Oct. 14, 1930. R. W. GLASNER 1,778,358

DRAWING PRESS

Filed July 18, 1930 4 Sheets-Sheet 1

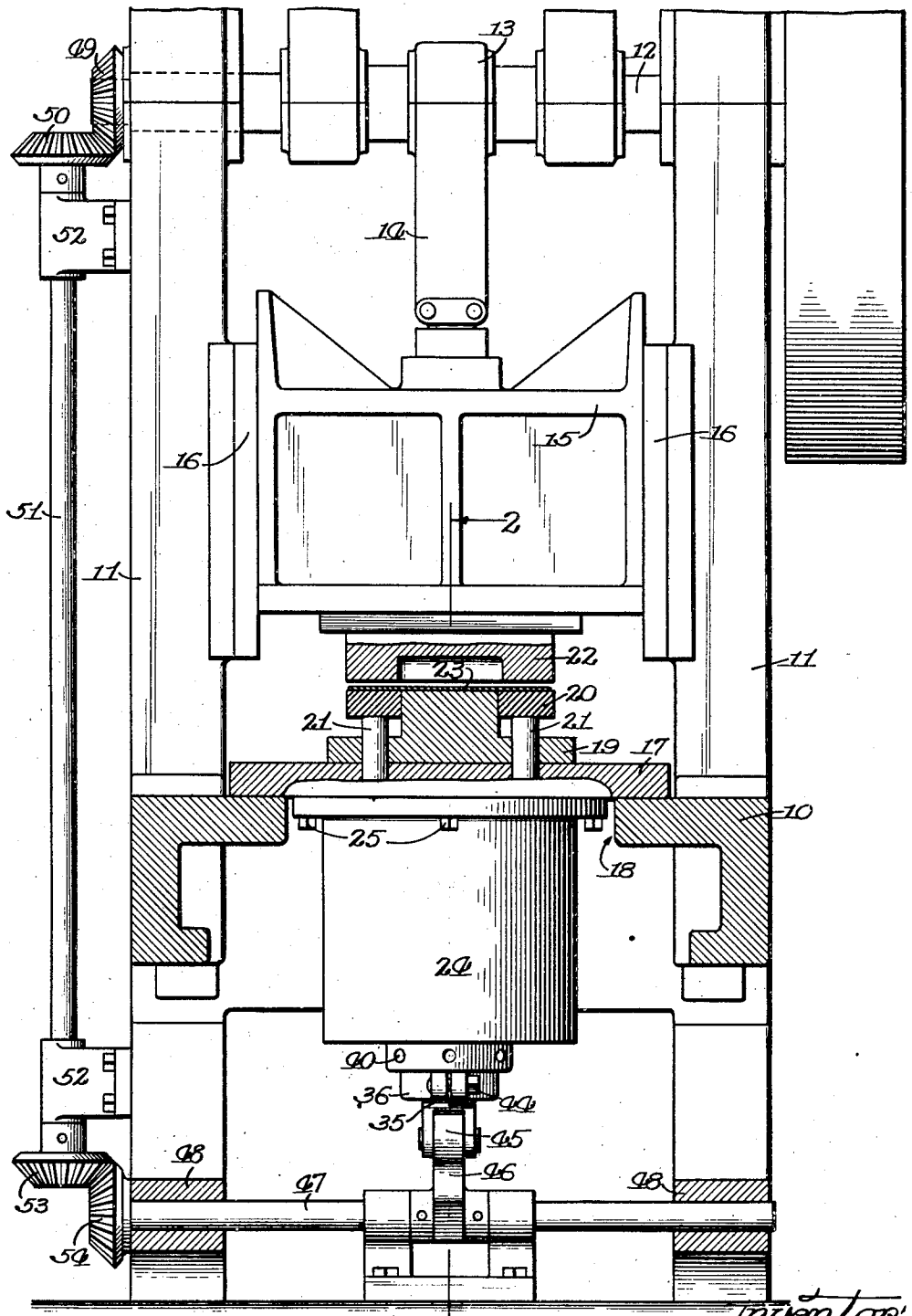


Fig. 1.

