

June 27, 1933.

B. E. IRMIS

1,915,531

KNOCK-OUT MECHANISM FOR METAL WORKING PRESSES

Filed Aug. 20, 1932

3 Sheets-Sheet 1

Fig. 2.

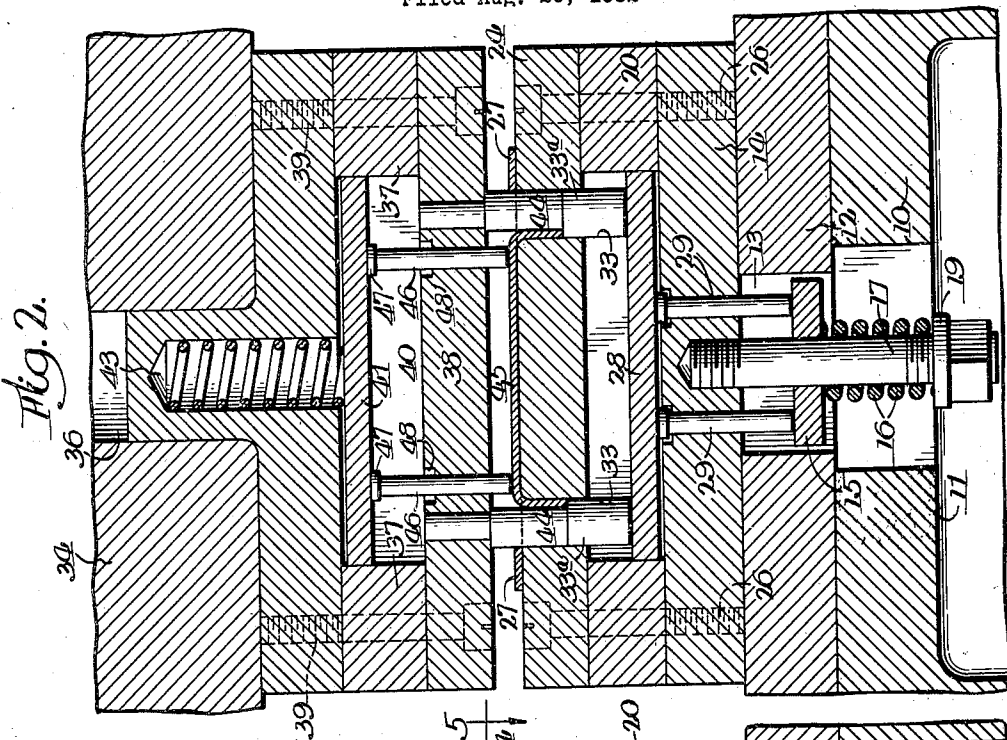
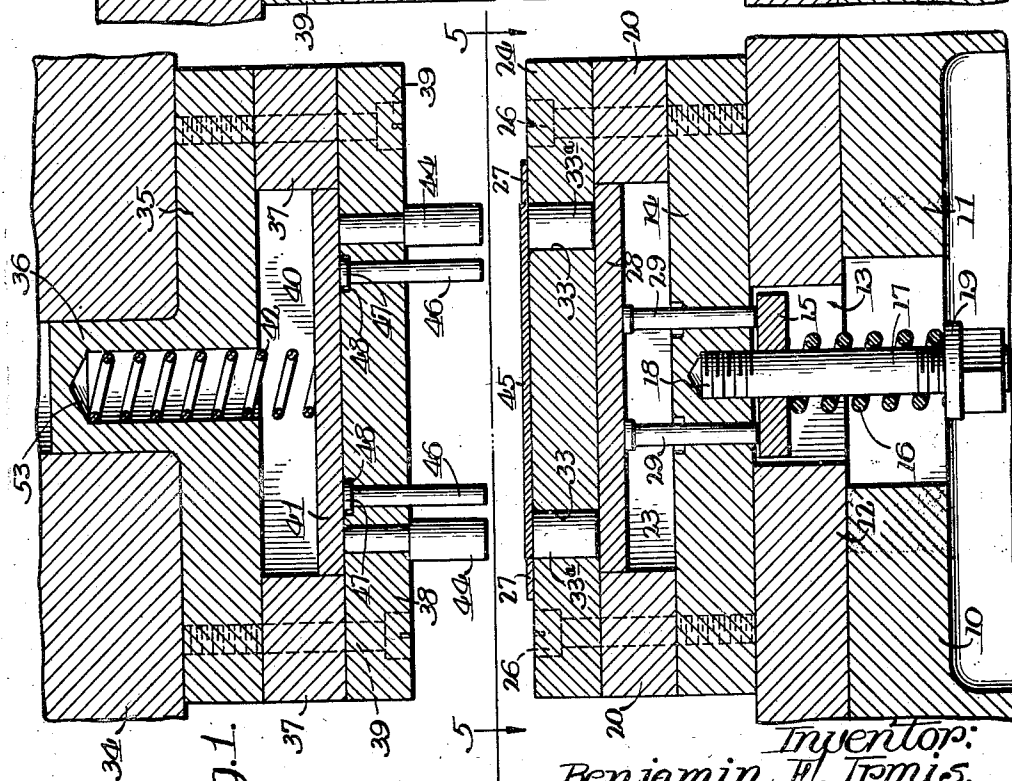


