Oct. 14, 1947. E. K. JOHANSEN 2,429,062

TRIPLE ACTION PRESS

Filed June 8, 1944 5 Sheets-Sheet 1

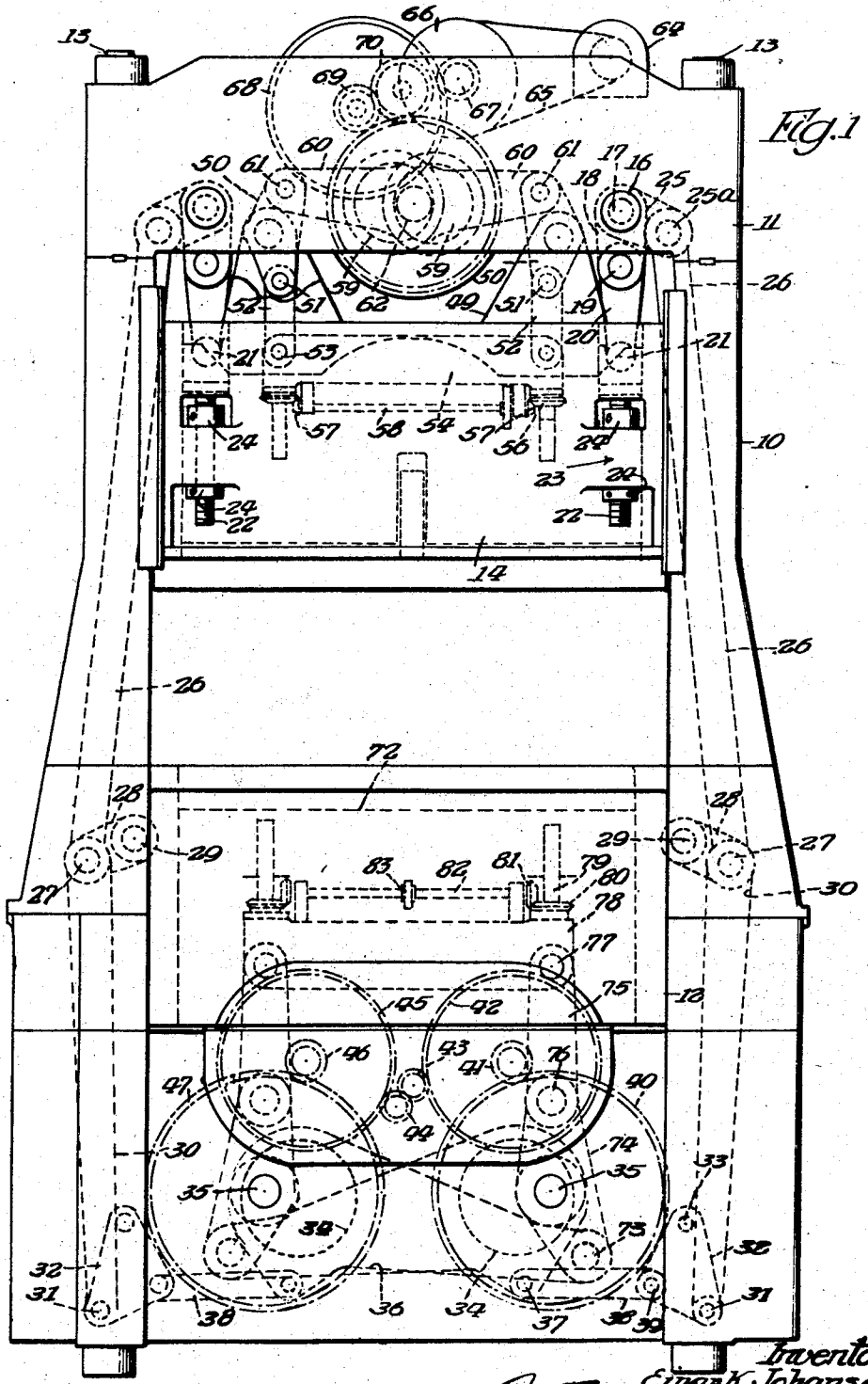


Fig. 1

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Fig. 2