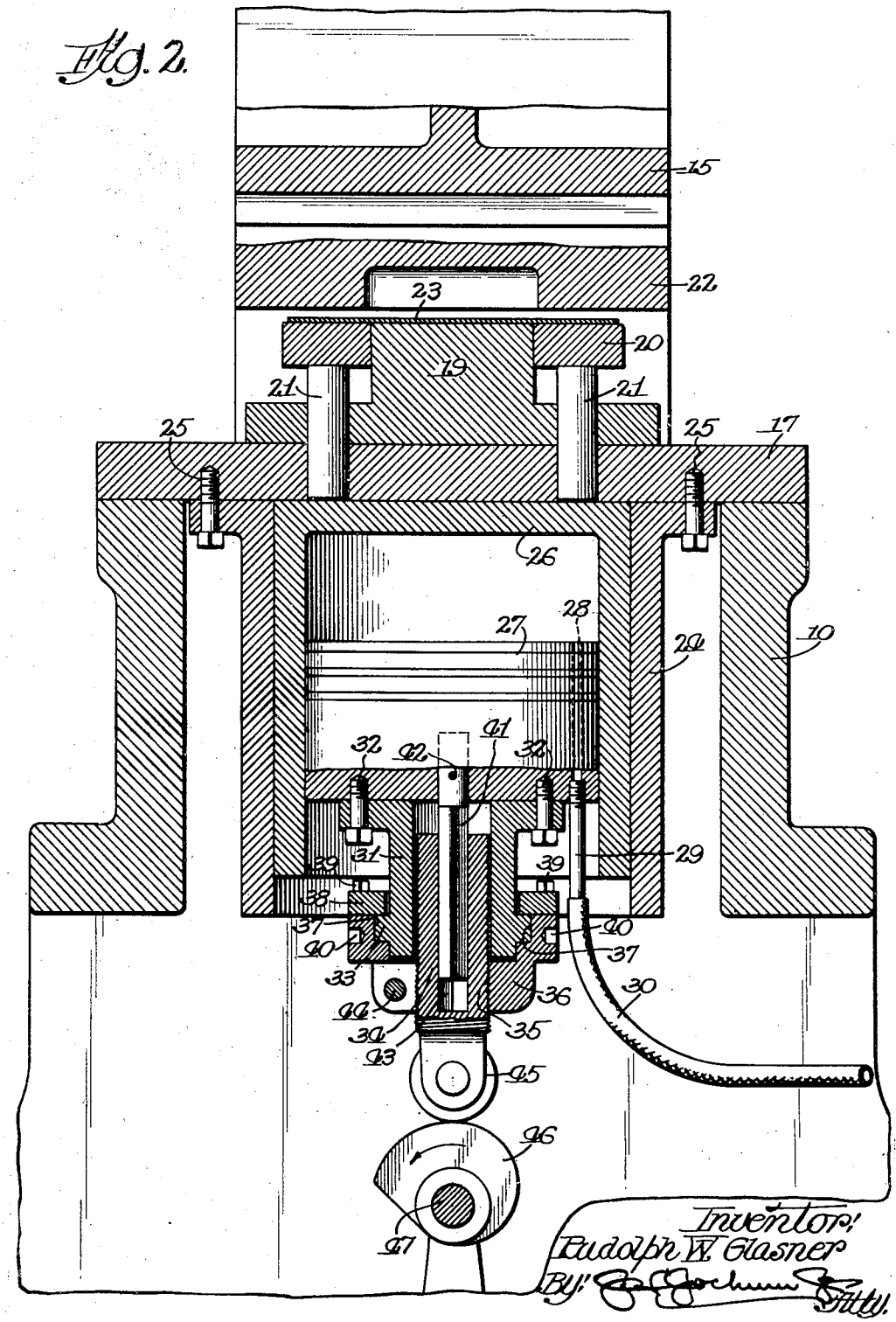
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Fig. 2.



