

July 6, 1937.

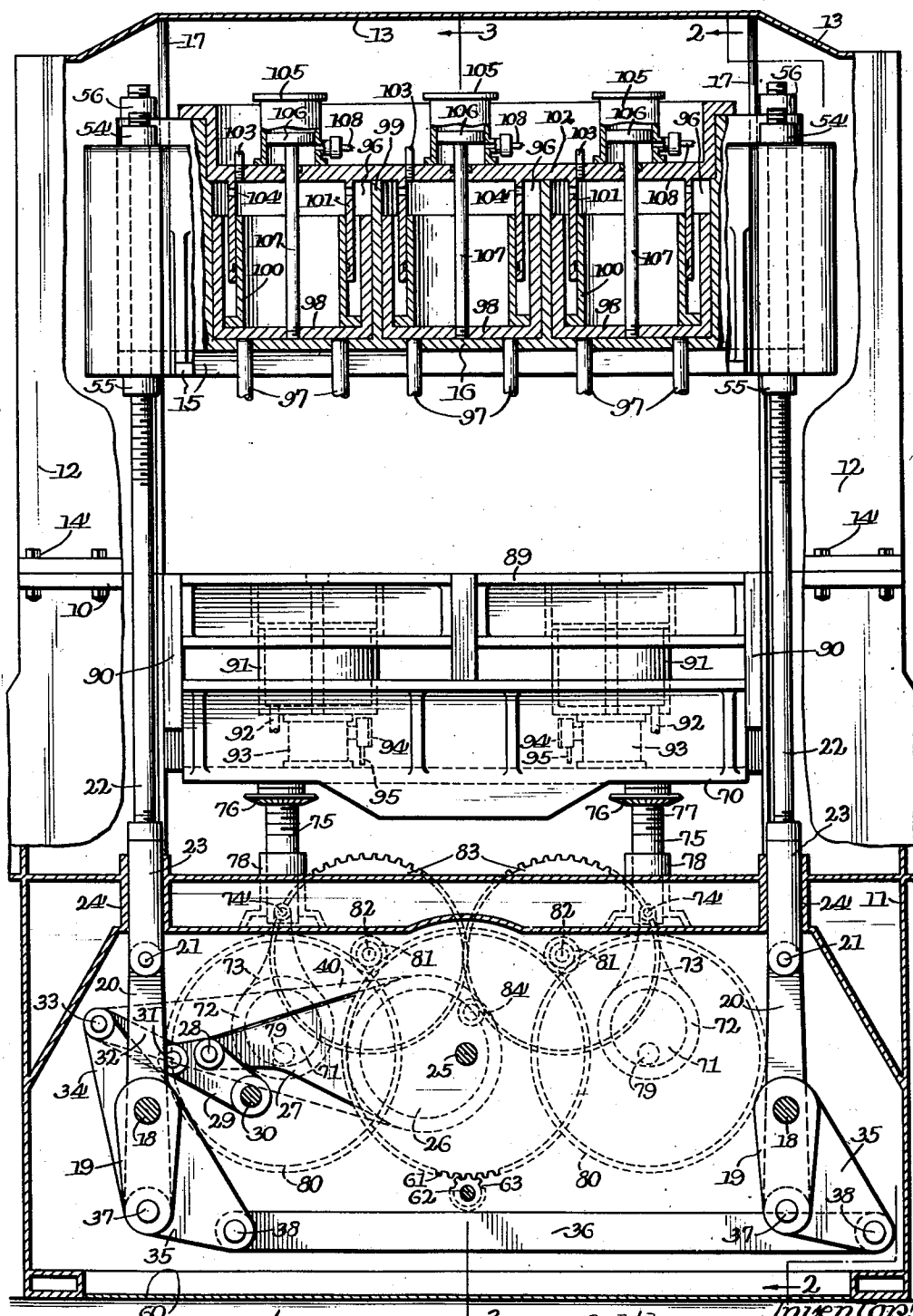
R. W. GLASNER

2,085,799

DRAWING PRESS

Filed March 6, 1936

4 Sheets-Sheet 1



3 Rudolph W. Glasner ^{Inventor}
By: E. J. Schumacher & Att.

