Dec. 12, 1933. L. V. WHISTLER 1,939,478

DIE AND PUNCH MOUNTING

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Fig. 1.

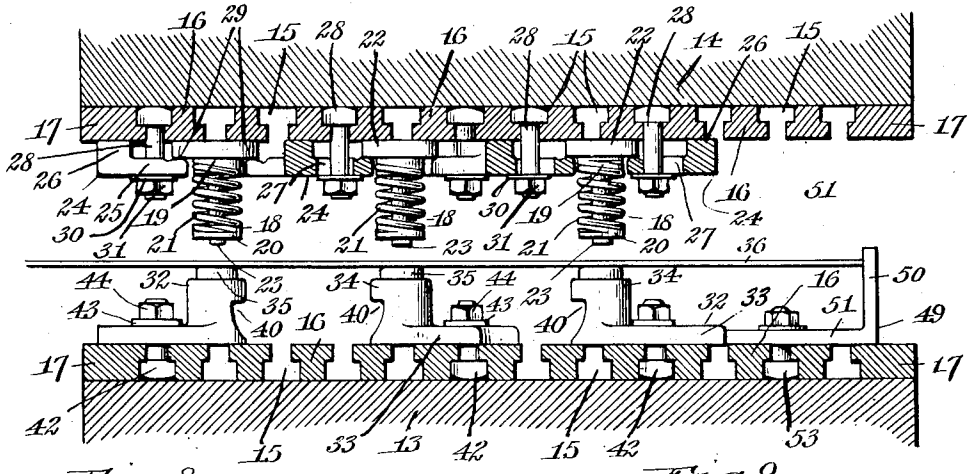


Fig. 8.

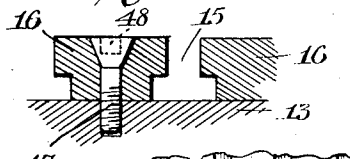


Fig. 2.

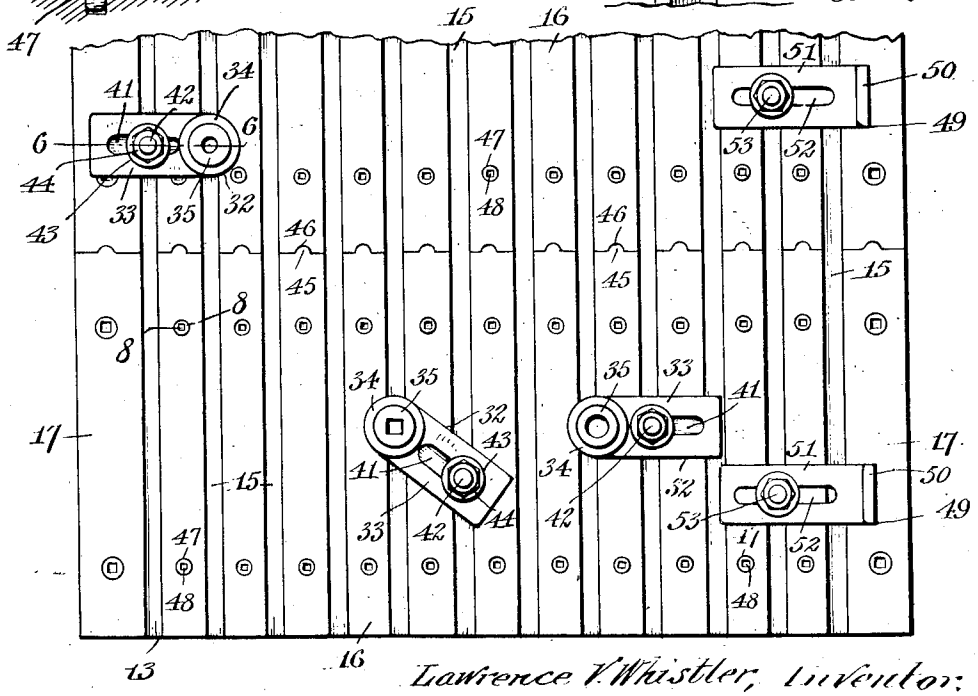


Fig. 9.

