of the press showing the blank-holder in the lower or holding position;

Fig. 3 is a side elevation of the press; and

Fig. 4 is a top plan view of the press.

The illustrated embodiment of the invention comprises a press having a frame 1 provided with a support 2 for a matrix (not shown). At the upper portion of the press is a plunger operating crank shaft 3 having cranks 4, which are connected by links or connecting rods 5 to the work-deforming or shaping plunger (not shown). The plunger is surrounded and guided by a blank or work-holder 6, which is guided in ways on the sides 7 of the frame 1, and is actuated by mechanism constituting the subject matter of the present invention.

The crank shaft 3 is journaled in bearings mounted on the sides 7 of the frame, and an intermediate bearing 8 which supports the central portion of the crank shaft so that the crank shaft is effectively supported adjacent the points at which power is applied to the crank shaft to drive it. The crank shaft is provided at its ends with twin driving gears 9 which are spaced from the sides 1 of the frame, power being transmitted to these gears by pinions (not shown).

Power is transmitted from the driving gears 9 to the blank-holder 6 by similar mechanism at opposite sides of the frame, it being deemed sufficient here to describe the arrangement and operation of the mechanism at one side of the frame. On the outer side of each driving gear is a crank 10, which is connected through a link 11 to a vertically disposed reciprocatory slide 12 movable in a guide 13. The slide 12 is reciprocable between the driving gear 9 and the side 1 of the frame, and extends upwardly to a point adjacent the upper end of the driving gear 9.

Pivoted to the upper end portion at 14 is a bell-crank lever 15, the opposite end of which is pivoted at 16 to an arm 17 which is pivoted at 18 to the machine frame. Disposed above and outwardly from the slide 12 is a rock shaft 19, the axis of which is positioned at right angles to the axis of the crank shaft 3. Fixedly secured to the rock shaft 19 is an arm 20 extending outwardly therefrom, and the outer end of the arm 20 is connected at 22 by a link 21 to an intermediate portion or elbow of the bell-crank lever 15. An arm 23 is also fixed to the rock shaft 19 and extends outwardly therefrom in substantially parallel relation to the arm 20, and a link 24 connects the arm 20 to a rocker lever 25 mounted intermediate its ends on and rotatable with a rock shaft 26 sup-

ported by the press frame. The opposite end of the rocker lever 25 is connected by a link 27 to the blank-holder 6, it being understood that the arm 20 and link 27 are duplicated at the front and back of the frame.

In operation reciprocatory movements are imparted to the slide 12 by the crank 10 through the link 11. When the slide 12 moves upwardly, power is transmitted through the bell-crank lever 15, link 21 and arm 20 to rock the shaft 19 in a clockwise direction (Figs. 1 and 2). Clockwise movement of the shaft 19 imparts downward movement to the blank-holder 6 through the arm 23, link 24, rocker lever 25 and link 27, as will readily be apparent.

During the upward movement of the slide 12, the outer end of the bell crank lever 15 is prevented from moving upwardly by the arm 17 which swings outwardly away from the slide to permit outward movement of the pivotal connection 16 between the bell crank lever 15 and arm 17. At the same time the link 21 is swung gradually outwardly from the slide 12 until the parts are arranged in such position that in continued upward movement of the slide, the link 21 is permitted to swing about its pivotal connection with the arm 20 without imparting to the arm any further movement.

This point is reached adjacent the end of the upward travel of the slide 12, but prior to the completion of its stroke so that continued movement of the slide may be had without imparting further rocking movement to the rock shaft 19. It will be apparent that the arms 20 and 23 of the rock shaft 19 are disposed in substantially a vertical position and held in such position during the final upward movement of the slide 12.

When the arms 20 and 23 of the rock shaft 19 are disposed in substantially vertical position the rocker lever 25 is moved to a similar position to position the blank-holder in its extreme lower blank-holding position. From the above description it is apparent that the rock shaft 19 is held stationary for a period of time when the blank-holder 6 has been moved to its extreme lower blank-holding position and the slide 12 is permitted to move upwardly without imparting movement to the rock shaft 19.

When the slide 12 commences its downward movement, the link 21 is swung about its pivotal connection with the rock shaft arm 20 and the radius from the rock shaft 19 to the point 22 remaining the same during this movement. When the link 21 is swung inwardly to such point that the radius between the rock shaft 19 and pivotal connection 22 is decreased by the arm 17 and bell crank lever 15. It will be noted that there is substantial movement of the slide 12 in both directions without imparting movement to the rock shaft 19. As the slide 12 continues its downward movement the rock shaft is moved in a counter clockwise direction, and through the above described connection, the blank-holder 6 is moved upwardly away from the work.

It is manifest from the above description that the slide 12 is flexibly connected to the rock shaft 19, and during movement of the slide in both directions at the upper end of the stroke, the connection is flexed in such a manner that the rock shaft is retained stationary a substantial period while the slide 12 continues its movement, at which time the metal deforming plunger continues its downward movement and starts upwardly. This provides a relatively long and continued dwell for the blank-holder 6 so that the work is securely and satisfactorily held in place during the completion of the working stroke of the deforming plunger.