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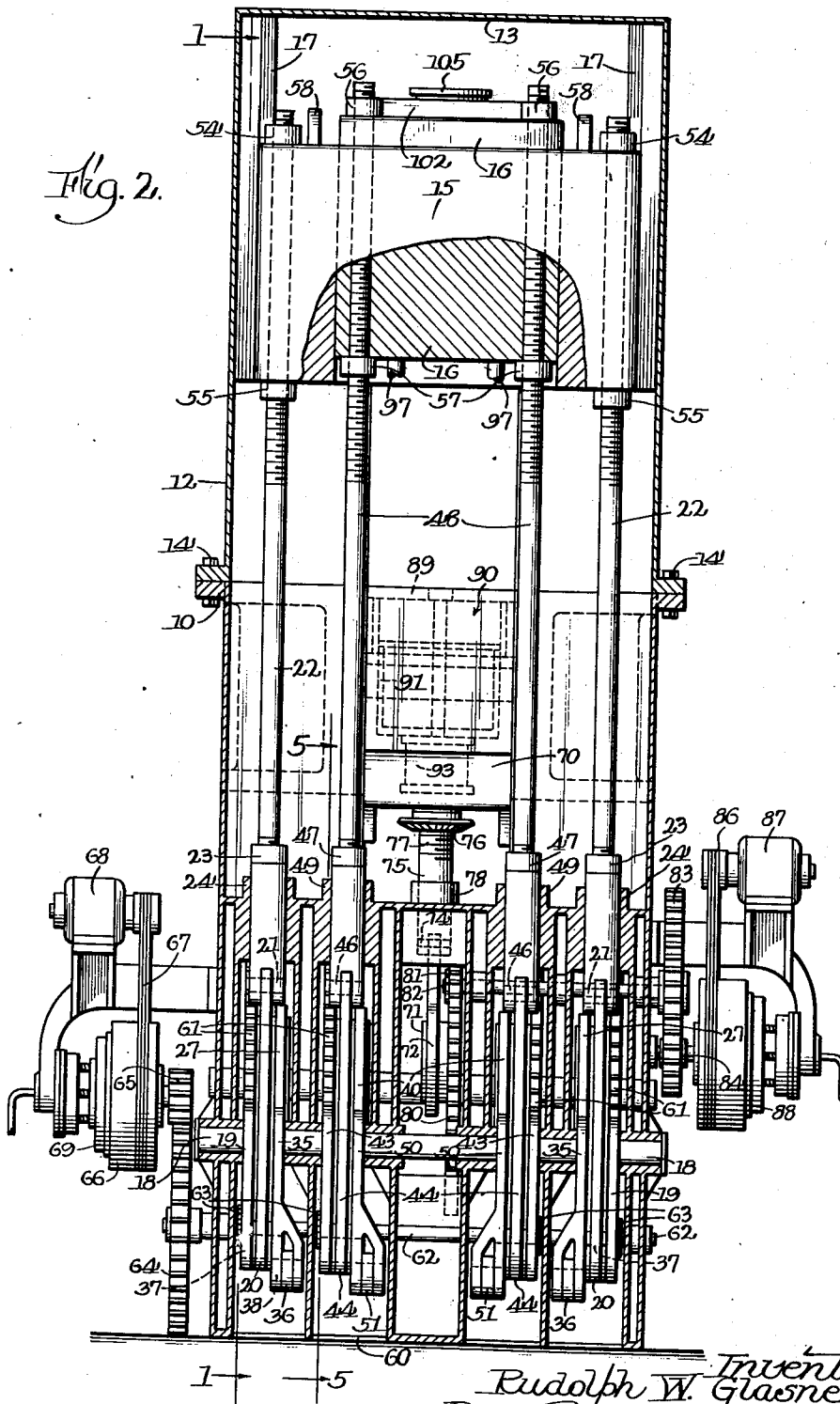
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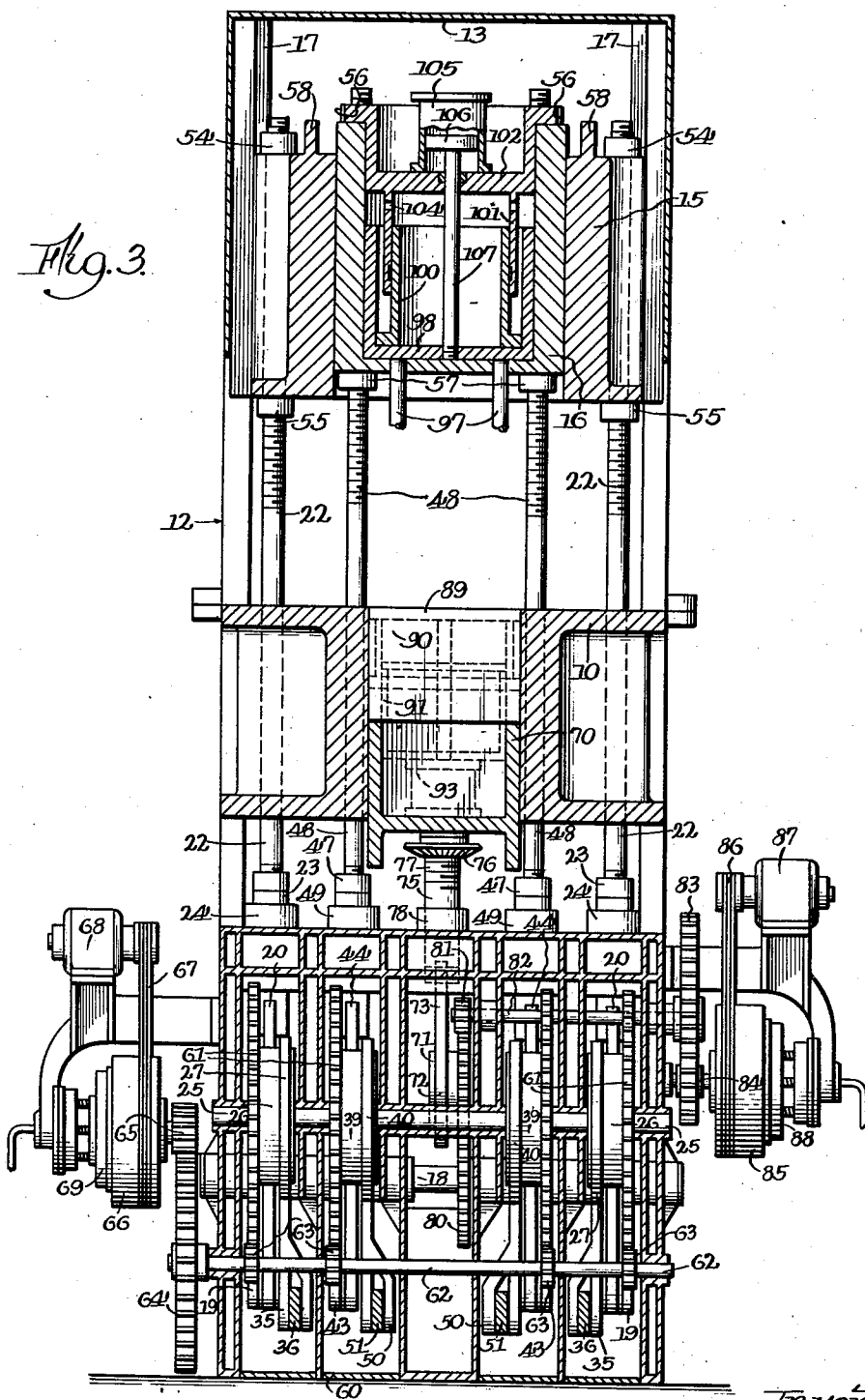
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