Fig. 1.



Inventor:
Benjamin H. Irmis.
BY: *[Signature]* Att'y.

June 27, 1933.

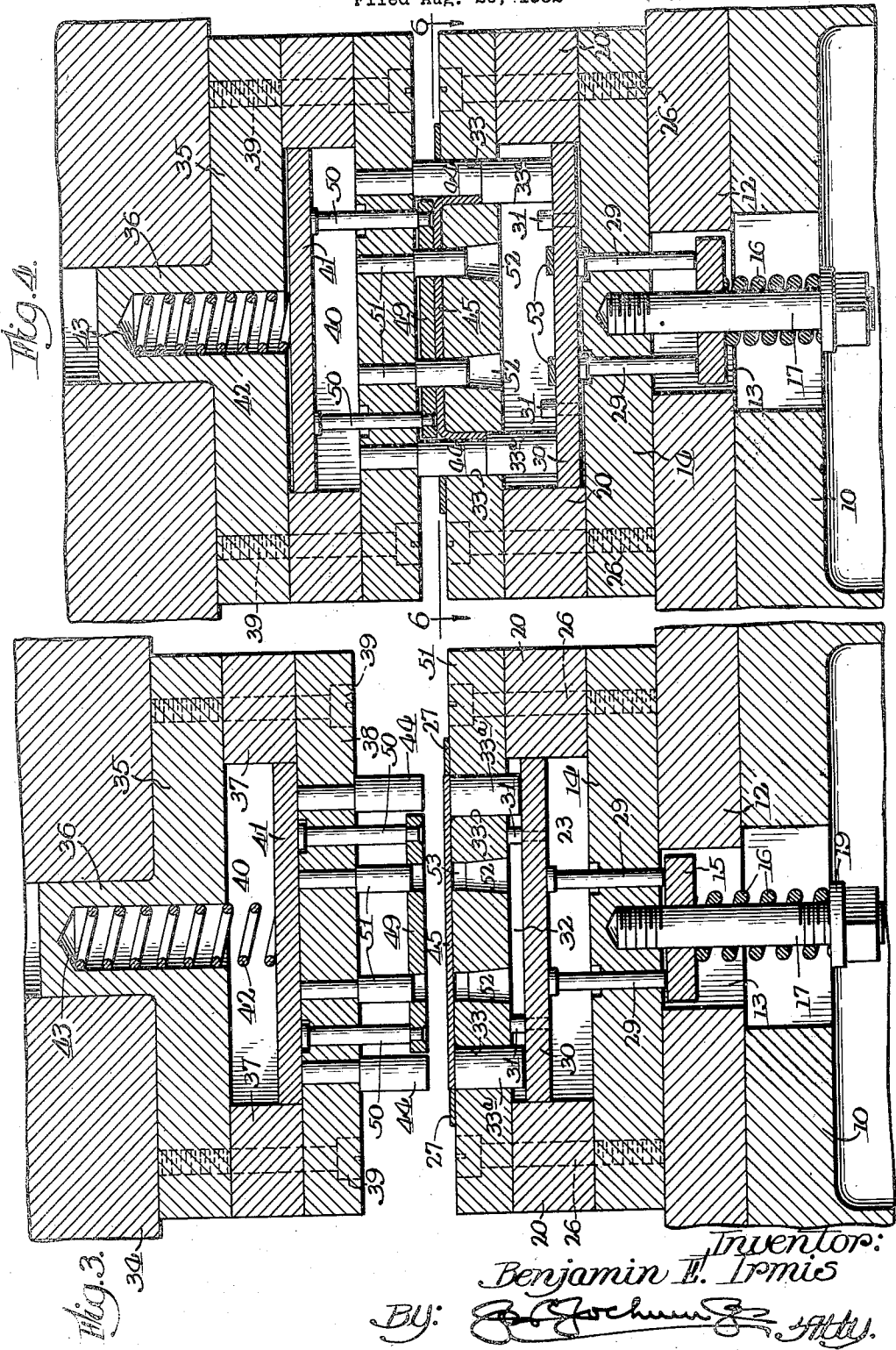
B. E. IRMIS

1,915,531

KNOCK-OUT MECHANISM FOR METAL WORKING PRESSES

Filed Aug. 20, 1932