While I have described my improved machine in more or less detail to comply with the requirements of the statute, it is, nevertheless, desired that this detailed description be considered merely as illustrative and not as limiting, and it is to be understood that changes and modifications may be made by those skilled in this art without departing from the invention as defined in the following claims.

What I claim as new and desire to secure by Letters Patent is:

1. A press having a vertically reciprocating blank-holder, a reciprocating slide, a crank connected to operate said slide, and means for operatively connecting said slide and blank-holder for imparting reciprocatory movements thereto and for holding said blank-holder in blank-holding position a substantial period of time, said means comprising a rock member spaced from said slide, lever and link means constituting a flexible connection between said slide and rock member for imparting rocking movements thereto from reciprocatory movements of said slide, pivoted lever means for positively flexing said connection near the end of the stroke of said slide for preventing further rocking movement of said member and for holding said member against return movement during the continued movement of said slide said pivoted lever means forming no portion of the operative connection between said parts, and means for imparting reciprocating movements to said blank-holder from rocking movements of said rock member.

2. A press having a reciprocable blank-holder, a crank shaft, and means for operatively connecting said crank shaft and blank-holder, said means comprising a slide operatively connected for reciprocation to said crank shaft, a rock shaft spaced vertically from said slide, lever and link members constituting a connection between said slide and

rock shaft for imparting rocking movements to the latter from reciprocating movements of the former, means having a fixed pivot engaging one of said lever and link members for gradually flexing said connection until further reciprocating movement of said slide ceases to impart rocking movement to said rock shaft, and an operative connection between said rock shaft and blank-holder.

3. A press having a frame, a blank-holder, a crank shaft, a slide connected to be reciprocated by said crank shaft, a bell crank pivoted at one end to said slide, an arm pivoted at one end to said frame and at the opposite end to an intermediate part of said bell crank, a rock shaft having an arm fixed thereto, a link connecting said arm and the opposite end of said bell crank, and means for operatively connecting said rock shaft and blank-holder for imparting reciprocating movements to the latter from rocking movements of said rock shaft.

4. A press having a frame, a blank-holder reciprocatory in said frame, a crank for operating said blank-holder, and means connecting said crank and blank-holder for reciprocating said blank-holder and holding the same in work-holding position for a substantial period of time, said means comprising a vertically disposed reciprocatory slide connected for operation to said crank, a rock shaft spaced vertically from said slide, a bell crank lever pivoted at one end to said slide, an arm pivoted at one end to said frame and having its opposite end pivoted to the opposite end of said bell crank, an arm fixed to said rock shaft, a link connecting the intermediate part of said bell crank and said fixed arm, and means operatively connecting said rock shaft and blank-holder for imparting reciprocating movements to the latter from rocking movements of the former.

5. A press having a frame, a blank-holder reciprocatory in said frame, power means, and means connecting said power means and blank-holder for imparting reciprocatory movements to the latter from rocking movements of the former, said connecting means comprising a vertically disposed reciprocatory slide, a rock shaft, a flexible connection between said slide and said rock shaft for imparting rocking movements to said shaft from reciprocating movements of said slide, a lever pivoted at one end to said frame and joined at its opposite end to said flexible connection for flexing said connection toward the end of the stroke of said slide for holding said rock shaft stationary irrespective of continued movement of said slide, and an operative connection between said rock shaft and blank-holder.

6. A press having a frame, a blank-holder reciprocatory in said frame, power means for reciprocating said blank-holder, and an operative connection between said power means and blank-holder, said connection comprising a vertically disposed reciprocatory slide operatively connected to said power means, a rock shaft, a flexible driving connection between said slide and rock shaft, means to flex said connection after a predetermined movement of said rock shaft for causing said shaft to remain stationary irrespective of continued movement of said slide, and an operative connection between said rock shaft and blank-holder.

7. A press having a frame, a crank shaft, a blank-holder reciprocatory in said frame, a driving gear on the outer end of said crank shaft and spaced from said frame, a crank on the outer side of said gear, a slide interposed between said gear and frame, a link operatively connecting said crank and slide, a transverse rock shaft at the upper part of the frame, a flexible driving connection between said slide and rock shaft for imparting rocking movements thereto, means to flex said connection after a defined movement of said rock shaft for causing said rock shaft to remain stationary irrespective of continued movement of said slide, and an operative connection between said rock shaft and blank-holder for imparting reciprocating movements thereto from rocking movements of said rock shaft.

8. In a press, a plunger operating crank shaft, a blank-holder, and an operative connection between said crank shaft and blank-holder to cause a substantial dwell of the latter when in holding position, said connection including a vertically disposed reciprocable member, a rocker member connected to operate said blank-holder, a flexible connection between said reciprocable member and rocker member, and means to gradually flex said connection before the end of the said reciprocable member's stroke for permitting said rocker member to remain stationary during the remainder of the stroke of said reciprocable member.

In testimony whereof I have hereunto signed my name to this specification.

MEREDITH R. HATCH.