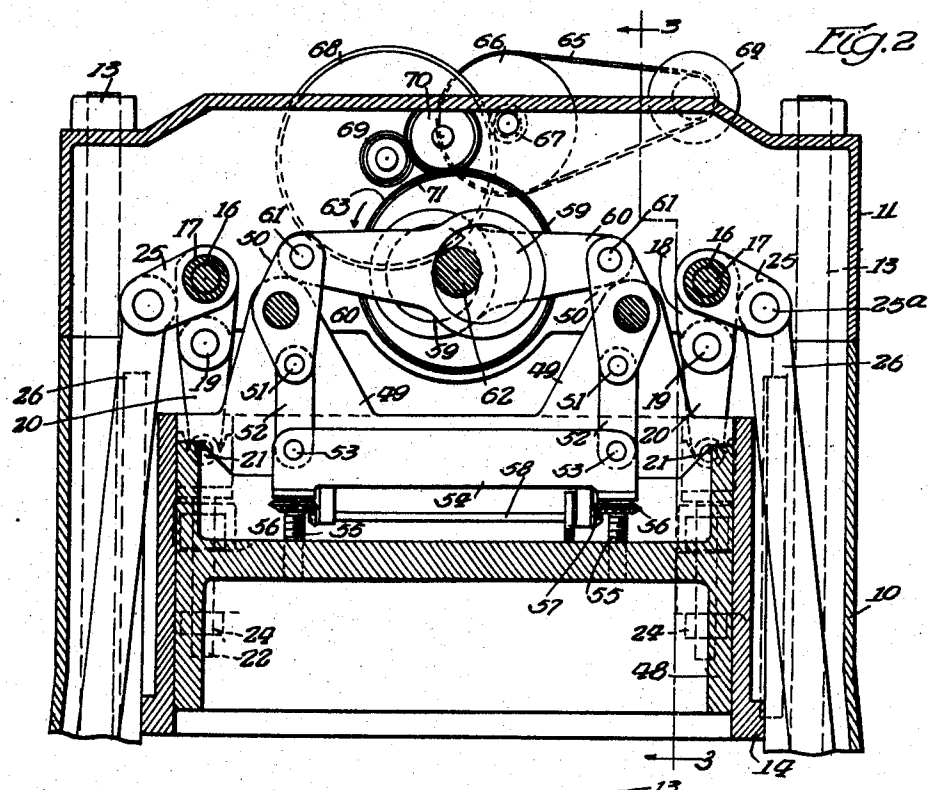
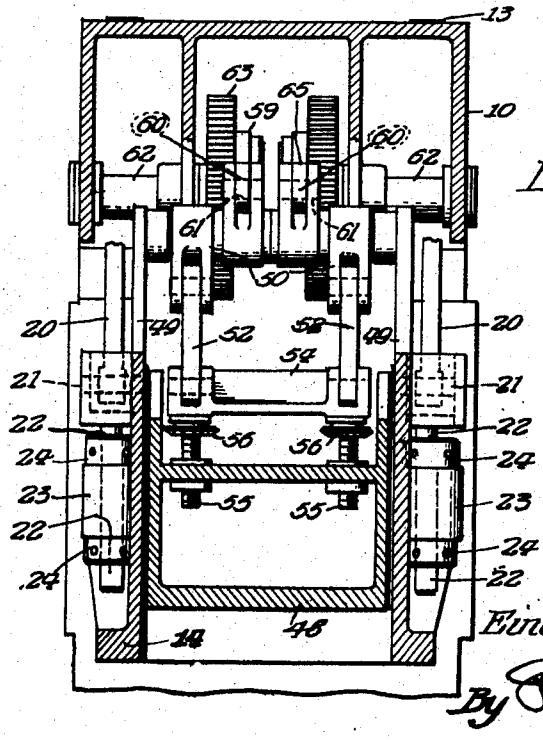


Fig. 3



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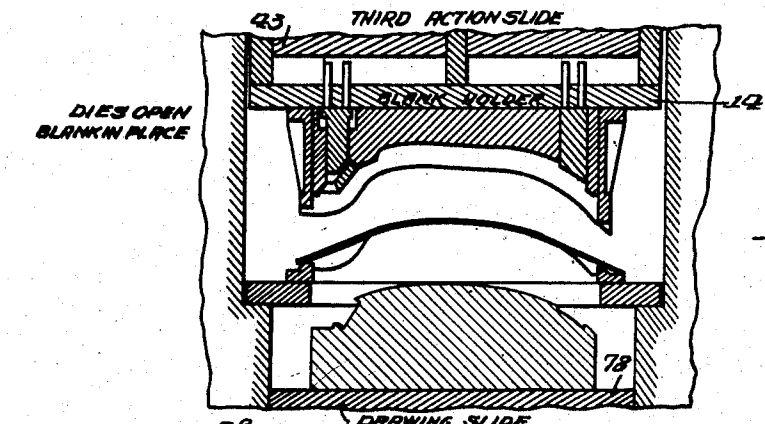