3 Sheets-Sheet 2



June 27, 1933.

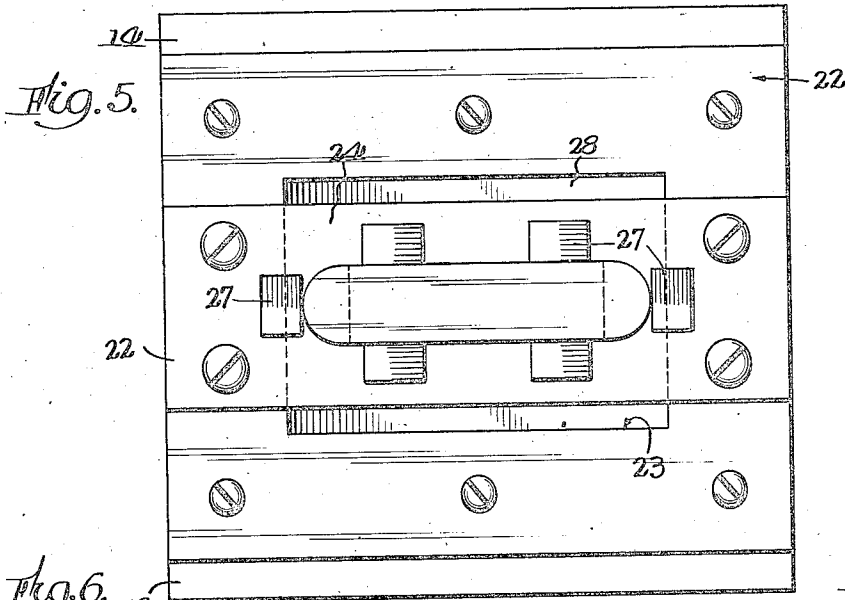
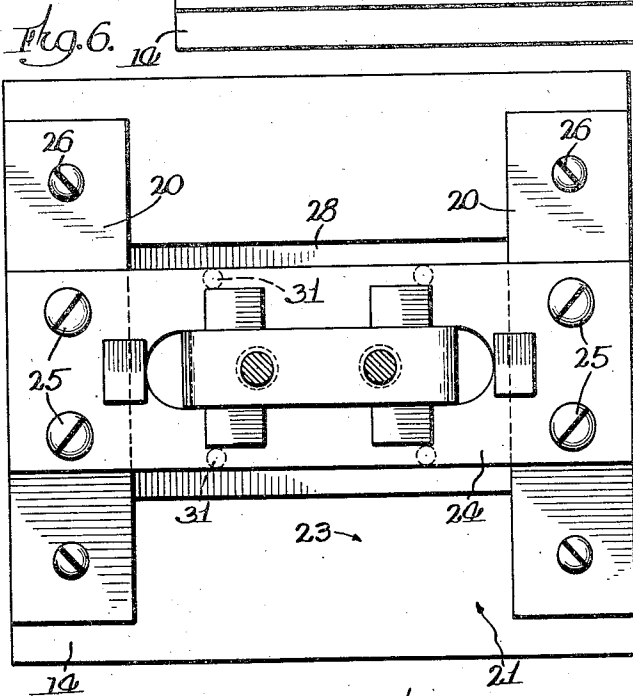
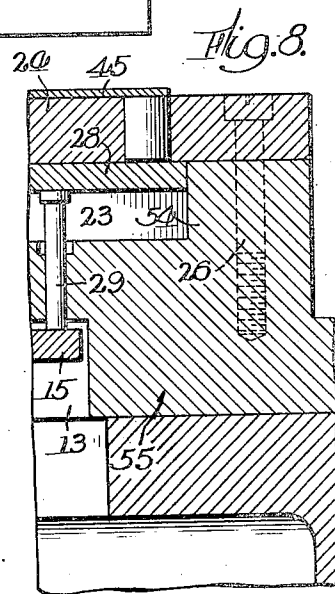
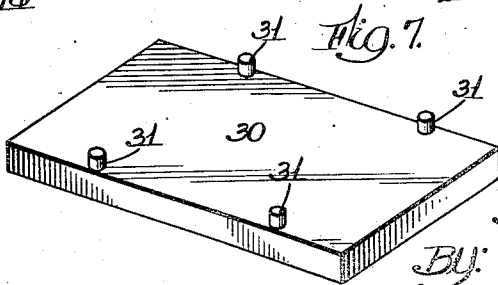
B. E. IRMIS