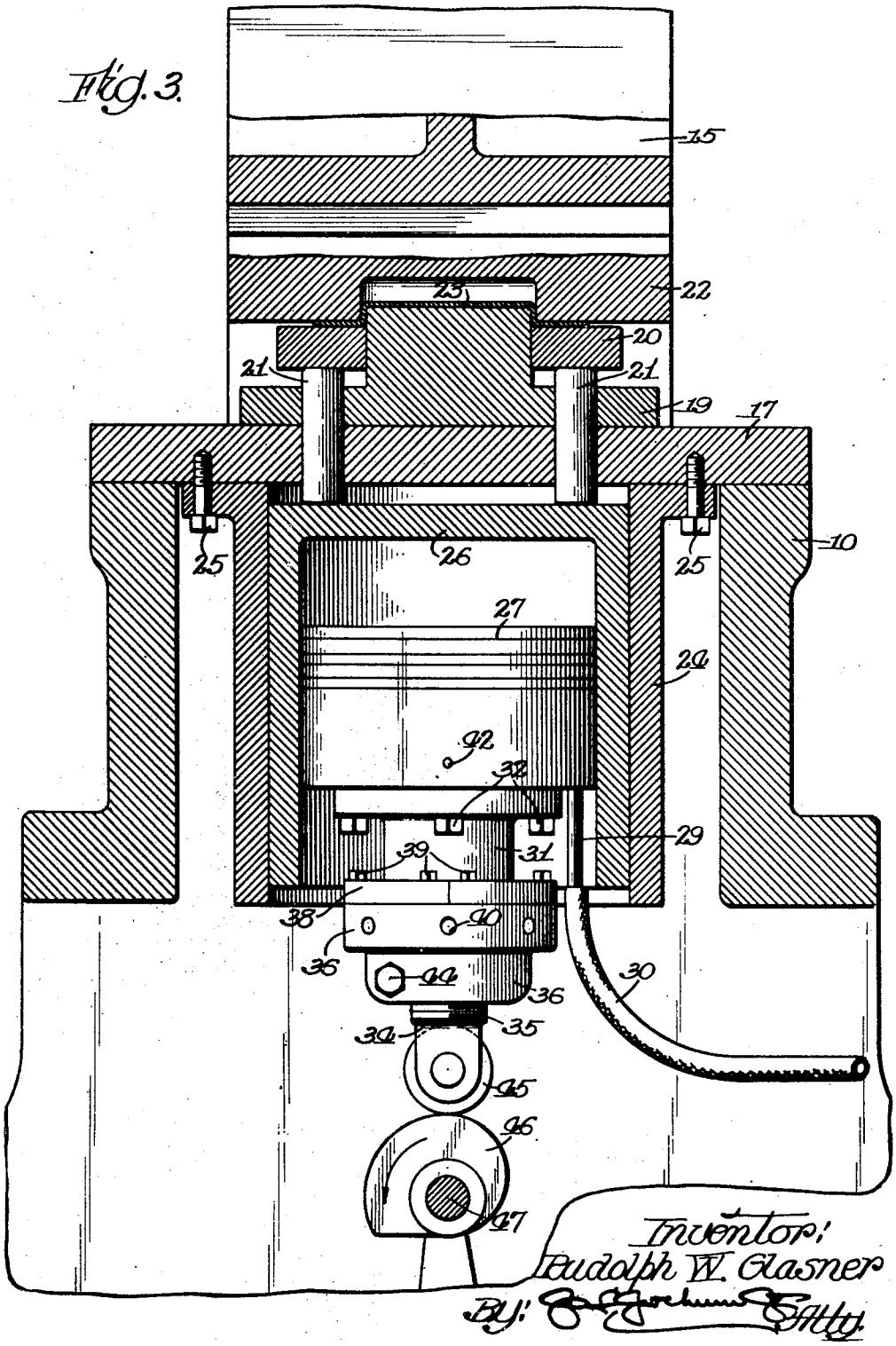
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Fig. 3.