Fig. 4

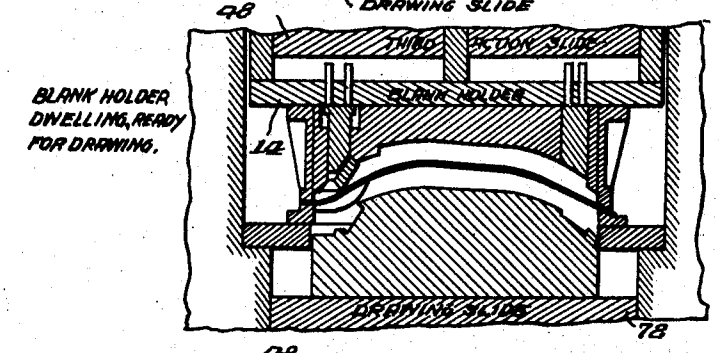


Fig. 5

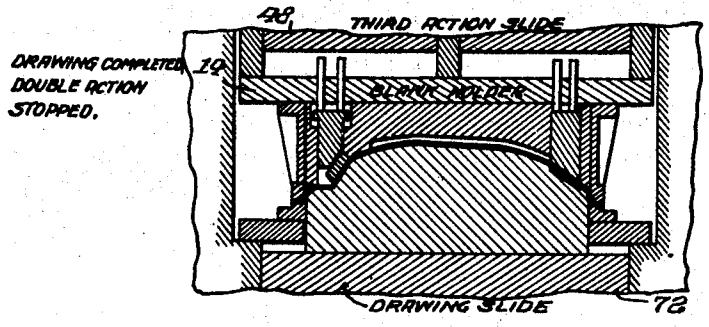


Fig. 6

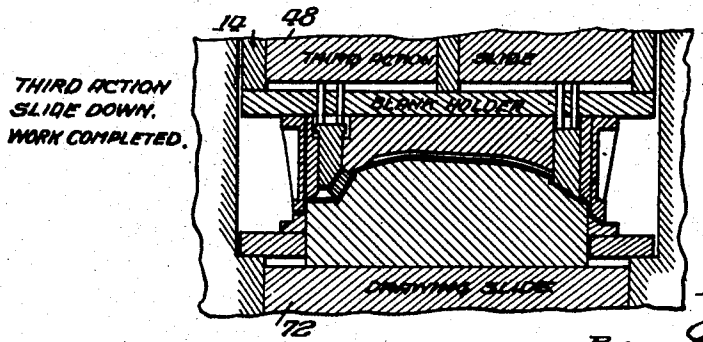


Fig. 7

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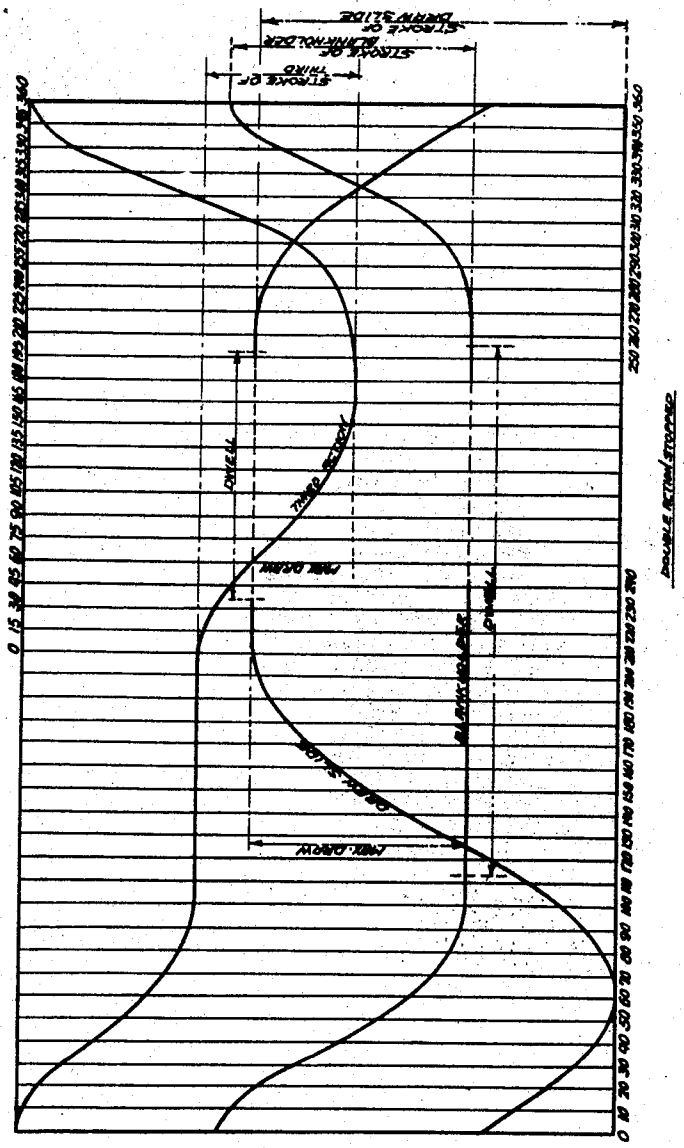


Fig. 8

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Fig. 9.