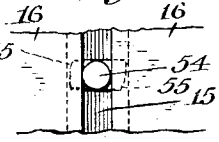
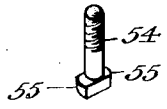


Fig. 10.



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DIE AND PUNCH MOUNTING

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Fig. 3.

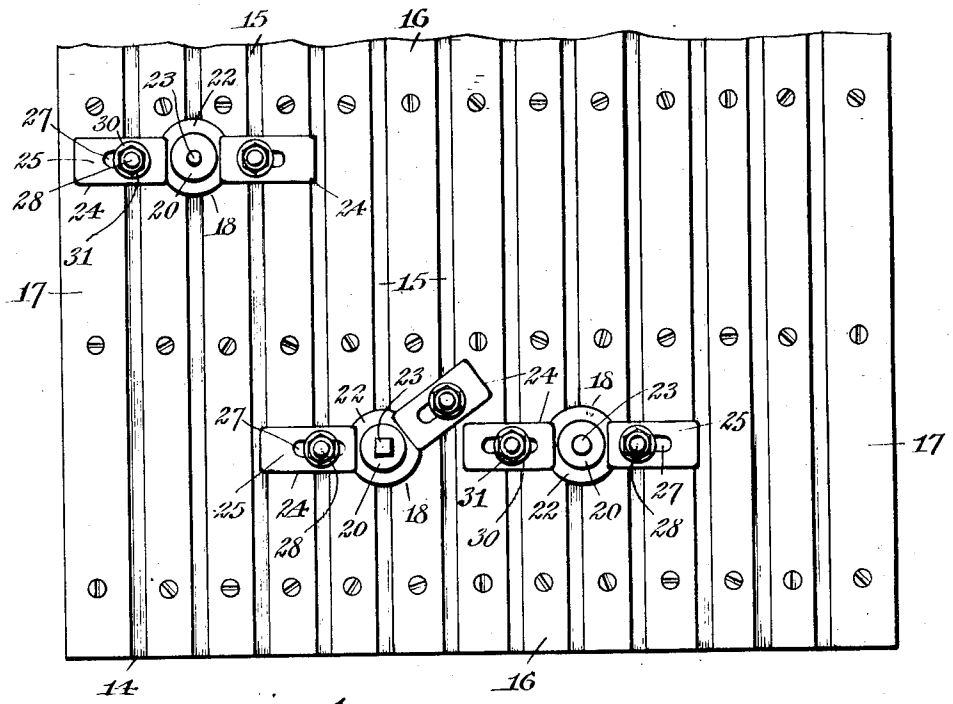


Fig. 4.

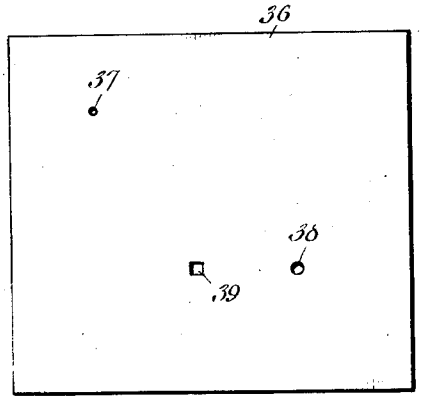


Fig. 5.

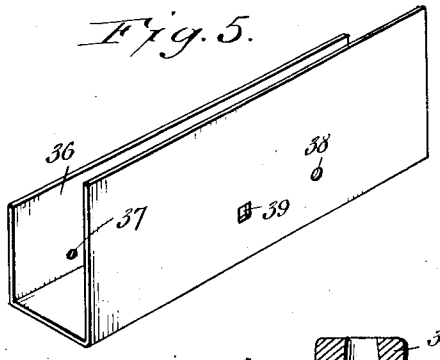


Fig. 6.