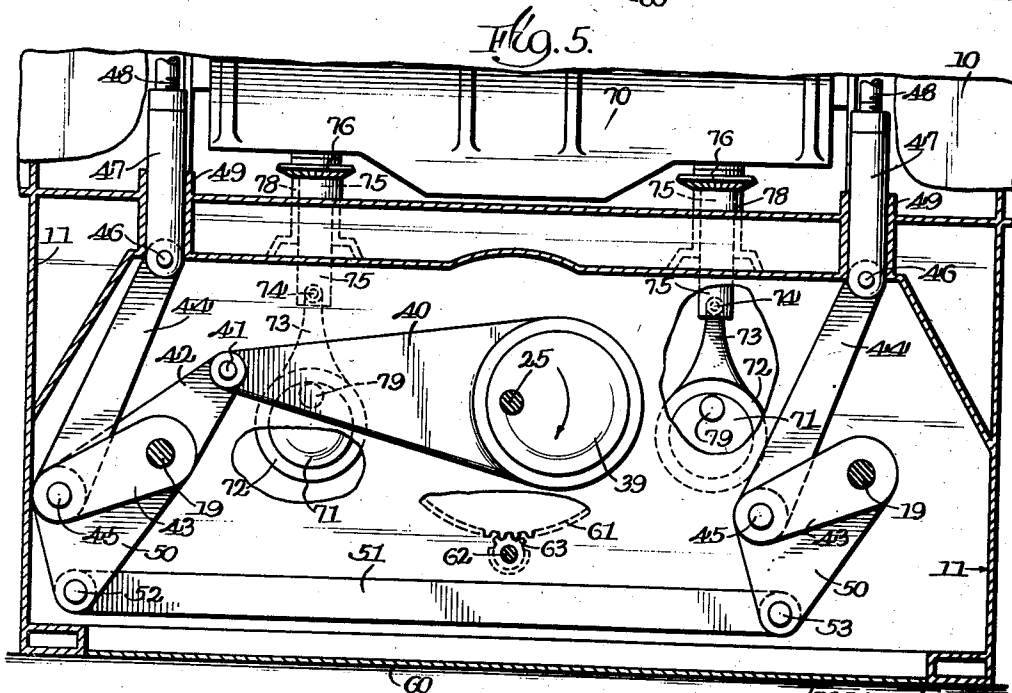
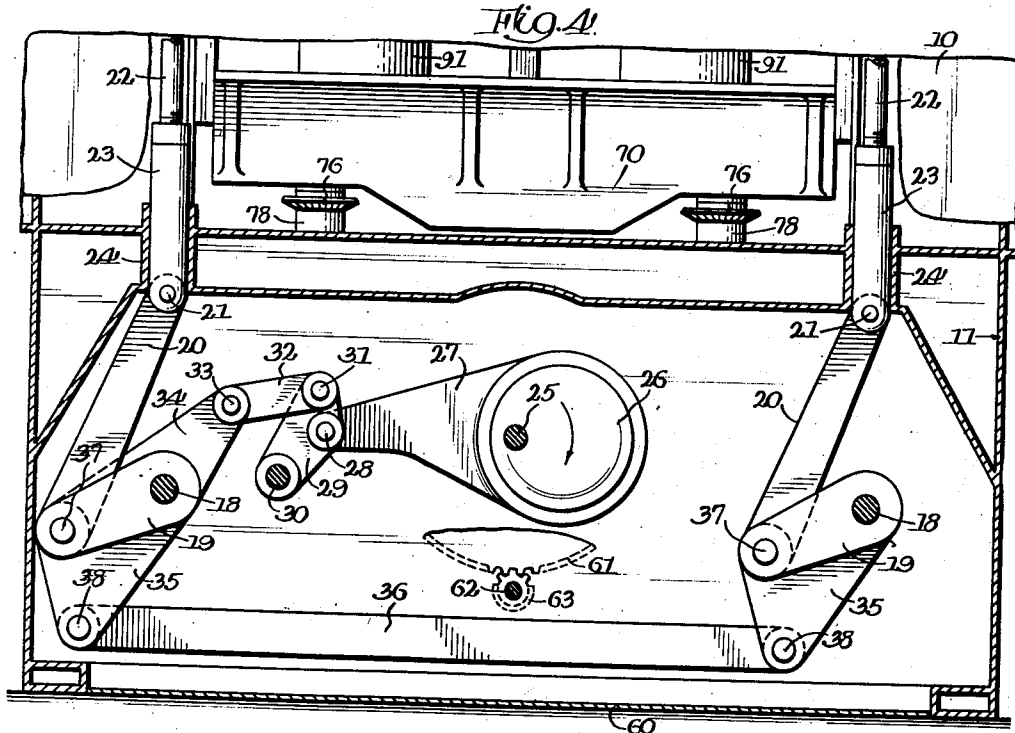
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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,085,799