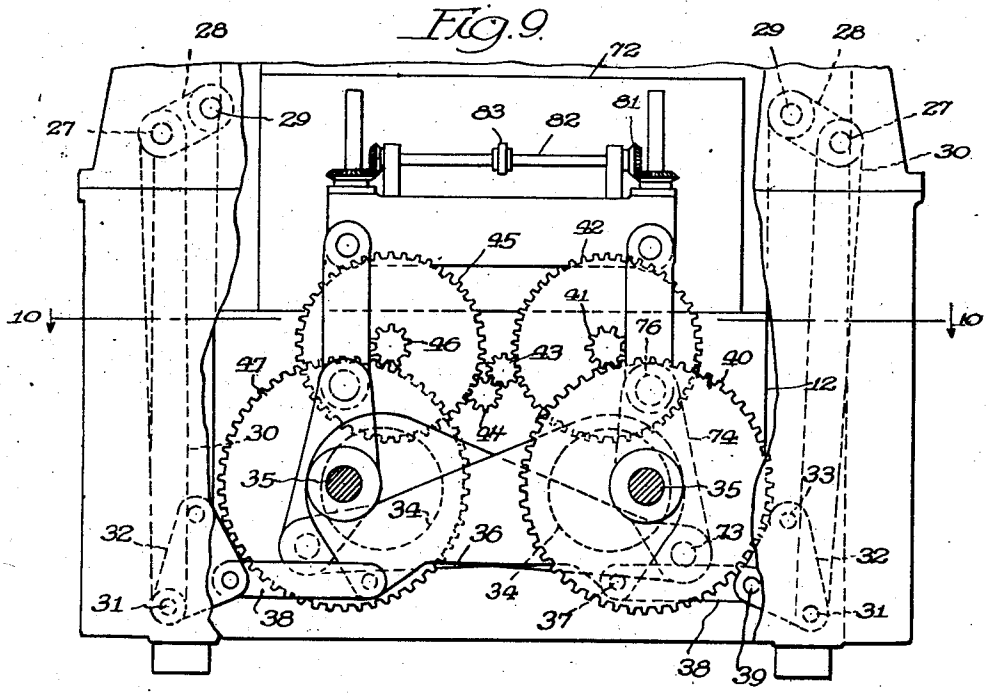
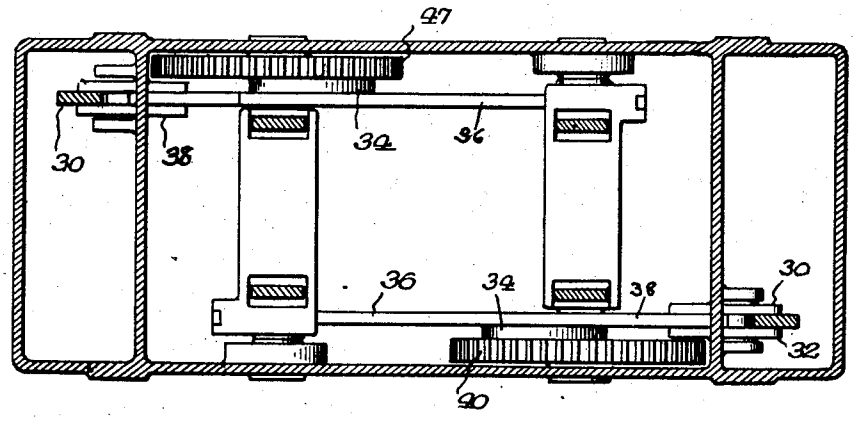


Fig. 10.



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UNITED STATES PATENT OFFICE

2,429,062

TRIPLE-ACTION PRESS

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Application June 8, 1944, Serial No. 539,337

17 Claims. (Cl. 113—38)

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This invention relates to improvements in presses, particularly adapted, though not necessarily limited in use, for metal drawing, wherein a plurality of slides are provided, one of which serves as a work-holder, while another slide performs operations upon the work, certain of the slides having a period of dwell in their operation.

It is one of the objects of the present invention to provide, in a press of this character, a plurality of slides operating on the same side of the bed, one of which slides is supported by the other slide, for movement therewith, by the operating mechanism of the said other slide, for a predetermined distance, after which the said operating mechanism will be rendered inactive, while the mechanism of the said supported slide will be rendered active to effect a relative movement of the slides. During the movement of both of the slides together, one of the slides will be moved with respect to its operating mechanism, while the latter is maintained inactive.

In presses of this character, it has heretofore been customary to clamp the work upon the bed by lowering the clamping means from the top of the press. The blank is then formed by the second action or draw slide operating in the same direction as that of the clamping slide. The third action slide then operates upon the work in the opposite direction from that of both of the other slides. The result is that the article, when thus formed, must be lifted from the die, then inverted for further operation, such as trimming, thereupon.

This is objectionable, as the handling of the product causes the same to be injured, besides being difficult to handle. In the present invention the first and third action slides operate upon the same side of the bed, while the second action or draw slide operates on the other side of the bed and in the opposite direction. The result is that the product will be positioned upon the top of the die, and can be easily removed from the press without any lifting or turning over of the article for further operation thereupon.

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, herein after more fully described and claimed, and shown in the accompanying drawings illustrating this invention, in which

Fig. 1 is a front view, partly in elevation, partly broken away, and with parts omitted, of a press of this character, constructed in accordance with the principles of this invention.

