Jan. 17, 1950 J. N. WEILAND 2,494,921

SHEET METAL WORKING PRESS

Filed Sept. 26, 1947 5 Sheets-Sheet 1

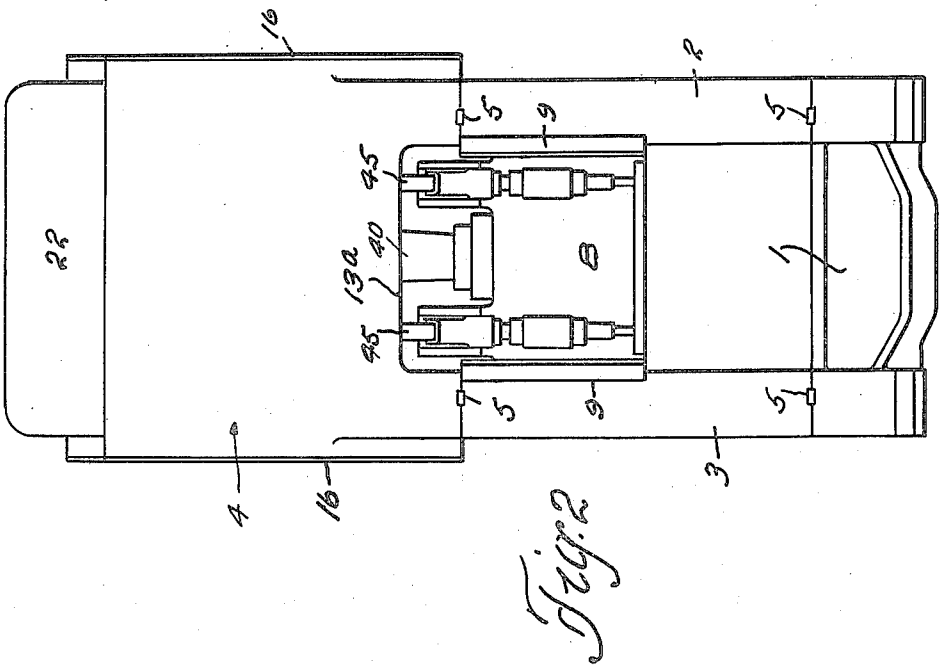