DRAWING PRESS

Rudolph W. Glasner, Chicago, Ill.

Application March 6, 1936, Serial No. 67,536

5 Claims. (Cl. 113—38)

This invention relates to improvements in drawing presses, particularly adapted, though not necessarily limited in its use for drawing sheet metal or imparting to the articles constructed therefrom the desired shape or contour.

Heretofore with machines of this general character it has been customary to construct the press with the operating mechanism for the upper slides arranged in the crown at the top of the press, while the operating mechanism for the lower dies or slides has been arranged at the bottom of the press, the parts of the press being fastened together with tie rods, and upon which rods considerable strain is exerted during the operation of the press.

This strain is due to the fact that the resistance of the work against which the dies operate, tends to strain and to separate the parts of the press, and there is a tendency for the crown to lift off of the bed and uprights, under such loads and deflection.

When repairs are required, it has heretofore been necessary for the operator to climb to the top of the press as well as down into the pit before proper adjustment and repairs can be made.

It is one of the objects of the present invention to overcome all of these difficulties and objections and to provide an improved machine of this character in which the operating parts of all of the slides, on both sides of the bed, will be housed within a crown disposed below the bed, thereby rendering it possible to build a press with a comparatively low height, without necessitating any additional depth of pit or additional height to the building in which the press is installed, at the same time provide the center of gravity of the press below the bed.

A further object is to provide a press of this character in which the main slides which are performing the heaviest part of the work, will be in tension, that is, drawn down or against the work, as distinguished from being pushed down, which not only provides for rigidity under loads, but the necessity for providing tie rods, with their attendant uneven shrinking will be dispensed with, as there will be in this improved construction of press, no tendency of the upper crown or parts of the press to lift off of the bed under stress of the load, since the bed and crown being connected or formed integral, no dependence is placed upon tie rods to prevent deflection or separation.

A further object is to provide in a press of this character improved means for guiding the

connections between the respective slides and their actuating means, which will prevent side swaying under unevenly distributed die loads.

Further, all repairs and assembly of the parts will be effected in a rigid foundation and not in the top of the press, and all parts will be readily accessible.

Furthermore, the upper slide guide and crown may be formed as an integral structure as may also the bed and lower crown, thereby rendering it possible to construct a press of this character from comparatively few major members.

A further object is to provide an improved press of this character embodying a plurality of slides, with actuating mechanism whereby the slides may be arranged to operate in a predetermined order or sequence, and which operating mechanism provides the desired dwell, and the periods of dwell may be varied as desired.

A further object is to provide a multiple slide press wherein fluid pressure die pads are provided on both sides of the work and means may also be provided for arresting the movement of the pad.

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 vertical, longitudinal, sectional view, with parts broken away and parts omitted, as taken on line 1—1, Figure 2, of a press of this character constructed in accordance with the principles of this invention.

Figure 2 is a vertical, sectional view taken on line 2—2, Figure 1.

Figure 3 is a vertical, sectional view taken on line 3—3, Figure 1.

Figure 4 is a view partly in elevation and partly in section, of a portion of the press, with parts omitted and showing the mechanism for reciprocating the upper outer slide.

Figure 5 is a view similar to Figure 4, showing the mechanism for reciprocating the upper inner slide.

Referring more particularly to the drawings, the numeral 10 designates generally the bed of the press which has connected thereto and forming an integral part thereof a hollow lower crown 11, which latter may form the supporting base for the press.

These parts are constructed and assembled in

any suitable manner, preferably of comparatively thin material secured together in any suitable manner into an integral structure or unit.