1,915,531

KNOCK-OUT MECHANISM FOR METAL WORKING PRESSES

Filed Aug. 20, 1932

3 Sheets-Sheet 3



Inventor:
Benjamin F. Trmies
J. J. Johnson

UNITED STATES PATENT OFFICE

BENJAMIN E. IRMIS, OF OAK PARK, ILLINOIS

KNOCK-OUT MECHANISM FOR METAL WORKING PRESSES

Application filed August 20, 1932. Serial No. 629,570.

This invention relates in general to metal working presses, but more specifically to the knockout mechanism for knocking out or removing the work with respect to the shaping or forming dies.

Heretofore in metal working presses it has been customary to provide knockout mechanism embodying knockout pins which pass loosely through the bolster plate and engage and rest upon a pressure pad or plate below the die shoe, and which plate, after it has been depressed during the operation upon the work, will be returned by suitable mechanism or means provided for that purpose to its normal position, thereby operating to knock out or eject the work.

In presses of this character, however, it has been found that it is necessary to provide special knockout mechanism for various dies, which is not only expensive but also necessitates drilling or boring the bed or bolster plate of the press, to permit the use of specially arranged pins for the respective knockout or stripping plates employed.

Furthermore, the range of work adapted to be performed upon presses equipped with such knockouts, is to a considerable extent limited.

It is one of the objects of the present invention to overcome these difficulties and objections and to provide what might be termed a universal die set including a die shoe and knockout, adapted to be applied to the ordinary punch press so as to increase the range of operation in the action of the knockout, and which knockout mechanism is adapted for use in conjunction with the knockout originally installed in the press, so as to knock out or eject work which is too large in area to be knocked out by the knockout mechanism with which the press is originally equipped, at the same time effecting economy in construction and installation.

A further object is to provide an improved knockout mechanism of this character which will not only eliminate the necessity of providing a special knockout plate for each die, but one which is adapted for use on any press regardless of the size of the opening in the

bed or bolster plate, and regardless of the size of the die use.

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 sectional view of a knockout mechanism constructed in accordance with the principles of this invention applied to both the bed and ram of the press, and showing a portion of the press in section.

Figure 2 is a view similar to Figure 1, with the parts in another position.

Figure 3 is a view similar to Figure 1, showing the knockout mechanism applied to another form of die.

Figure 4 is a view similar to Figure 3, showing the parts in another position.

Figure 5 is a view taken on line 5—5, Figure 1.

Figure 6 is a sectional view taken on line 6—6, Figure 4.

Figure 7 is a detail perspective view of another form of knockout plate.

Figure 8 is a detail sectional view of a modified form of die and bolster plate.

Referring more particularly to the drawings, the numeral 10 designates generally the bed of a press having the usual opening 11 therethrough and upon which bed a bolster plate 12 rests. The bolster plate is provided with the usual opening 13 communicating with the opening 11 in the bed of the press and supported upon the bolster plate is a die shoe 14. The die shoe extends across the opening 13 in the bolster plate and arranged within the opening is a pressure pad or plate 15 which is held in position and adapted to be returned to its original position after being depressed, in any suitable manner, such as by means of a resiliently yielding element 16, in the form of a spring which is coiled about a bolt 17 which passes through the pad or plate 15 and is threaded as at 18 into the

die shoe. One end of the spring abuts the pad or plate 15 and the other end abuts a nut or collar 19 threaded upon the lower end of the bolt 17 so that by adjusting the collar or nut upon the bolt 17, the stress of the spring 16 may be varied.

The die shoe is held in position upon the bolster plate in any suitable manner and may be of any desired size.