Fig. 2

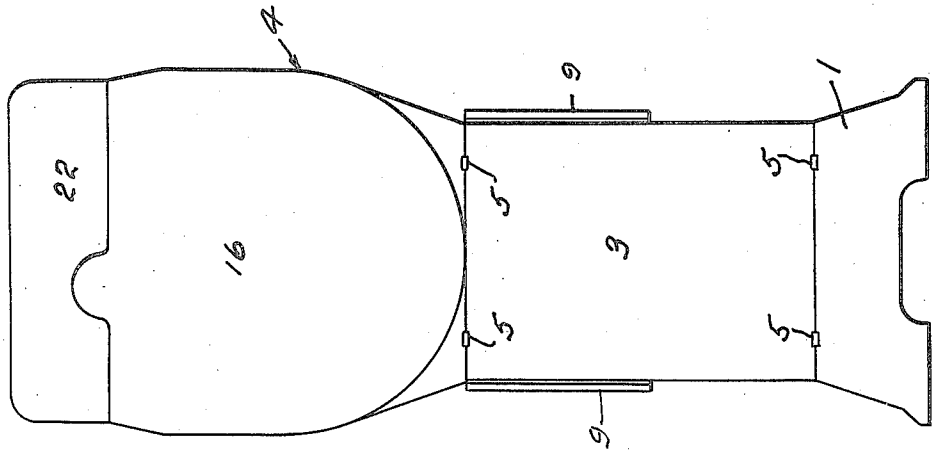


Fig. 1

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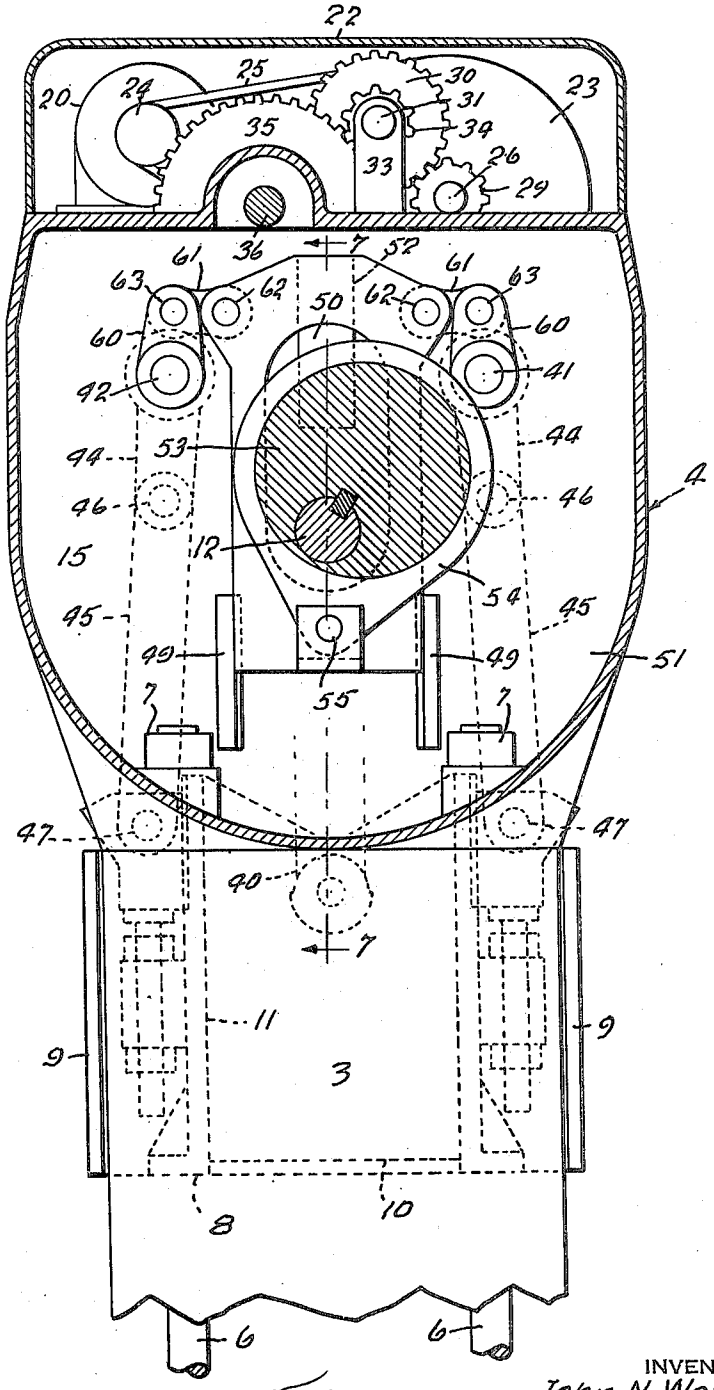