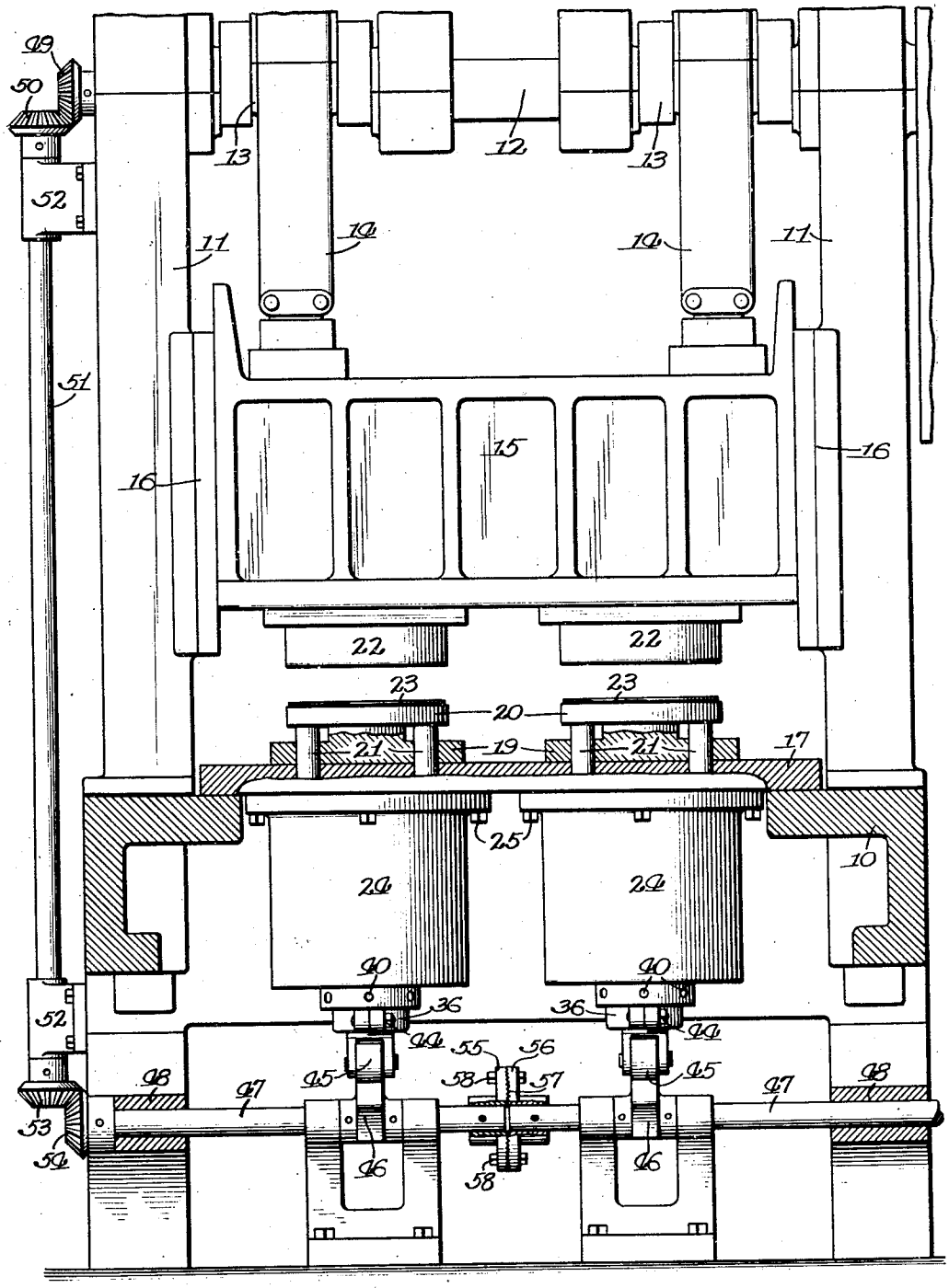


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Oct. 14, 1930. R. W. GLASNER 1,778,358

DRAWING PRESS

Filed July 18, 1930 4 Sheets-Sheet 4



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Patented Oct. 14, 1930 1,778,358

UNITED STATES PATENT OFFICE

RUDOLPH W. GLASNER, OF CHICAGO, ILLINOIS

DRAWING PRESS

Application filed July 18, 1930. Serial No. 468,801.

In the drawing sheet metal upon a drawing press, a certain portion of the power of the press is required to form the metal into the shape of the die, but if the blank is to be held so as to prevent it from buckling or wrinkling during the forming operation, then additional power is required for thus holding the blank.

The type of die cushion heretofore employed, exerts its pressure upon the blank holder ring and to overcome this pressure of the die and cushion, a portion of the power of the press must be employed.

It is one of the objects of the present invention to provide fluid pressure blank holding means for presses of this character, particularly for the purpose of providing fluid pressure means which will exert an unvarying pressure upon the work, without the use of auxiliary reservoirs or pressure tanks.

A further object is to provide fluid pressure means of this character which may be readily attached to an ordinary punch press and thereby convert the press into a drawing press.

A further object is to provide means constructed in a manner as to provide even pressure on the blank holding means without obstructing the working space above the bolster plate and thereby maintain the entire space available for the die and the work to be done upon the press.

A further object is to provide improved blank holding means of this character which will relieve the ram of the added stress of the cushioning means and at the same time exert an even pressure upon the blank holding means.

A further object is to provide improved fluid pressure means of this character which is adapted for use on presses, either singly or in multiples, and adjustment means to independently adjust one of the cushion means with respect to the other, so that the normal position of the piston with respect to the cylinder of one cushion may be varied independently with respect to the position of the cylinder and piston of the other cushion.

To the attainment of these ends and the accomplishment of other new and useful objects as will appear, the invention consists in the features of novelty in substantially the construction, combination and arrangement of the several parts hereinafter more fully described and claimed and shown in the accompanying drawings illustrating this invention, and in which

Figure 1 is a view partly in elevation, partly in section and partly broken away, of a press of this character constructed in accordance with the principles of this invention, and with the ram in a partially raised position.