Supported by and resting upon the upper surface of the die shoe are spacing members 20 which may be in the form of parallel bars shown more clearly in Figure 6, to provide openings 21 between the bars and through which openings 21 punchings may be removed from the die shoe, or the spacing members may be shaped to form a framework 22, as shown in Figure 5, providing an open space 23 within the framework.

These spacing members 20—22 may be of any desired thickness so that the opening 23 may be of any desired depth and supported by the spacing members 20 is the die shoe 24. The spacing members may be secured in position in any suitable manner such as by means of fastening bolts 25 and the spacing members 20 may also be secured in position in any suitable manner such as by means of fastening bolts 26 which pass through the die spacing members and into the die shoe 14.

If desired, positioning guides 27 formed in any suitable manner may be provided for holding the work in position upon the die.

Arranged within the space 23 beneath the die 24 is a knockout plate 28 which may be of any desired size and thickness, but is preferably of a size to extend across the space 23 and may, if desired, extend beyond the edges of the die.

By the provision of the spacing members 20 (see particularly Figure 6) it will be noted that the die shoe 24 extends entirely across the space 23 and is secured in such position. When the spacing members 22, in the form of a framework, are employed, the die 24 may be secured in position as shown in Figure 5, or it may be turned at an angle of 180° and secured to the spacing members in that position, to compensate the size and nature of the die employed.

The knockout plate 28 rests upon pins 29 which pass loosely through the die shoe and engage and rest upon the pressure pad or plate 15 and in the normal position of the parts as shown in Figure 1, the spring 16 will hold the knockout plate 28 in contact with the lower face of the die 24. However, if desired, a knockout plate 30 may be employed, as shown more clearly in Figures 3 and 7, which is provided with upwardly projecting pins 31 extending above the upper surface thereof and adapted to contact with the lower face of the die 24, as shown more clearly in Figure 3, to provide a space 32 between the plate 30 and the bottom of the die,

so as to limit the return movement of the plate 30 under the stress of the spring 16.

The particular die 24 shown in Figures 1 and 2 of the drawings, is provided with openings 33 extending therethrough, and across which openings the knockout plate 28 extends, so that members 33^a carried by the knockout plate will project into and move through these openings to co-operate with the punches carried by the ram.

A similar knockout mechanism may be applied to the ram or reciprocable member 34 of the press, wherein a die shoe 35 is provided having a shank 36 which is set into the ram of the press and secured to the die shoe 35 are similar spacing members 37 to which the punch or die member 38 is secured by means of fastening bolts 39 passing therethrough and also through the spacing members 37 and into the die shoe. Within a space 40 formed by the spacing members 37 is arranged a knockout plate 41 against one face of which rests one end of a spring 42 and the other end of the spring engages in the bottom of a recess 43 into which the spring projects. Shaping punches 44 are carried by the die or punch member 38 and are adapted to engage and force portions of the work 45 into the openings 33, as shown in Figure 2, and at the same time enter the openings 33 in the die 24 to depress the members 33^a and the knockout plate 28 against the stress of the spring 16.

Pins 46 pass loosely through the die or punch 38 and are provided with heads 47 adapted to enter recesses 48 in the die or punch 38 to prevent the pins from falling out of position by gravity. The headed ends of the pins 46 contact with the knockout plate 41 and the stress of the spring 42 is such that the knockout plate 41 will be held against the face of the die or punch plate 38 but, when the knockout pins 46 contact with the work 45, as shown in Figure 2, during the lowering movement of the ram, the pins 46 engage the work and their movement will be arrested while the movement of the ram continues, with the result that the knockout plate 41 will be raised in the space 40 from the position shown in Figure 1 to the position shown in Figure 2.

When the ram starts to ascend from the position shown in Figure 2 the spring 42 will cause the pins 46 to remain in contact with the work 45 while the ram is receding, so as to permit the punches 44 to be withdrawn from the openings 33 and at the same time prevent the work from following the ram. After the punches 44 have cleared the work 45, the knockout plate 41 will be lowered in the space 40 from the position shown in Figure 2 back to the position shown in Figure 1.

The type of press shown in Figures 3 and 4 is adapted for both a forming and piercing

operation and in that event in addition to the parts just described, there is provided a plate 49 which may be secured to the pins 50 that correspond with the pins 46. Additional punches 51 are carried by the die or punch block 38 and the forming dies 44 are disposed beyond the plate 49.