Fig. 3

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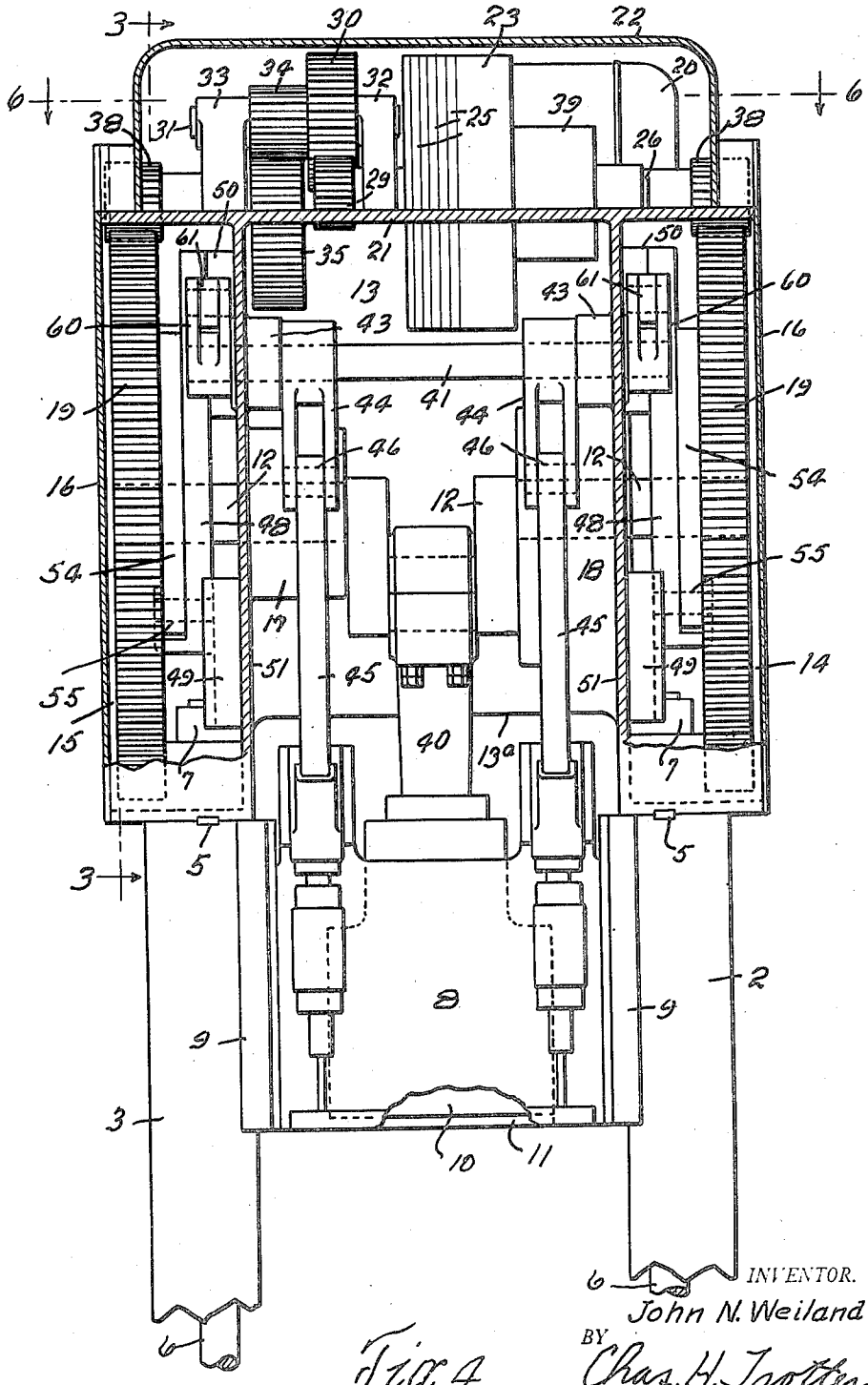