The numeral 12 designates uprights connected by a top beam or crown 13 and these uprights 12 and crown 13 are also formed into an integral structure and are preferably constructed of comparatively thin material.

The upper crown and uprights 12 may be secured to the bed 10 in any suitable manner, such as by means of fastening bolts 14, the frame being of such a structure that the use of tie rods as usual in presses of this general character, will be dispensed with.

The numerals 15 and 16 designate respectively outer and inner slides which are arranged above the bed 10, the inner slide being nested within the outer slide and the other slide being provided with portions which reciprocate in guides or ways 17.

Arranged within the hollow crown 11, below the bed, are a pair of shafts 18, one preferably adjacent each side of the frame, and mounted upon these shafts 18 are rocker members 19, preferably four in number, and arranged beneath the corners of the bed. Connected to these rocker members 19 are one end of links 20 forming a toggle construction, and to the other end of each of the links is pivotally connected as at 21, a connecting member 22, each preferably in the form of a bar or pitman rod, the lower end of each connection being preferably provided with an adjustable section 23.

The lower ends of the pitman rods reciprocate through suitable bearings or guides 24, of substantial length, and the guides 24 are so disposed and are of such a length that the point of pivotal connection 21 between the end of the section 23 of the rods 22 and the link 20 will not pass beyond the upper end of the guides, so as to prevent the exertion of a lateral stress on the pitman rods 22 which would be communicated to the outer slide 15 and cause the same to bind in its guide-ways. With this construction the lateral stress of the actuating mechanism will be exerted upon the end 23 of the rods 22 and the slide will be relieved of such stress.

The numeral 25 designates a shaft which is mounted in suitable bearings in the lower crown, and this shaft 25 may be a stationary shaft or a rotatable shaft. A plurality of eccentrics 26 are mounted upon the shaft 25, and in the event that the shaft 25 is a stationary shaft, the eccentrics will rotate about the shaft 25, but in the event that the shaft 25 is a rotatable shaft, then the eccentrics are mounted upon the shaft for rotation therewith.

Any number of eccentrics may be provided for reciprocating the outer slide, but preferably two eccentrics are employed, one in proximity to each of the front and rear faces of the base. Eccentric straps 27 co-operate with the eccentrics and the end of each of the straps is pivotally connected as at 28 to a rocker member 29 mounted upon a shaft 30. The pivotal connection 28 is preferably disposed between the ends of the rocker member 29, and to one end of the rocker member as at 31, is pivotally connected one end of a link 32. The other end of the link is pivotally connected as at 33 to an extension or arm 34 on the rocker member 19 on one side of the frame, so that when the eccentric 26 is rotated, the rocker member 29 will be actuated, and through the medium of the intermediate connecting links, the rocker members 19 will be actuated, and this will

impart a reciprocatory movement to the rods 22 and consequently to the outer upper slide 15.

The toggle members 19 on opposite sides of the press are each provided with depending extensions or projections 35, and a link 36 is pivotally connected by its ends as at 37—38 with the extensions 35 of the respective rocker members 19.

With this construction it will be manifest that when the eccentrics 26 are rotated there will be imparted a reciprocatory movement to the outer upper slide and by reason of the links or supplemental toggle mechanism formed by the links 32 and rocker member 29, a period of dwell will be imparted to the outer slide during the cycle of operation of the press.

Mounted also upon the shaft 25 are eccentrics 39, any number of which may be provided, but preferably two are shown, and with these eccentrics eccentric straps 40 co-operate. The free end of the eccentric straps 40 are each pivotally connected as at 41 to an extension 42 on a rocker member 43, and to the rocker members 43 one end of links 44 are pivotally connected as at 45. The other ends of the links 44 are pivotally connected as at 46 to an adjustable section 47 of vertically reciprocating pitman rods 48, which latter are connected to the inner slide 16. A portion of the rods 48 reciprocate through extended guides or bearings 49, similar to the guides or bearings 24 for the outer slide rods, so as to relieve the pitman rods 48 as well as the slide 16 of lateral stress exerted by the reciprocating means.

The rocker members 43 are provided with depending portions or extensions 50, and to these portions 50, the ends of a connecting link 51 are respectively pivoted as at 52—53, so that when the eccentrics 39 are rotated, the rocker members 43 will be actuated and this actuation will cause a reciprocatory movement to be imparted to the inner slide 16, and by reason of the linkage there will be imparted to the inner slide, a period of dwell in its operation.

The rods 22 may be connected to the outer slide 15 in any suitable manner, preferably by passing through a portion of the slide, and nuts or collars 54—55 are threaded on to the rods 22 adjacent opposite faces of the slide for securing these parts assembled. The threaded portion of the rods 22 together with the nuts or collars 54—55 permit of an adjustment of the slide with respect to the rods.

Similarly, the rods 48 may be connected with the inner slide 16 preferably by a portion of the rods passing through the slide and being provided with threaded portions for the reception of nuts or collars 56—57.

If desired, shields or ribs 58 may be provided on the outer slide for protecting the collars 54.