Fig. 2 is a detail view, partly in elevation, partly in section, and with parts omitted, on an enlarged scale, of the upper part of the press, with the actuating mechanism for the slides.

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Fig. 3 is a detail sectional view taken on line 3—3, Fig. 2.

Figs. 4, 5, 6 and 7 are detail sectional views, showing the different positions of the slides and their dies, during one cycle of operation of the press.

Fig. 8 is a cyclograph of the movement of the slides, showing the period of dwell obtained in the slides.

Fig. 9 is a detail view, in elevation, of the operating mechanism for the second action slide.

Fig. 10 is a sectional view, taken on line 10—10, Fig. 9.

The press consists, essentially, of a frame designated, generally, by the reference numeral 10, which may be of any desired construction, but is preferably sectional, embodying a crown 11 and a base 12, the parts being secured together in any suitable manner, such as by means of tie rods 13.

Reciprocable between the uprights is an outer or first action slide 14, which is supported by its actuating means from the crown of the press, so that the operating strain upon the work will be exerted upon the crown 11, and will be absorbed by the tie rods 13. The actuating means for the outer slide consists, preferably, of a rock shaft 16 mounted to oscillate upon a shaft or support 17, which in turn is supported by the press crown. One of these actuating mechanisms is located on each side of the press, and as the construction and operation of both of them are the same, a description of one will apply to both.

The rock shaft 16 is provided with an arm 18, to which are pivotally connected by one end, as at 19, links 20, which in turn are pivotally connected, as at 21, to a screw-threaded member 22 which passes through a suitable portion 23 of the slide. Adjustably mounted on the threaded member 22 are collars 24, by means of which the slide 14 may be adjusted with respect to its actuating means, to vary the space between the slide and the press bed.

The rock shaft 16 is also provided with an arm 25 arranged at an angle to the arm 18, and pivotally connected to the arm 25, as at 25a, is a link or member 26 that extends downwardly and within the press frame. The other end of the link or member 26 is pivotally connected, as at 27, to a rocker member 28, which in turn is pivotally mounted at its other end, as at 29, to the press frame. This rocker member 28 may be of any desired or suitable construction. Pivoted also to the rocker member 28 is one end of another link or member 30 which extends downwardly within the frame, and is in turn pivotally connected by its other end, as at 31, to a rocker member 32 located in the base of the machine, so that when the rocker member 32 is swung about its pivot 33, the actuating mecha-

nism for the outer slide 14 will be operated, and as this actuating mechanism is located in the crown of the press and is in the nature of a toggle, it will be manifest that the slide 14 will be reciprocated. Furthermore, the stress exerted upon the slide 14 will be to force the slide downwardly against the work, as distinguished from pulling the slide down by actuating mechanism located in the base or bed of the press.

Arranged within the bed of the press, is an eccentric member 34 which is rotatable about the axis 35. Co-operating with the eccentric 34, is an eccentric arm or strap member 36, to which member 36 is pivotally connected, as at 37, one end of a link 38. The other end of the link is pivotally connected, as at 39, to the rocker member 32. It will therefore be manifest that when the eccentric 34 is rotated, the rocker member 32 will be oscillated about its pivot 33 through the medium of the link connection 38. This, in turn, will operate the actuating mechanism in the crown of the press, for the outer slide. The eccentric which oscillates the rocker member 32 is preferably located on the side of the press opposite to that on which the rocker member is located, so as to insure the proper movement or actuation of the rocker member 32. A rotary movement is imparted to the eccentric 34 from any suitable source, and connected with the eccentric is a gear 40, with which a pinion gear 41 meshes. Connected with the pinion gear 41, is a gear 42 which in turn meshes with a gear 43, which latter drives a gear 44 that meshes with a gear 45 that has connected with it a gear 46. This gear 46 meshes with another gear 47 secured to the shaft or axis 35 of the eccentric 34 on the other side of the press.

With this construction, it will be manifest that the gear mechanism is so arranged with respect to the eccentric 34 and the gears 40—47, that they will rotate in the proper direction, so as to cause a reciprocation of the slide 14, by the operation of the actuating mechanism on each side of the press.

Within the slide 14 is arranged another or third action slide 48 that is supported by the slide 14, so as to move therewith and with respect thereto. To that end, the slide 14 is provided with portions 49 which serve as fulcrums for the actuating mechanism of the inner slide. Supported by each of the portions 49, and for rocking movement with respect thereto, are rocker members 50, to which are pivotally connected, as at 51, links 52. These links 52 are in turn pivotally connected, as at 53, to a support 54 of the inner slide, such actuating mechanisms being located at each end of the slide.

The slide 48 is connected directly with the support 54 in any suitable manner, so that it may be adjusted with respect thereto, to vary the space between the slide and the bed of the press, preferably by means of screws or threaded shafts 55 having connected therewith gears 56, and with each of these gears 56 a gear 57 carried by a shaft 58, meshes. By rotation of the shaft 58 in any suitable manner (not shown), it will be manifest that the screws or threaded shafts 55 will be rotated to effect an adjustment of the slide 48 with respect to the support 54.