Fig. 4

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SHEET METAL WORKING PRESS

Filed Sept. 26, 1947 5 Sheets-Sheet 4

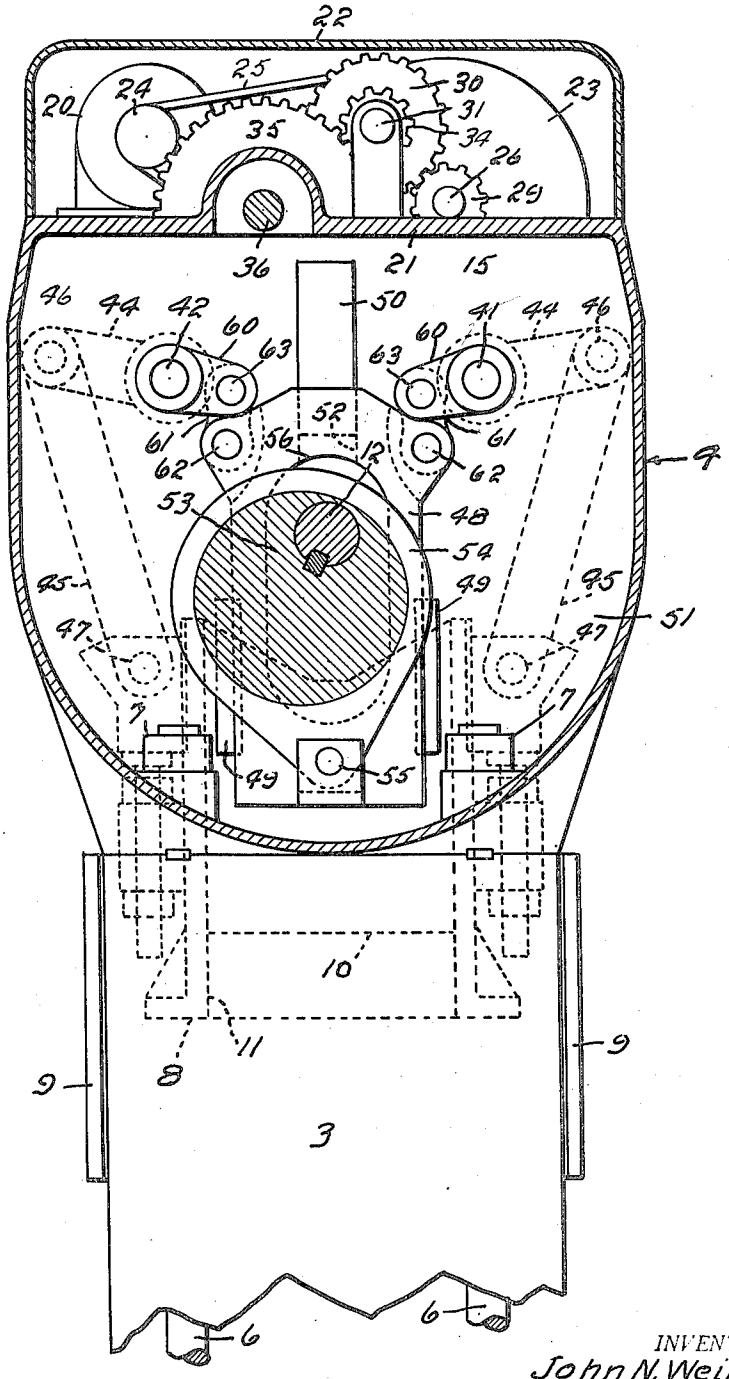


Fig. 5

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SHEET METAL WORKING PRESS

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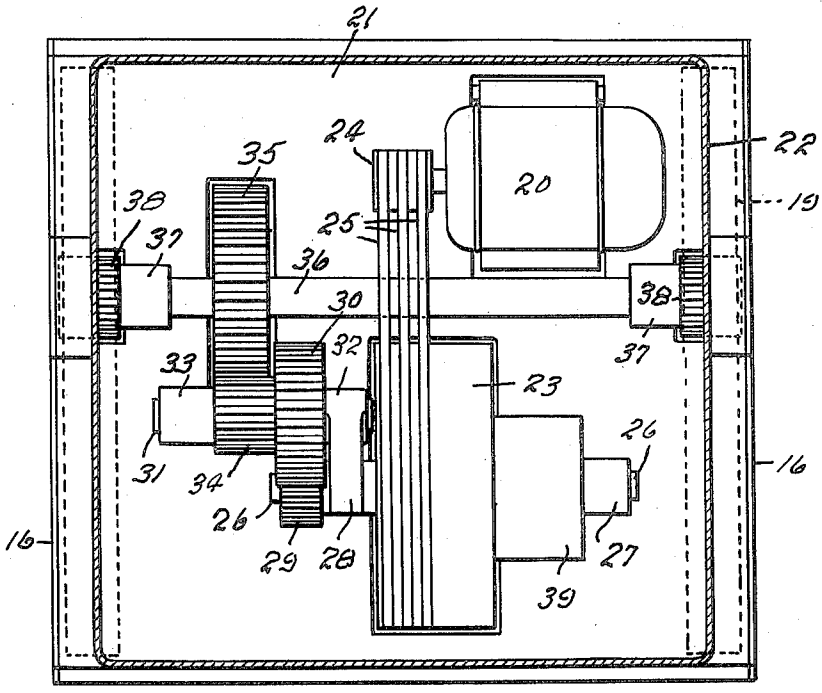