It will therefore be manifest that as the eccentrics 26 and 39 are rotated, the slides 15 and 16 will be correspondingly reciprocated, and inasmuch as provision is made for producing a dwell in the movement of each of the slides, they will be arrested in their movement as they engage and rest upon the work. The period of dwell in the movement of the outer slide is preferably of a longer duration than that of the inner slide, but it is obvious that the desired period of dwell of the respective slides may be provided for.

It is to be understood that any form of toggle mechanism may be provided for accomplishing the desired movements and the desired dwells, with the desired periods of such dwells. Furthermore the number, arrangement and shapes of

the various links and connecting parts may be varied so as to accomplish or produce these desired movements and dwells in the operation of the various slides.

5 All of the operating parts, to-wit: the eccentrics and toggle mechanisms are arranged within the hollow crown 11 below the bed, and cover plates 60 may be provided for closing the bottom of the crown.

10 Suitable hand openings or fill openings (not shown) may be provided in any one or more of the walls of the crown to permit of the insertion of a lubricant, the crown constituting a lubricant container so that the operating mechanisms will be immersed and operate in the lubricant.

15 The eccentrics may be rotated in any desired or suitable manner, but preferably connected to each of the eccentrics, so as to rotate therewith, is a gear 61.

20 A shaft 62 is journaled in suitable bearings in the crown, and mounted upon this shaft for rotation therewith (see particularly Figure 3) are pinion gears 63, meshing with each of the gears 61. Connected to the shaft 62 and on the outside of the crown is a driving gear 64 with which a pinion gear 65 meshes, and this pinion gear 65 is connected to the shaft of one of the members of a clutch designated generally by the reference numeral 66. One of the clutch members is continuously driven by means of a driving belt 67 from a motor 68, so as to operate the clutch element 66 independently with respect to the pinion gear 65.

30 A clutch member 69 controlled in any suitable manner either hydraulically, pneumatically or otherwise (not shown), and which is under the control of the operator, is adapted to connect the gear 65 with the rotatable element of the clutch device, so as to impart a rotary motion to the shaft 62 and thereby rotate the eccentrics 26 and 39.

45 With this construction it will be manifest that inasmuch as all of the actuating mechanism for the upper slides 15 and 16 is disposed below the bed, the slides will be operated by a tension, that the slides will be pulled downwardly toward the bed of the press, as distinguished from being pushed downwardly, with the result that any tendency of the parts of the frame of the press to spread or spring under the stress of the operation of the upper slides upon the work, will be prevented, as the tendency of the slide being pulled downwardly would be to draw the parts of the press frame together.

55 This is not the case with the presses as now ordinarily constructed, and in which the parts of the frame are held or bolted together by tie rods, the operating mechanism for the upper slides being disposed in the upper crown of the press.

60 This latter construction as will be manifest, operates to push the slides downwardly towards the bed or work, the result being that there is a tendency of the slides and the operating mechanism to push the parts of the press frame apart, or separate them, which creates an undue strain upon the tie rods, and with the consequent uneven shrinkage or springing of the tie rods, there is a tendency to misalign parts of the press and the operating mechanism, which is entirely obviated with the present construction.

70 Mounted below the bed of the press is another slide 70 which is reciprocated in any suitable manner, preferably by means of eccentrics 71 located preferably adjacent each corner of the bed,

and each of these eccentrics is connected to the bed by means of an eccentric strap 72, the arm 73 of which is pivotally connected at 74 to a pitman rod or member 75 which is connected to the bed in any suitable manner, preferably by means of an adjustable connection embodying a sleeve or collar 76 connected to the bed and threaded upon a threaded portion 77 of the member 75, so that an adjustment of the bed 70 with respect to the eccentrics 71 may be provided.

Each of the pitman rods or members 75 slides through an extended guide 78, similar to the guides 24 and 49, so as to relieve the bed 70 as well as the pitman members of lateral stress of the operating mechanism.

15 The eccentrics 71 are mounted upon a shaft 79, one of these shafts being provided adjacent each end of the bed, and the shafts 79 are journaled in suitable bearings in the frame. Connected to each of the eccentrics 71 to rotate therewith is a gear 80 and meshing with each of the gears 80 is a pinion gear 81 secured to a shaft 82 journaled in suitable bearings in the frame, all of these parts for operating the lower slide 70 being housed within the lower crown below the bed. Secured to each of the shafts 82 for rotation therewith are gears 83 which mesh with each other, and meshing with one of the gears 83 is a pinion gear 84 which is connected to one of the elements of a clutch device, designated generally by the reference numeral 85. This clutch device may be of any desired or suitable construction, but preferably embodies a rotatable member continuously driven by means of a belt 86 from a motor 87.

25 The gear 84 is connected to the member 88 of the clutch and which member can be controlled in any desired or suitable manner, either hydraulically, pneumatically or otherwise, so as to render the clutch device active and impart rotary movement to the pinion gear 84, the clutch being under the control of the operator in any suitable manner (not shown).