Figure 2 is a view similar to Figure 1, party in elevation, partly in section and on an enlarged scale, and with parts removed, showing the parts in the position illustrated in Figure 1.

Figure 3 is a view similar to Figure 2, showing the parts of the press in another position.

Figure 4 is a view similar to Figure 1, of another form of the invention.

Referring more particularly to the drawings the numeral 10 designates generally the bed of a press suitably supported and projecting above which are uprights or standards 11, in which is journaled a shaft 12 and the shaft is provided with a crank 13 connected by means of a link 14 with a ram 15 that slides upon guides 16 supported by the uprights 11.

The numeral 17 designates the bed plate which extends across an opening 18 in the bed 10.

Supported by the bed plate 17 is a die 19 with which a blank or work holder 20 cooperates and the work holder 20 is supported by pins 21 passing loosely through the bed plate 17.

Connected with the ram 15 is a die 22 which co-operates with the blank or work holder 20 to grip the material 23 and thereby form the material over the die 19, as shown more clearly in Figure 3.

All of the above referred to parts are of the ordinary and well known construction.

Arranged beneath the bed plate 17 is a fluid pressure cushion which preferably consists of a cylinder 25 which is secured to

the bed plate 17 in any suitable manner, such as by means of fastening bolts 25.

The cylinder 24 is open at the bottom and the bed plate 17 forms a closure for the top thereof.

Within the cylinder 24 is an inverted cylinder 26 which is open at the bottom and is of an external diameter to snugly fit within the cylinder 24. Upon the end of the cylinder 26 the pins 21 which support the work holder 20, rest.

Reciprocable within the cylinder 26 is a piston 27 and through the piston is provided an opening 28 to which is connected a pipe 29 that in turn has connected with it a flexible pipe 30, whereby fluid may be supplied into the space between the piston 27 and the end of the cylinder 26 from any suitable source and under any suitable pressure, in a manner well known in this art.

Connected to the piston 27 is a tubular extension or piston rod 31 which may be secured to the piston in any suitable manner, such as by means of fastening bolts 32. This extension 31 is provided with a circumferential flange or shoulder 33 spaced from the end thereof.

The numeral 34 designates a member which telescopes into the extension 31 and this member 34 is provided with external screw threads 35 with which screw threads on a collar 36 co-operate, and which collar 36 is provided with a cut away portion 37 to form a seat for the flange 33. Clamping members 38 encompass the extension 31 above the collar 36 and extend over the circumferential flange 33 and are secured in position by means of fastening devices 39 which engage and rest upon the flange 33, so as to permit the collar 36 to be rotated with respect to the extension 31 and the member 34. Any suitable means may be provided for rotating the collar 36, such as openings 40 extending through the periphery thereof into which a suitable tool or implement may be inserted.

In order to effect a longitudinal adjustment of the member 34 with respect to the piston 27 and the tubular extension 31, a suitable means may be provided for maintaining the member 34 against rotation when the collar 36 is rotated.

A suitable and efficient means embodies a rod or shaft 41 which is angular in cross section and is anchored as at 42 by means of a suitable fastening device with the piston 27. This rod 42 telescopes into an opening 43 in the member 34 and which opening 33 is of a similar configuration in cross section to the rod 41. The collar 36 is preferably split and the split portions are held together by means of a clamping screw 44. Carried by the free end of the member 34 is a roller 45 which engages and co-operates with a cam 46, the latter being rotatable and serves as a support for the piston 27 and the parts attached thereto.

The cam 46 is connected with a shaft 47 journaled in suitable bearings 48, and this shaft is rotated from the crank 12 through the medium of a gear 49 connected with the shaft 12, which meshes with a gear 50, which in turn is connected with a shaft 51, journaled in suitable bearings 52.

To the shaft 51 is connected a gear 53 which meshes with a gear 54, the latter being secured to the shaft 47.

Thus when the shaft 12 is rotated, it will be manifest that the cam 46 will be rotated and the cam 46 will cause the piston 27 to maintain a predetermined position with respect to the cylinder 26.

Obviously by adjusting the collar 36 to raise or lower the member 34 and consequently the anti-friction wheel 25, the normal position of the piston 27 with relation to the cylinder 26 may be varied.