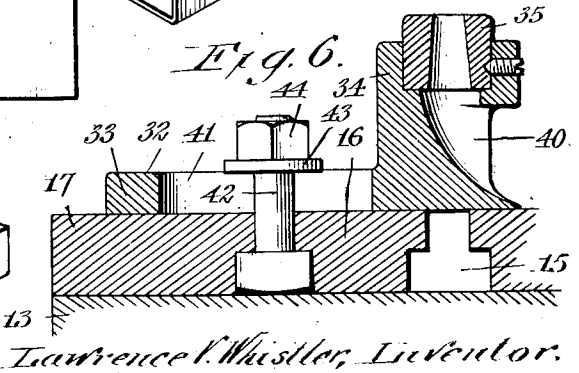
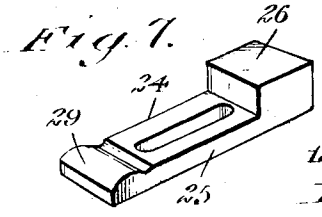


Fig. 7.



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DIE AND PUNCH MOUNTING

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Fig. 11.

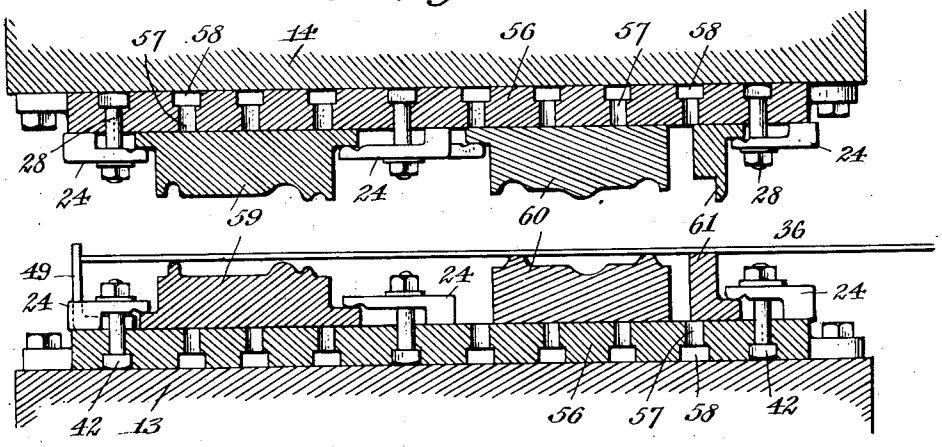
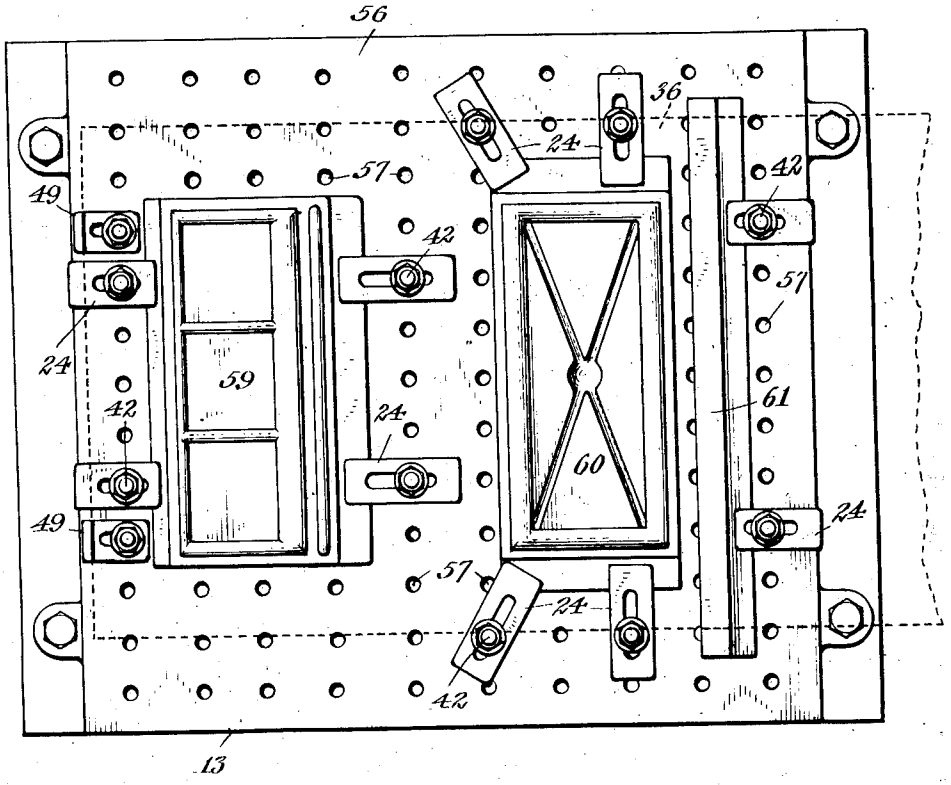