It will therefore be manifest that when the clutch devices are all rendered active, motion will be imparted to the respective slides, and it is to be understood that these slides are so arranged and the actuating mechanism is also so arranged that they will operate in timed relation with respect to each other.

35 The clutch devices may also be employed as a means for securing the desired dwell in the movements of the respective slides, and renders it possible to vary at will not only the length of period of dwell, but the order or sequence of operation of the slides may be selectively varied. While the periods of dwell may be controlled by the toggle linkage construction, it will be manifest that it will not be necessary to rely thereupon for such dwells, as the clutches will as before stated, serve as a means for accomplishing this result.

45 Carried by the lower slide 70 for movement therewith and with respect thereto, is a supplemental slide 89, which moves in suitable guides 90 forming a part of the lower slide 70, and which lower slide, together with the supplemental guides 90 move in suitable guideways in the press frame structure.

55 Suitable cushioning devices 91 may be provided for controlling and for resisting the movement of the supplemental slide 89 with respect to the slide 70, under the stress of the operation of the upper rams upon the work. These cushioning devices may be of any desired or suitable construction, but are preferably of the fluid con-

trolled type, the fluid being delivered to and discharged from the cushioning devices 91 through suitable pipes 92 connected to the source of supply and having the usual controlling mechanism.

5 A suitable locking device designated generally by the reference numeral 93 may be provided for each of the cushions, and the locking device is provided with a fluid pressure controlled means 94 of any suitable construction, to which
10 fluid may be directed through the pipe 95, so that when it is desired to lock the supplemental slide 89 in a predetermined position with respect to the slide 70, this may be accomplished through the locking mechanism.

15 If desired, pressure may be relieved from the cushioning device 91 and the supplemental slide 89 will then become inactive with respect to the slide 70.

20 The inner slide 16 may be provided with cushioning means for cushioning the operation of a work holder or a movable part of the die, and to that end the slide is preferably of a hollow construction in which may be arranged a plurality of chambers 96 against which die pins
25 or movable members 97 rest, and which pins pass through suitable openings in the bottom of the slide and are connected to the work holder or the movable part of the die, which is controlled by the cushion.

30 Within each of the chambers 96 is arranged a cup shaped member 98 of a diameter slightly less than the internal diameter of the respective chambers, and which is guided in its movement by the wall 99 of the chamber.

35 A cylinder 100 is arranged within the member 98 and is of an external diameter considerably less than the internal diameter of the member 98, and the cylinder is closed by the bottom of the member 98, but is open at the top.

40 The cylinder is of a diameter substantially less than the internal diameter of the member 98, and telescoping with the cylinder is another cylinder 101, which is supported by a top plate 102 of the slide 16.

45 Fluid pressure is supplied to the respective cushions formed by the telescoping cylindrical members 100 and 101, from any suitable source and in any suitable manner, preferably by means of a pipe 103, so that the fluid will be discharged
50 into the cushion and discharged therefrom through the pipe 103. Obviously, any other means for supplying fluid to and relieving the cushion of the fluid pressure, may be employed.

55 If desired, the cylinders 101 may be provided with openings 104, so that the fluid pressure entering the cylinders will also enter the chambers 96, thereby increasing the area of the pistons or members upon which the fluid pressure operates.

60 It will be manifest that any desired degree of pressure may be supplied to the cushions and to the respective cylinders, and these pressures may be equal or may vary in the respective cushions as desired.

65 When the pressure is established in the cushion and the ram 16 is lowered in its operation, the movable element of the die or the work holder, which operates upon the pins 97, when it con-
70 tacts with the work, will cause the cylinders 100 and 101 to telescope and the resistance of the fluid pressure in the cushion will be controlled by the degree of pressure created in the cylinders.

75 In order to lock or hold the movable die member or the work holder which is being controlled by

the cushion, against the operation of the expansion of the fluid under pressure in the cylinders, when the slide 16 starts to ascend, suitable locking mechanism may be provided to prevent the cylinder members from separating under such pressure.

To that end there may be provided a supplemental cylinder 105, one of which may be provided for each of the cushioning chambers, and which cylinder 105 is out of communication with
10 the interior of the cylinders 100—101.

A piston 106 moves in the cylinder 105 and a piston rod 107 is connected to the piston 106 and is also connected to the member 98.

15 With this construction it will be manifest that when the cylinders 100 and 101 are moved towards each other to compress the fluid therein, the piston 106 will rise in the cylinder 105, and therefore in order to lock these cylinders against separation or expansion under the fluid pressure,
20 suitable locking means are provided. This locking may be accomplished by fluid pressure, and to that end fluid may be supplied through a suitable pipe 108 from a suitable source of supply. The pipe discharges into the cylinder 105 on one side of
25 the piston 106, and when it is desired to lock the parts in this position, pressure to a suitable degree is established in the cylinder 105 beneath the piston 105, and which pressure must be of a degree greater than the degree of pressure of the fluid
30 in the cylinders 100—101, to overcome such latter pressure.

Suitable mechanism, not shown, is provided for supplying the fluid pressure to the cylinder 105, and the source of supply of fluid pressure may be established or cut off at any predetermined time
35 in the cycle of operation of the press, according to the nature of the work or of the material being operated upon.