The operation of the press is as follows:

When the ram 15 is elevated, the parts will be in the position shown in Figures 1 and 2, that is the end of the cylinder 26 will abut the lower face of the bed plate 17 and the upper surface of the blank holder 20 will be maintained substantially flush with the top of the die 19 for supporting the work 23. The cam 46 will be in the position shown.

When the ram 15 descends the die 22 will co-operate with the blank gripping or work holding means 20 to grip the work 23 and a further lowering movement of the ram 15 will cause the work to be shaped over the die 19 by depressing the work holder 20. The depression of the work holder 20 will through the medium of the pins 21 depress the cylinder 26 for a short distance during which time the piston 27 will be held stationary by the cam 46.

It is of course to be understood that fluid under pressure from a suitable source of supply is delivered into the space between the piston 27 and the end of the cylinder 26 in a manner usual in cushions of this character.

As soon as the piston 26 starts to descend an increased pressure will be exerted upon the fluid between the piston 27 and the end of the cylinder 26 to yieldingly resist the movement of the blank holding means 20 in one direction.

At the time that the ram 15 starts to descend, the crank shaft 12 will through the medium of the intermeshing gears 49—50, rotate the shaft 51 and this will cause the gears 53—54 to rotate the shaft 47 and thereby rotate the cam 46 in the direction indicated by the arrows in Figures 2 and 3.

The cam 46 may be of any desired shape, but is preferably of a shape to hold the piston 27 stationary until the cylinder 26 has moved a predetermined distance, at which time the cam 46 will so operate as to cause the piston

27 to be bodily lowered with the cylinder 26, while the space between the piston 27 and the end of the cylinder 26 will be maintained unvaried.

It will therefore be manifest that after a predetermined pressure has been exerted in the cushion by maintaining the piston 27 against movement while the cylinder 26 moves with respect thereto, the desired resistance pressure will be obtained, after which and through the operation of the cam 46, the piston 27 will move with the cylinder and there will be maintained an unvarying pressure in the space between the piston 27 and the end of the cylinder 26 during the remaining portion or cycle of operation of the press.

A further movement of the cam, when the ram ascends, will cause the piston 27 to rise and the fluid pressure in the cylinder 26 will return the cylinder to the normal position or against the lower face of the bed plate 17.

By adjusting the member 34 with respect to the piston 27 the size of the space between the piston 27 and the cylinder 26 may be varied.

It will also be manifest with a structure of this character that the cushioning means as well as all of the operating mechanism therefor are disposed beneath the bed of the press so as to eliminate all obstructions to the working space between the dies 19 and 22.

In the form of the invention shown in Figure 4, a plurality of cushioning devices are provided, each being controlled by its separate cam device 46 and as these cam devices 46 are connected with the shaft 47, means must be provided, if desired, whereby independent adjustments of the cushioning devices may be had.

Any suitable means may be provided for that purpose, but a simple and efficient means embodies a clutch device which preferably comprises two member 55—56, the shaft 47 being divided and one of the members 55—56 being secured to each of the shaft sections.

The proximate faces of the clutch members 55—56 are serrated as at 57, and the members are secured together by means of suitable fastening devices 58.

By detaching the fastening devices 58, it will be manifest that either section of the shaft 47 may be rotated with respect to the other to vary the position of the respective cams 46, after which the clutch devices 55—56 may be again secured together so that the shaft sections will operate in unison.

It will be manifest that with this improved construction a cushioning device of this character may be readily applied to an ordinary power press and by means of which attachment an ordinary punch press may be converted into a sheet metal drawing press.

Furthermore, by the use of this invention supplemental reservoirs may be dispensed with.

While the preferred forms of the invention have been herein shown and described, it is to be understood that various changes may be made in the details of construction and in the combination and arrangement of the several parts, within the scope of the claims, without departing from the spirit of this invention.

What is claimed as new is:—

1. A power press, a driving member therefor, a sheet metal forming die, blank holding means for gripping the work, a fluid pressure cushion for yieldingly resisting the movement of the blank holding means in one direction and embodying two members movable relatively one with respect to the other, and rotating means for supporting one of the said members of the said cushion, said rotating means being responsive in its action to a rotatable element of the press.

2. A power press, a driving member therefor, a sheet metal forming die, blank holding means for gripping the work, a fluid pressure cushion for yieldingly resisting the movement of the blank holding means in one direction and embodying two members movable relatively one with respect to the other, and rotating means for supporting one of the said members of the said cushion, said rotating means being responsive in its action to a rotatable element of the press, the said cushion and the said supporting means being disposed below the bed of the press.