Fig. 6

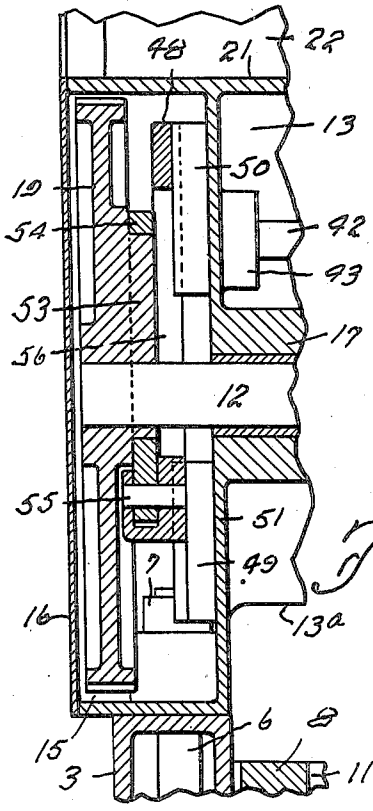


Fig. 7

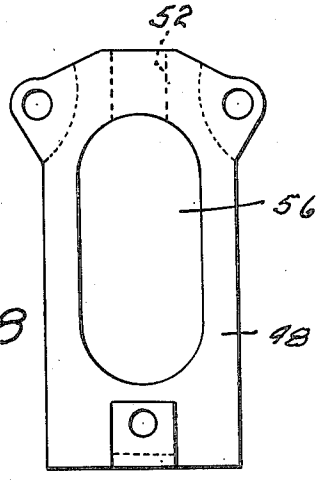


Fig. 8

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Patented Jan. 17, 1950 2,494,921

UNITED STATES PATENT OFFICE

2,494,921

SHEET METAL WORKING PRESS

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Application September 26, 1947, Serial No. 776,215

3 Claims. (Cl. 113—38)

1

This invention relates to mechanically actuated sheet metal working presses of the double action type.

Presses of this type have two slides which are operated in timed relation to each other. One is generally known as the die slide and the other as the blankholder slide. They are reciprocally supported by spaced uprights between the bed and crown of a press. The blankholder slide is directly supported and guided by the uprights and the die slide is mounted in a vertical opening which extends through the blankholder slide. The die slide is reciprocated by a crankshaft through a suitable connecting rod and the blankholder slide is reciprocated in timed relation thereto by suitable mechanism which is driven from the crankshaft.

In operation, the blankholder slide is moved downwardly in advance of the die slide until the blankholder engages the material to be formed. The blankholder slide then dwells holding the material while the die slide continues on down and forms the material. After the forming is completed, both the die slide and the blankholder slide move back to their uppermost position ready for the next operation.

The mechanism for driving the blankholder slide with the proper dwell in its movement consists of various shafts, toggles, slides and links which in prior presses have been quite complicated and cumbersome. Also in prior presses of this type, the entire operating mechanism was exposed so that it was difficult to lubricate and properly maintain. These presses were also very unsightly and were liable to injury by something striking or becoming entangled in the exposed mechanism.

The principal object of this invention is to simplify and compact the operating mechanism for the slides in presses of this character.

Another object of the invention is to entirely enclose the whole slide operating mechanism within the crown of the press in order to eliminate possibility of damage thereto and to improve the appearance of the press as a whole.