40 Likewise the fluid pressure may be supplied to the cushions or in the respective cylinders 100—101, at any time during the cycle of operation of the press, automatically and in a manner well known in this art.

45 It will therefore be seen that the cushioning device in the inner slide 16 may be rendered active or inactive at predetermined times in the cycle of operation of the press.

Obviously, suitable packing is provided wherever needed, and it is also obvious that any desired
50 number of individual cushions may be provided in the slide.

It is thought that the operation of the press will be clearly understood from the foregoing, but briefly stated it is as follows. All of the operating
55 mechanisms for the slides, both the upper and the lower slides, with the exception of the connecting rods which connect the rods directly to the operating mechanisms are disposed below the bed of the press, so that the upper slides will be actuated by a pulling movement rather than a pushing
60 movement, thereby overcoming the tendency of the parts of the frame to spread, separate, or lift from the bed under the working stress of the slides and dies upon the work, thereby obviating
65 the necessity of the provision of tie rods with their consequent uneven shrinkage.

The upper slides are operated by toggle mechanism from eccentrics, and the toggle mechanism for one of the upper slides operates it with a
70 dwell in its movement, so that the movement of one of the slides will be arrested while the other slide is completing its operation.

The lower hollow crown in which all of the operating mechanisms for the slides are located, is
75

a lubricant container, so that these parts will be immersed and will operate in a lubricant.

Furthermore, by the arrangement of the press in this manner, the center of gravity is disposed below the bed and it is possible to construct a press of this character without necessitating any increase in height of the building in which the press is to be installed.

In the preferred construction as herein shown, it will be manifest that no crank shaft is employed, thereby obviating or overcoming the serious objection of deflection, which is usual in presses which employ long stroke shafts.

Any repairs or adjustments necessary will be accomplished from below the bed at a point or in a position where it is convenient for the workmen, thereby obviating the necessity of the workmen having to climb to the top of the press to gain access to the crown in which a portion of the operating mechanism of presses heretofore constructed, have been located.

While the preferred form of the invention has 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. In a press a frame, a bed, a plurality of reciprocable slides above the bed, toggle links connected to one of said slides for operating it with a dwell in its movement, toggle links connected to another of said slides for operating it, said toggle links being disposed below the bed, a plurality of eccentrics disposed below the bed, operative connections between certain of said eccentrics and certain of said toggle links for operating the latter, operative connections between others of said eccentrics and others of said toggle links for operating the latter, driving means also below the bed for rotating said eccentrics, a reciprocating slide below the bed, means also below the bed for reciprocating the last said slide, a supplemental slide movable with and with respect to one of the slides, and fluid pressure controlled means for controlling the movement of said supplemental slide with respect to its supporting slide.

2. A press embodying a frame, a combined bed and hollow lower crown, a plurality of reciprocable slides above the bed, a plurality of sets of toggle links individual to the slides and disposed in the crown below the bed, operative connections between the slides and their respective sets of toggle links, said connections passing through a wall of the crown, guides for said connections for relieving the respective slides from lateral stress

of their reciprocating means, the toggle links of one slide operating the slide with a dwell in its movement, actuating means for the toggle links, a slide on the other side of the bed, actuating means for the last said slide disposed in said crown, an operative connection between the last said slide and its actuating means, and a guide for the last said connection to relieve the slide from lateral stress of its operating means.

3. A press embodying a frame, a combined bed and hollow lower crown, a plurality of reciprocable slides above the bed, a plurality of sets of toggle links individual to the slides and disposed in the crown below the bed, operative connections between the slides and their respective sets of toggle links, said connections passing through a wall of the crown, guides for said connections for relieving the respective slides from lateral stress of their reciprocating means, the toggle links of one slide operating the slide with a dwell in its movement, actuating means for the toggle links, a slide on the other side of the bed, actuating means for the last said slide disposed in said crown, an operative connection between the last said slide and its actuating means, and a guide for the last said connection to relieve the slide from lateral stress of its operating means, the said actuating means for the said toggle links embodying rotatable eccentrics and eccentric strap connections between said eccentrics and the respective toggle links.

4. A press embodying a frame, a bed, a plurality of reciprocable slides above the bed, toggle links below the bed, operative connections between the slides and their respective toggle links, actuating means for the toggle links of the respective slides, each of said actuating means embodying eccentrics on each side of which the links are arranged and eccentric strap connections between the eccentrics and certain of the toggle links, and means for rotating the eccentrics, one set of toggles operating their respective slide with a dwell in its movement.

5. A press embodying a frame, a bed, a plurality of reciprocable slides above the bed, toggle links below the bed, operative connections between the slides and their respective toggle links, actuating means for the toggle links of the respective slides, each of said actuating means embodying eccentrics on each side of which the links are arranged, eccentric strap connections between the eccentrics and certain of the toggle links, means for rotating the eccentrics, one set of toggles operating their respective slide with a dwell in its movement, a slide on the other side of the bed, and means for actuating the last said slide.

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