The die 51 corresponding to the die 24 in Figure 1, is also provided with openings 52 having a recessed portion, the walls of which recess converge from the lower extremity towards and terminates short of the top of the opening to form a portion 53 of uniform diameter, and these openings 52 are arranged directly beneath the punches 51, so that when the ram descends and during the punching or piercing operation, the punchings 53 will fall into the space 32 and rest upon the knockout plate 30 to be removed therefrom in any desired or suitable manner or at any time during the cycle of operation of the press.

In the form of the invention shown in Figure 8, the spacing members 54 are formed integral with the bolster plate 55.

With this improved construction it will be manifest that by the use of the supplemental knockout mechanism the range of operation upon the ordinary press equipped with the usual knockout mechanism, may be greatly increased and it will not be necessary to perforate the bed or bolster plate for the purpose of permitting the use of pins specially arranged to operate upon knockout or stripper plates designed for the specific shape of die used. On the contrary, this attachment may be applied to any punch press and will permit of the operation upon work or the formation of articles beyond the range of operation of the press equipped with the ordinary knockout mechanism.

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. In a metal working press, a die supporting base, knockout mechanism disposed below and operating through said base and having a predetermined active area with respect to the area of the supporting surface of the base, and a supplemental knockout mechanism separate from the first recited knockout mechanism, said supplemental knockout mechanism having an active area with respect to the supporting surface of said base, greater than the active area of the first recited knockout mechanism, whereby the press will be adapted for operation upon work of an area which is considerably greater than the original said predetermined area.

2. In a sheet metal working press, a supporting base, a die supported by and disposed above the base to form a space therebetween, knockout mechanism arranged below and operating through said base, and supplemental knockout mechanism separate from the first said knockout mechanism and having an active area greater than the active area of the knockout mechanism with which the press is originally equipped, said supplemental knockout mechanism being disposed above said base and operating to remove the work from the said die, said supplemental knockout mechanism being responsive in its operation to the operation of the first recited knockout mechanism and embodying a plate disposed within the said space and of a thickness considerably less than the vertical dimension of said space whereby said plate may be vertically moved in the space.

3. In a sheet metal working press, a bolster plate provided with an opening there-through, a die shoe supported by and above said bolster plate and extending across said opening, knockout mechanism embodying a plate below said die shoe and operating in said opening and knockout pins supported by said plate and operating through said die shoe, a die supported by and spaced above said die shoe to form a space therebetween, and a supplemental knockout embodying a plate within said space, knockout pins supported by the last said plate and movable through said die, the last said plate being of a thickness less than the vertical dimension of said space and adapted to be vertically moved in said space by the first recited pins, said supplemental knockout having an active area greater than that of the knockout mechanism with which the press is originally equipped.

4. In a metal working press, a die supporting base, a die supported by and above the base to form a space therebetween, knockout mechanism disposed below and operating through said base and having a predetermined active area with respect to the area of the supporting surface of the base, and a supplemental knockout mechanism separate from the first recited knockout mechanism, said supplemental knockout mechanism having an active area with respect to the supporting surface of said base greater than the active area of the first recited knockout mechanism, whereby the press will be adapted for operation upon work of an area which is considerably greater than the original said predetermined area, said supplemental knockout mechanism embodying a plate within said space and of a thickness less than the vertical dimension of the space and vertically movable in the space by the first recited knockout mechanism.

5. A knockout mechanism attachment

adapted to be attached to a metal working press for operation in conjunction with the knockout mechanism with which the press is originally equipped whereby the area of operation of the latter will be increased beyond the active area of the knockout mechanism with which the press is originally equipped, said attachment embodying a die shoe, spacing members supported by said shoe, a die supported by the spacing members, said spacing members themselves being laterally spaced to form a space of substantial area between the die shoe and die, a plate within said space of a thickness less than the vertical dimension of the space, and knockout elements supported by said plate and operable through the die, there being openings through the die shoe through which pins actuated by the knockout mechanism with which the press is originally equipped, may operate.

6. For use with a press which embodies a pressure pad or knockout plate operating below the surface of the bed press, and pins resting upon said pad extending through and projectable above said surface by said pad, a supplemental knockout plate positioned to be engaged by said pins and of an area considerably greater than the opening accommodating said pad, and knockout or work holding pins supported by said supplemental plate and projecting thereabove, whereby the working area of the press will be greatly increased beyond the working area originally permitted by the pad.

In testimony whereof I have signed my name to this specification, on this 9th day of August, A. D. 1932.

BENJAMIN E. IRMIS.