Other and more limited objects of the invention will be apparent from the following specification and the accompanying drawings forming a part thereof wherein:

Fig. 1 is an end elevation of a press constructed according to my invention:

Fig. 2 is a front elevation thereof;

Fig. 3 is a sectional end elevation thereof on a larger scale than that of Fig. 1 showing part of the operating mechanism, the plane of the section being indicated by the line 3—3 on Fig. 4;

2

Fig. 4 is a front elevation, on the same scale as Fig. 3, with the front of the crown in section to expose the mechanism therein;

Fig. 5 is a view similar to Fig. 3, showing the mechanism in a different position;

Fig. 6 is a sectional plan view, the plane of the section being indicated by the line 6—6 on Fig. 4;

Fig. 7 is a fragmentary vertical section taken on the line 7—7 on Fig. 3;

Fig. 8 is a front elevation of one of the operating slides.

Referring now to the drawings by reference characters, the numeral 1 indicates a base from which a pair of spaced uprights 2 and 3 extend. Supported on the upper ends of the uprights 2 and 3 is a crown generally indicated by the numeral 4. The base, uprights, and the crown are held in proper position with respect to each other by keys 5, and they are all bolted rigidly together by the tie-rods 6 and nuts 7.

A blankholder slide 8 is reciprocally mounted between the uprights 2 and 3 beneath the crown 4, and is held in position by suitable gibs 9. A die-slide 10 is reciprocally mounted in an opening 11 which extends through the blankholder slide from the top to the bottom thereof. These slides are operated in timed relation to each other by a crankshaft 12 through suitable mechanism to be described hereinafter.

The crown 4 comprises a mid-section 13 and a pair of chambers 14 and 15, one at each side of the mid-section 13. The mid-section 13 is open at the bottom thereof as indicated at 13a and the chambers 14 and 15 are closed by removable cover plates 16.

The crankshaft 12 is rotatably supported by bearings 17 and 18 in the crown of the press. The ends of the crankshaft extend into the chambers 14 and 15 and have rigidly secured thereto large gears 19, one on each end thereof, within the chambers 14 and 15 through which the crankshaft is rotated. The gears 19 are driven from a motor 20 through suitable mechanism, all of which is mounted on the top 21 of the crown and is enclosed by a removable cover 22.

In operation, the motor 20 continuously drives a flywheel 23 through a pulley 24 and a plurality of belts 25. The flywheel 23 is rotatably mounted on a shaft 26 which is suitably supported in bearings 27 and 28. The shaft 26 has secured to one end thereof a pinion gear 29 which meshes with a larger gear 30 which is keyed to

a shaft 31 rotatably supported by bearings 32 and 33. The shaft 31 also has keyed thereto pinion gear 34 which meshes with a large gear 35 keyed to a shaft 36 which is mounted in suitable bearings 37. The shaft 36 extends all the way across the crown of the press with ends thereof disposed within the chambers 14 and 15. There is a gear 38 secured to each end of shaft 36 and these gears 38 mesh with the large gears 19. The flywheel 23 which is rotatably mounted upon the shaft 26 is adapted to be connected to and disconnected from shaft 26 by a suitable clutch and brake mechanism 39. The clutch mechanism 39 is operated through suitable control mechanism not shown. Any one of a number of mechanisms of this type which are available will work equally well. These control mechanisms are such that they can be operated either manually or automatically, or by a combination of both automatic and manual control. Generally, the operator initiates the operation of the press by pushing a suitable button. The press will then go through one cycle of operation and stop automatically.

The die-slide 10 is reciprocated by the crankshaft 12 through a suitable connecting rod 40, and the blankholder slide 8 is reciprocated in a timed relation to the die-slide 10 by suitable mechanism which is operatively connected to the crankshaft 12 within the chambers 14 and 15. In operation, the blankholder slide 8 is moved downwardly in advance of the die-slide 10. At the bottom of its stroke, the blankholder slide will dwell during approximately 120° rotation of the crankshaft 12. During this dwell, the blankholder which is secured to the blankholder slide will grip and hold the edges of the blank being formed while the die slide continues on down forming article to be shaped. The mechanism for operating the blankholder slide 8 includes a pair of rock-shafts 41 and 42. These rock-shafts are rotatably mounted in suitable bearings 43 in the crown of the press and are disposed above the crankshaft 12 with one rock-shaft at each side thereof. These rock-shafts extend across the mid-section 13 of crown 4 and into the chambers 14 and 15. The rock-shafts 41 and 42 are connected to the blankholder slide 8 by arms 44 and links 45. The arms 44 are rigidly keyed to the rock-shafts 41 and 42 and are pivotally connected to the upper ends of the links 45 as indicated at 46. The lower ends of the links 45 are pivotally connected to the blankholder slide 8 as indicated at 47. The arms 44 and links 45 constitute toggle links which assume a straight line position with respect to each other when the blankholder slide is at the lower limit of its movement as shown in Figure 3. When the blankholder slide is at the upper limit of its movement, the arms 44 and links 45 assume the position shown in Fig. 5.