3. A power press, a driving member therefor, a sheet metal forming die, blank holding means for gripping the work, a fluid pressure cushion for yieldingly resisting the movement of the blank holding means in one direction and embodying two members movable relatively one with respect to the other, and rotating means for supporting one of the said members of the said cushion, said rotating means being responsive in its action to a rotatable element of the press, the said supporting means operating at a predetermined time in the cycle of operation of the press to maintain an unvarying pressure in the cushion.

4. In a power press the combination of a sheet metal forming die, fluid pressure means for holding the work, said means including a cylinder and piston member, and rotatable means for effecting a relative movement of said members during a predetermined portion of the cycle of operation of the press and for causing both of said members to be maintained in a fixed relative position and for movement together during another portion of the cycle of operation of the press.

5. In a power press the combination of a sheet metal forming die, a plunger, reciprocating means therefor, fluid pressure means for holding the work, said means including a cylinder and piston member, rotatable means

for effecting a relative movement of said members during a predetermined portion of the cycle of operation of the press and for causing both of said members to be maintained in a fixed relative position and for movement together during another portion of the cycle of operation of the press, and means for varying the relative position of said member with relation to the said reciprocating means.

6. A power press, a driving member therefor, a die, a fluid pressure chamber embodying two members movable one with relation to the other, means for exerting pressure from the die to the chamber, and pivoted supporting means for one of the said members, whereby a predetermined constant pressure may be maintained in the chamber during a substantial period of the cycle of operation.

7. A power press, a driving member therefor, a die, a fluid pressure chamber embodying two members movable one with relation to the other, means for exerting pressure from the die to the chamber, pivoted supporting means for the chamber, and an operative connection between the last said means and the driving means of the press.

8. A power press, a driving member therefor, a die, a fluid pressure cushion embodying two members movable one with relation to the other and also movable together, means for exerting a pressure from the die to the cushion, means disposed entirely below the bed of the press for supporting the cushion, and means for causing the last recited means to effect a relative movement of the said members during a portion of the cycle of operation of the press and also a movement of the said members together and in fixed relation during another portion of the cycle of operation of the press.

9. A power press, a driving member therefor, a die, a fluid pressure cushion embodying two members movable one with relation to the other and also movable together, means for exerting a pressure from the die to the cushion, means disposed entirely below the bed of the press for supporting the cushion, means for causing the last recited means to effect a relative movement of the said members during a portion of the cycle of operation of the press and also a movement of the said members together and in fixed relation during another portion of the cycle of operation of the press, and means for varying at will the fixed position of one the cushion members with respect to the bed of the press.

10. A power press, a driving member for said press, a die, a fluid pressure cushion embodying two members movable relatively one with relation to the other, means for exerting pressure from the die to the chamber, and a pivoted supporting means for the chamber for maintaining an unvarying pressure in the cushion after a predetermined pressure has been established in the cushion.

11. A power press, a driving member therefor, a die, a plurality of fluid pressure cushions each embodying two members movable relatively one with relation to the other, means for exerting pressure from the die to each of the chambers, a pivoted supporting means for the chamber for maintaining an unvarying pressure in the cushions after a predetermined pressure has been established therein, and means for varying in the cycle of operation of the press, the time of effective operation of the cushions.

12. A power press, a driving member therefor, a die, a plurality of fluid pressure cushions each embodying two members movable relatively one with relation to the other, means for exerting pressure from the die to each of the chambers, a pivoted supporting means for the chamber for maintaining an unvarying pressure in the cushions after a predetermined pressure has been established therein, and means for varying in the cycle of operation of the press, the time of effective operation of the cushions, independently and one with relation to the other.

13. In a sheet metal press, blank holding means, a fluid pressure cushion for yieldingly resisting the movement of the blank holding means in one direction and disposed below the bed of the press, pivotally mounted means also below the press bed for supporting the cushion, and means operatively connecting the last said means with a movable part of the press for moving the former about its pivot.

14. In a sheet metal press, blank holding means, a fluid pressure cushion disposed below the press bed for yieldingly resisting the movement of the blank holder in one direction, said cushion consisting of two members movable one with relation to the other and also bodily movable simultaneously, pivotally mounted means disposed below the press bed for supporting one of the members of the cushion to effect such relative movement of the cushion members, and means operatively connecting said pivotally mounted means with a movable part of the press to move the former about its pivot to effect a simultaneous movement of the cushion members in fixed relation to each other.