The actuating mechanism for the inner slide also consists of eccentrics 59, with each of which an eccentric arm or member 60 co-operates, the free end of the arm or member 60 being pivotally connected, as at 61, with one of the rocker members 50. The eccentrics 59 are mounted upon a shaft 62, and are driven by means of a suitable gear 63 from a motor 64, preferably through the medium of a belt 65 which passes over a pulley 66 and an intermediate gear connection 67, 68, 69, 63, 70 and 71, so as to drive the gear 63 in the direction of the arrow shown in Fig. 2. Thus it will be seen that when the actuating mechanism for the inner slide 48 is operated, this slide will be moved with respect to the outer slide 14.

The lower or second action slide 72 of the press is actuated by the same mechanism which operates the upper slides. To that end, the ends of the eccentric arms or members 36 in the base of the machine are pivotally connected, as at 73, with a rocker member 74. This rocker member 74 is supported by the shaft 35, and a link 75 is pivotally connected by one end, as at 76, with the rocker member 74, and by its other end, as at 77, to a support 78 carried by the slide 72.

When the eccentric 34 is rotated to operate the eccentric arm or strap 36, it will cause a rocking movement of the rocker member 74. This in turn will, through the medium of the link 75, cause a reciprocation of the lower slide 72. This lower slide is adjustably connected to the support 78 in any suitable manner, such as by means of a threaded rod or shaft 79, upon which is mounted a gear 80. Meshing with the gear 80, is a gear 81 carried by a shaft 82, and, if desired, an actuating member or handle 83 (diagrammatically illustrated) may be provided to rotate the shaft 82, to effect an adjustment of the slide 72 with respect to the support 78.

In the operation of the press, the actuating means at the top of the press is controlled independently of the actuating means at the bottom of the press, and suitable mechanism may be provided (not shown), whereby when one of the actuating means is rendered active, the other will be rendered inactive. Inasmuch as the inner slide is supported by the outer slide, it will be clear that when the actuating means for the outer slide is operated, the inner slide will be lowered with the outer slide. Therefore, in order to prevent a relative movement of the inner slide with respect to the outer slide, until the outer slide has reached the limit of its downward movement, the actuating mechanism at the top of the press will remain inactive, while the operating mechanism at the bottom of the press is active. That is, both of the slides will be lowered together for a predetermined distance, by the mechanism in the base of the press.

During this time, the actuating mechanism at the top of the press is inactive and, as a result, the eccentric straps or members 60 will slide or move about the eccentrics 59, the latter being maintained at rest until the outer slide 14 has reached a predetermined point in its movement. At this time, the operating mechanism which lowers the outer slide 14, and also actuates the lower slide 72, may be rendered inactive in any suitable manner (not shown), to provide a dwell in the movement of the outer slide 14, and the lower slide 72, at which time the actuating mechanism for the inner slide 48 will be rendered active, thereby causing relative movement of the inner slide 48 with respect to the outer slide 14.

Figs. 4 to 7 of the drawings illustrate the different positions of the slides with their attached dies. Fig. 4 illustrates the dies in an open position, while Fig. 5 illustrates the blank-holder or outer slide dwell, the parts being in position for a drawing operation. Fig. 6 illustrates the posi-

tion of the dies when the drawing has been completed and the double action of the slides has been stopped. Fig. 7 shows the third action slide down, with the work completed. The cyclograph illustrated in Fig. 8 gives the position of the slides during a cycle of operation, and indicates the points of dwell of the slides.

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 of the character described, a first action slide, actuating means for the slide, supported by the press crown, operating means for said actuating means, said operating means being located in the base of the press, link connections between said operating and actuating means, a third action slide on the same side of the bed supported by and movable with and with respect to the first said action slide, actuating means for the said third action slide, the last said actuating means being mounted upon the first said action slide, operating means for the said third action slide actuating means, the last said operating means being mounted in the crown of the press, whereby the said third action slide may be moved with respect to the said first action slide, both of said slides initially moving in unison, for a predetermined distance, during which initial movement the said third action slide will move with respect to its operating means, while the latter remains inactive, a second action slide on the side of the bed opposite to the side on which the other slides are mounted, and means for operating said second action slide.

2. In a press of the character described, a first action slide, toggle mechanism mounted in the crown of the press and connected with said slide for reciprocating it, operating mechanism mounted in the base of the press, link connections between said toggle and operating mechanisms, a third action slide on the same side of the press, toggle mechanism mounted upon the said first action slide and operatively connected with the said third action slide, and operating mechanism mounted in the press crown and connected with the said third action slide toggle mechanism, said third action slide being responsive in its initial movement in one direction, to the movement of the said first action slide while the operating mechanism for the said third action slide remains inactive, a second action slide on the side of the bed opposite to the side on which the first and third action slides are located, and means for operating the said second action slide.