The rock-shafts 41 and 42 are oscillated by the reciprocation of a pair of operating slides 48 which are reciprocally mounted in the chambers 14 and 15. The operating slides 48 are guided in their up and down movement by a pair of guides 49 and a key 50. The guides 49 are secured to the end walls 51 of the crown adjacent to the lower ends of the operating slides 48 and engage the rear surface and the sides of the slides 48. The keys 50 are secured to the end walls 51, adjacent to the upper ends of the slides 48 and extend into suitable slots 52 in the rear face of the slides 48. The operating slides 48 are reciprocated by eccentrics 53 through eccentric straps 54 which are pivotally connected to the operating slides 48 as indicated at 55. The operating slides 48 have elongated apertures 56 therethrough through which the ends of the crankshaft 12 extend, and the eccentrics 53 are formed integrally with the gears 19.

The operating slides 48 are connected to the rock-shafts 41 and 42 by arms 60 and links 61. The arms 60 are rigidly secured to the ends of the rock-shafts 41 and 42 within the chambers 14 and 15. The links 61 are pivotally connected at one end thereof to the operating slides 48, as indicated at 62, and at the other end thereof are pivotally connected to the arms 60 as indicated at 63. The arms 60 and links 61, like the arms 44 and links 45, also constitute toggle links.

The eccentrics 53, operating slides 48, and the toggle connections just described are so arranged with respect to each other that they produce the desired dwell in the blankholder slide at the lower limit of its movement. This will be apparent from Fig. 3. In this position of the various parts, there will be no appreciable reciprocation imparted to the slides 48 by the rotation of the crankshaft 12. What little reciprocation there is of the slides 48 will be dissipated by the toggle connection between the slides 48 and the rock-shafts 41 and 42, and further dissipated by the toggle connections between the rock-shafts 41 and 42 and the blankholder slide 8.

From the foregoing, it will be apparent that I have provided a sheet metal working press of the double action type which is very compact and efficient in operation, and in which all of the various parts of the operating mechanisms are entirely enclosed within the crown of the press. With this arrangement, the press can be lubricated and maintained much easier, as it is impossible for dirt or foreign matter to get into the major portion of the operating mechanism. Also all danger of the press being injured by falling objects striking or becoming entangled with the mechanism is eliminated.

It is to be understood that I am not restricted to the specific construction shown and described herein, as various modifications may be made thereto within the scope of the appended claims.

Having thus described my invention, I claim:

1. In a device of the character described, the combination of a base, a pair of spaced uprights extending upwardly from said base, a crown removably mounted upon the upper ends of said uprights and spanning the space therebetween, a blankholder slide reciprocally supported by said uprights between said base and said crown, a die-slide reciprocally supported by said blankholder slide, said crown comprising a mid-section open at the bottom thereof and a closed chamber at each end thereof, a crankshaft rotatably mounted in bearings supported by the end walls of the mid-section of said crown, the ends of said crankshaft extending into said closed chambers, a large gear secured to each end of said crankshaft within said closed chambers, a drive shaft rotatably mounted in bearing secured to and extending upwardly from the top wall of said crown, said drive shaft extending across the top of said crown and having each end thereof extending into one of said closed chambers, a pinion gear secured to each end of said drive shaft within a closed chamber and meshing with the large gear therein, driving means for said drive shaft supported by the top of said crown, said driving means including a rotatable flywheel and a reduction gearing between said flywheel and said drive shaft, a pair of rock-shafts rotatably

mounted in bearings supported by the end walls of the mid-section of said crown, with the ends of said rock-shafts disposed within said closed chambers, operative connections between said rock-shafts and said blankholder slide through which said blankholder slide is reciprocated as said rock-shafts are oscillated, said operative connections being disposed within the mid-section of said crown, operative connections within each of said closed chambers between said large gears and the ends of said rock-shafts through which said rock-shafts are oscillated, and operative connections between said crankshaft and said die-slide through which said die-slide is reciprocated by the rotation of said crankshaft.