15. In a sheet metal press, blank holding means, a fluid pressure cushion disposed below the press bed for yieldingly resisting the movement of the blank holder in one direction, said cushion consisting of two members movable one with relation to the other and also bodily movable simultaneously, pivotally mounted means disposed below the press bed for supporting one of the members of the cushion to effect such relative movement of the cushion members, means operatively connecting said pivotally mount-

ed means with a movable part of the press to move the former about its pivot to effect a simultaneous movement of the cushion members in fixed relation to each other, and means for varying at will the time in the cycle of operation of the press at which the said cushion members will move in unison.

16. In a sheet metal press, blank holding means, a plurality of fluid cushions disposed below the press bed for yieldingly resisting the movement of the blank holding means in one direction, each of said cushions consisting of two members movable one with relation to the other and also movable simultaneously, and pivotally mounted means disposed below the press bed and individual to the cushions for supporting one of the members of the respective cushions and to effect a relative movement of the members of the respective cushions, said pivotally mounted means being responsive in this operation to the actuation of a movable part of the press to cause a simultaneous movement of the members of the respective cushions in fixed relation to each other.

17. In a sheet metal press, blank holding means, a plurality of fluid cushions disposed below the press bed for yieldingly resisting the movement of the blank holding means in one direction, each of said cushions consisting of two members movable one with relation to the other and also movable simultaneously, pivotally mounted means disposed below the press bed and individual to the cushions for supporting one of the members of the respective cushions and to effect a relative movement of the members of the respective cushions, said pivotally mounted means being responsive in this operation to the actuation of a movable part of the press to cause a simultaneous movement of the members of the respective cushions in fixed relation to each other, and means whereby the time of operation of the said pivotally mounted members with respect to each other may be varied, to vary the extent of movement of both members of the respective cushions together and in fixed relation and of one cushion with respect to the other.

18. A power press, a driving member therefor, a sheet metal forming die, blank holding means for gripping the work, a fluid pressure cushion for yieldingly resisting the movement of the blank holding means in one direction and embodying two members movable relatively one with respect to the other, and rotating means for supporting one of said members of the said cushion.

19. A power press, a driving member therefor, a sheet metal forming die, blank holding means for gripping the work, a fluid pressure cushion for yieldingly resisting the movement of the blank holding means in one direction and embodying two members movable relatively one with respect to the other, and rotating means for supporting one of the said members of the said cushion, the said cushion and the said supporting means being disposed below the bed of the press.

20. A power press, a driving member therefor, a sheet metal forming die, blank holding means for gripping the work, a fluid pressure cushion for yieldingly resisting the movement of the blank holding means in one direction and embodying two members movable relatively one with respect to the other, and rotating means for supporting one of the said members of the said cushion, the said supporting means operating at a predetermined time in the cycle of operation of the press to maintain an unvarying pressure in the cushion.

21. A power press, a driving member therefor, a sheet metal forming die, blank holding means for gripping the work, a fluid pressure cushion for yieldingly resisting the movement of the blank holding means in one direction and embodying two members movable relatively one with respect to the other, and movable means for supporting one of the said members of the said cushion, said movable means being responsive in its action to a movable element of the press.

22. A power press, a driving member therefor, a sheet metal forming die, blank holding means for gripping the work, a fluid pressure cushion for yieldingly resisting the movement of the blank holding means in one direction and embodying two members movable relatively one with respect to the other, and movable means for supporting one of the said members of the said cushion, said movable means being responsive in its action to a movable element of the press, the said cushion and the said supporting means being disposed below the said die.

23. In a power press, the combination of a sheet metal forming die, fluid pressure means for holding the work, said means including a cylinder and piston member, and pivoted means for effecting a relative movement of the said members during a predetermined portion of the cycle of operation of the press and for causing both of said members to be maintained in a fixed relative position and for movement together during another portion of the cycle of operation of the press.

24. A power press, a driving member therefor, a die, a fluid pressure chamber embodying two members movable one with relation to the other, means for exerting pressure from the die to the chamber, and rotating supporting means for the chamber, whereby a predetermined constant pressure may be maintained in the chamber during a substantial portion of the cycle of operation.

25. A power press, a driving member therefor, a die, a fluid pressure chamber embodying two members movable one with relation to the other, means for exerting pressure from

the die to the chamber, and pivoted operating means for one of the said members, whereby a predetermined constant pressure may be maintained in the chamber during a substantial portion of the cycle of operation, the last recited means being disposed beneath the last said member.

In testimony whereof I have signed my name to this specification, on this 14th day of July, A. D. 1930.

RUDOLPH W. GLASNER.