3. In a press, a first action and a third action slide reciprocable on the same side of the bed, and means individual to the slides for operating them one with respect to the other, the operating means for the first action slide being mounted upon the frame of the press, and the operating means for the said third action slide being mounted partially upon the press frame and partially upon the said first action slide, whereby both slides will be moved in unison for a predetermined distance by the operating mechanism of the first action slides, and subsequently the said third action slide may be moved with respect to the first action slide by its own operating mechanism, after both of the slides have been moved simultaneously for said predetermined distance, a second action slide on the other side of the bed, and means for actuating said second action slide.

4. In a press, a first action and a third action slide reciprocable on the same side of the bed, and means individual to the slides for operating them one with respect to the other, the operating means for the said first action slide being mounted upon the frame of the press, and the operating means for the said third action slide being mounted partially upon the press frame and partially upon the said first action slide, whereby both slides will be moved in unison for a predetermined distance by the operating mechanism of the said first action slide, and subsequently said third action slide may be moved with respect to the said first action slide by its own operating mechanism, after both of the slides have been moved simultaneously for said predetermined distance, the operating mechanism for the said first action slide being mounted in the crown of the press, and portions of the operating mechanism for the said third action slide being mounted in the crown and in the base of the press frame, a second action slide on the other side of said bed, and means for actuating said second action slide.

5. In a press, a first action and a third action slide reciprocable on the same side of the bed, means individual to the slides for operating them one with respect to the other, the operating means for the said first action slide being mounted upon the frame of the press, and the operating means for the said third action slide being mounted partially upon the press frame and partially upon the said first action slide, whereby both slides will be moved in unison for a predetermined distance by the operating mechanism of one of the slides, and subsequently the said third action slide may be moved with respect to the said first action slide by its own operating mechanism, after both of the slides have been moved simultaneously for said predetermined distance, means individual to the slides for adjusting them with relation to their respective operating mechanisms, for varying the space between them and the press bed, while the extent of operation of their operating means remains constant, a second action slide on the other side of the bed, and means for actuating said second action slide.

6. In a press, a first action and a third action slide reciprocable on the same side of the bed, and means individual to the slides for operating them one with respect to the other, the operating means for the said first action slide being mounted upon the frame of the press, and the operating means for the said third action slide being mounted partially upon the press frame and partially upon the said first action slide, whereby both slides will be moved in unison for a predetermined distance by the operating mechanism of the first action slide, a portion of the operating means of the said third action slide, during the last said movement, remaining inactive, and subsequently being rendered active to effect movement of its respective slide with relation to the said first action slide, a second action slide on the other side of the bed, and means for actuating said second action slide.

7. In a press, a first and a third action slide reciprocable on the same side of the bed, means common to the slides for moving them together, the said means being mounted upon the frame of the press, means for moving one of the slides with respect to the other, the last said means being mounted partially upon the press frame and partially upon one of the slides, said slides moving in

unison for a predetermined distance by the first said means, and subsequently one of the slides being movable with respect to the other slide by its own operating mechanism, after both of the slides have been moved for said predetermined distance, a second action slide on the other side of the bed, and means for operating the said second action slide.

8. In a press, a first and a third action slide reciprocable on the same side of the bed, means common to the slides for moving them together, the said means being mounted upon the frame of the press, means for moving one of the slides with respect to the other, the last said means being mounted partially upon the press frame and partially upon one of the slides, said slides moving in unison for a predetermined distance by the first said means, and subsequently one of the slides being movable with respect to the other slide by its own operating mechanism, after both of the slides have been moved for said predetermined distance, a second action slide on the other side of the bed, and means responsive to the operation of one of the aforesaid operating means for reciprocating the said second action slide.

9. In a press, a first and a third action slide located on the same side of the bed, actuating means for the said first action slide, mounted upon the press crown, operating means for said actuating means, located on the other side of the bed, an operative connection between said actuating and operating means, toggle mechanism supported by and bodily movable with the said first action slide and connected to the said third action slide, an eccentric mounted upon the press frame, an eccentric member co-operating with the eccentric, an operative connection between said eccentric member and said toggle mechanism, for moving the said third action slide with respect to said first action slide, means other than the first said operating means, for rotating the eccentric, said slides being movable simultaneously by the first said operating means for a predetermined distance, during which last said movement said eccentric member will move with respect to said eccentric, while the latter remains inactive, a second action slide on the other side of the bed, and means for actuating said second action slide.

10. In a press, a first and a third action slide located on the same side of the bed, actuating means for the first action slide, mounted upon the press crown, operating means for said actuating means, located on the other side of the bed, an operative connection between said actuating and operating means, toggle mechanism supported by and bodily movable with the said first action slide and connected to the third action slide, an eccentric mounted upon the press frame, an eccentric member co-operating with the eccentric, an operative connection between said eccentric member and said toggle mechanism, for moving the said third action slide with respect to said first slide, means other than the first said operating means, for rotating the eccentric, said first and third action slides being movable simultaneously by the first said operating means for a predetermined distance, during which last said movement said eccentric member will move with respect to said eccentric, while the latter remains inactive, a second action slide on the other side of the bed, and means for operating the said second action slide.