2. In a device of the character described, the combination of a base, a pair of spaced uprights extending upwardly from said base, a crown removably mounted upon the upper ends of said uprights and spanning the space therebetween, a blankholder slide reciprocally supported by said uprights between said base and said crown, a die-slide reciprocally supported by said blankholder slide, said crown comprising a mid-section open at the bottom thereof and a closed chamber at each end thereof, a crankshaft rotatably mounted in bearings supported by the end walls of the mid-section of said crown, the ends of said crankshaft extending into said closed chambers, a large gear secured to each end of said crankshaft within said closed chambers, a drive shaft rotatably mounted in bearing secured to and extending upwardly from the top wall of said crown, said drive shaft extending across the top of said crown and having each end thereof extending into one of said closed chambers, a pinion gear secured to each end of said drive shaft within a closed chamber and meshing with the large gear therein, driving means for said drive shaft supported by the top of said crown, said driving means including a rotatable flywheel and a reduction gearing between said flywheel and said drive shaft, a pair of rock-shafts rotatably mounted in bearings supported by the end walls of the mid-section of said crown, with the ends of said rock-shafts disposed within said closed chambers, operative connections between said rock-shafts and said blankholder slide through which said blankholder slide is reciprocated as said rock-shafts are oscillated, said operative connections being disposed within the mid-section of said crown, operative connections within each of said closed chambers between said large gears and the ends of said rock-shafts through which said rock-shafts are oscillated, said second mentioned operative connections including a reciprocal slide in each of said closed chambers, said slides being supported and guided by suitable supports carried by the end walls of the mid-section of said crown, and operative connections between said crank-shaft and said die-slide through which said die-slide is reciprocated by the rotation of said crankshaft.

3. In a device of the character described, the combination of a base, a pair of spaced uprights extending upwardly from said base, a crown removably mounted upon the upper ends of said uprights and spanning the space therebetween, a blankholder slide reciprocally supported by said uprights between said base and said crown, a die-slide reciprocally supported by said blankholder slide, said crown comprising a mid-section open at the bottom thereof and a closed chamber at each end thereof, a crankshaft rotatably mounted in bearings supported by the end walls of the mid-section of said crown, the ends of said crankshaft extending into said closed chambers, a large gear secured to each end of said crankshaft within said closed chambers, a drive shaft rotatably mounted in bearing secured to and extending upwardly from the top wall of said crown, said drive shaft extending across the top of said crown and having each end thereof extending into one of said closed chambers, a pinion gear secured to each end of said drive shaft within a closed chamber and meshing with the large gear therein, driving means for said drive shaft supported by the top of said crown, said driving means including a rotatable flywheel and a reduction gearing between said flywheel and said drive shaft, a pair of rock-shafts rotatably mounted in bearings supported by the end walls of the mid-section of said crown, with the ends of said rock-shafts disposed within said closed chambers, operative connections between said rock-shafts and said blankholder slide through which said blankholder slide is reciprocated as said rock-shafts are oscillated, said operative connections being disposed within the mid-section of said crown, an eccentric secured to each of said large gears, a reciprocal slide in each of said closed chambers slidably supported and guided by suitable supports carried by the end walls of the mid-section of said crown, operative connections between said slides and said eccentrics through which said slides are reciprocated by said eccentrics, operative connections between said slides and the ends of said rock-shafts through which said rock-shafts are oscillated by said slides, and operative connections between said crank-shaft and said die-slide through which said die-slide is reciprocated by the rotation of said crankshaft.

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