11. In a press, a first action and a third action slide located on the same side of the bed, actuating means for the first action slide, mounted upon the press crown, operating means for said actuating means, located on the other side of the bed, an operative connection between said actuating and operating means, toggle mechanism supported by and bodily movable with the said first action slide and connected to the said third action slide, an eccentric mounted upon the press frame, an eccentric member co-operating with the eccentric, an operative connection between said eccentric member and said toggle mechanism, for moving the said third action slide with respect to said first action slide, means other than the first said operating means, for rotating the eccentric, said slides being movable simultaneously by the first said operating means for a predetermined distance, during which last said movement said eccentric member will move with respect to said eccentric, while the latter remains inactive, means individual to said slides for adjusting them to vary the space between the respective slides and said bed, while the extent of movement of the slides by their actuating means remains constant, a second action slide on the other side of the bed, and means for operating said second action slide.

12. In a press, a first and a third action slide located on the same side of the bed, toggle mechanism mounted upon the press crown and connected to the first action slide for moving it, operating means located on the other side of the bed, an operative connection between said operating means and said toggle mechanism for actuating the latter, toggle mechanism supported by and bodily movable with the said first action slide and connected to the said third action slide, an eccentric mounted upon the press frame, an eccentric member co-operating with the eccentric, an operative connection between said eccentric member and the last said toggle mechanism, for moving the said third action slide with respect to said first action slide, means other than the first said operating means, for rotating the eccentric, said slides being movable simultaneously by the said first action slide operating means for a predetermined distance, during which last said movement said eccentric member will move with respect to said eccentric, while the latter remains inactive, a second action slide on the other side of the bed, and means for moving the last said slide.

13. In a press, a first action slide, means for reciprocating the slide, a third action slide on the same side of the bed and operable in the same direction as the first action slide, a rocker member pivotally mounted upon and bodily movable with the first action slide, a link connection between said rocker member and the said second action slide, whereby both slides may be moved in unison by the first action slide operating means, a rotatable eccentric mounted upon the press crown, an eccentric member co-operating with said eccentric, a pivotal connection between said eccentric member and said rocker member, whereby to move the said third action slide with respect to the first action slide, means for rotating said eccentric, the said eccentric member moving with respect to the eccentric when the slides are simultaneously moved by the first action slide operating means, while the said eccentric is maintained inactive, a second action slide on the other side of the bed, and means for operating the last said slide.

14. In a press, a first action slide, means embodying toggle mechanism, supported by the press crown, operating mechanism on the other side of the bed for actuating the toggle mechanism,

means for reciprocating the slide, a third action slide on the same side of the bed and operable in the same direction as the said first action slide, a rocker member pivotally mounted upon and bodily movable with the first action slide, a link connection between said rocker member and the said third action slide, whereby both slides may be moved in unison by the first action slide operating means, a rotatable eccentric mounted upon the press crown, an eccentric member co-operating with said eccentric, a pivotal connection between said eccentric member and said rocker member, whereby to move the said third action slide with respect to the said first action slide, means for rotating said eccentric, the said eccentric member moving with respect to the eccentric when the slides are simultaneously moved by the first action slide operating means, while the said eccentric is maintained inactive, a second action slide on the other side of the bed, and means for actuating the last said slide.

15. In a sheet metal drawing press, a bed, a first and a third operation slide located on the upper side of the bed, a second action slide located on the lower side of the bed, positive actuating means individual to the slides for operating them in predetermined sequence and independently one with respect to the other, the said means also embodying mechanisms to impart a positive work operating stroke to the second action slide intermediate the operation of the first and third operating slides and in a direction opposite to the direction of movement of the first and third action slides.

16. In a sheet metal drawing press, a bed, a first and a third operation slide located on the same side of the bed, a second action slide located on the other side of the bed, means individual to the slides for operating them in predetermined sequence, the said means embodying positive operating mechanisms whereby to impart an operative stroke to the second action slide in a direction opposite to the direction of movement of the first action slide, the operating mechanism for the said third action slide being carried by the first action slide and operating to impart a positive operative movement to the third action slide in the same direction as that of the first action slide.

17. In a sheet metal drawing press, a bed, a first and a third operation slide located on the same side of the bed, a second action slide located on the other side of the bed, means individual to the slides for operating them in predetermined sequence, the said means embodying operating mechanisms to impart a positive operative stroke to the second action slide in a direction opposite to the direction of movement of the first and third action slides, a portion of the operating mechanism for the said third action slide being mounted upon the press frame, another portion of the last said mechanism being carried by the said first action slide for movement with and with respect to the first action slide.

EINAR K. JOHANSEN.

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