Fig. 12.



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1,939,478

UNITED STATES PATENT OFFICE

1,939,478

DIE AND PUNCH MOUNTING

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Application November 19, 1932
Serial No. 643,427

23 Claims. (Cl. 164—118)

My invention relates to die and punch mountings, and while it has special utility as a mounting for perforating devices, it may be used as mountings for dies and other implements employed for forming various articles from sheet metal, and for other devices designed to operate upon metallic and other sheet material.

While in certain figures of the drawings I have illustrated perforating punches and dies, I include under the general term of dies or metal working implements shearing devices, embossing devices, and most all other forms of devices employed in presses for operating upon sheet metal or other sheet material.

Metal working presses are usually employed with a head or ram and a bed or table, which I will refer to under the general terms of platens, and these are relatively movable and have the metal working implements attached thereto.

In the preferred form, the bed or table, or what may be termed the lower platen, is usually stationary, while the head or ram, or what may be termed the upper platen, is movable towards and away from the lower platen.

The primary object of my invention is the provision of die mountings forming part of the platens of a metal working press, they being so arranged or constructed that dies or punches may be located at any point or points within the area of the platens, or other metal working implements may be secured to the platens in pairs through the medium of said mountings in any desired relation and along any desired region or regions within the areas of the platens.

Another object of my invention is the provision of novel means for securing the metal working implements to the platens, and novel means for fastening the securing elements in any desired places on the platens, depending on the positions in which the metal working implements are to be located.

With the above and other objects in view to appear hereinafter, the invention consists in providing the platens with means whereby working implements may be secured thereto at any points within the area thereof, or may be made to trend in any direction and extend over any particular area thereof; also to provide novel securing means for this purpose, and novel means for fastening the securing means to the platens.

The invention further consists in the novel features of construction, and in the arrangement and combination of parts to be hereinafter described and more particularly pointed out in the subjoined claims.

In the drawings:

Fig. 1 is a vertical section through the two platens of a metal working press, showing the manner of attaching perforating punches and dies therefor to the platens in accordance with my invention.

Fig. 2 is a plan view of the bed or base platen.

Fig. 3 is a bottom plan view of the ram or header platen, it being positioned to match the bed or base platen, as shown in Fig. 2.

Fig. 4 is a plan view on a reduced scale of a sheet of metal punched or perforated in accordance with the arrangement of punches and dies illustrated in Figs. 1 to 3.

Fig. 5 is a view of the so punched or perforated metal formed into an article of manufacture, or at least a portion of an article of manufacture.

Fig. 6 is an enlarged transverse section taken on line 6—6, Fig. 2.

Fig. 7 is a detached perspective view of one of the securing devices or clamp members employed for securing the dies to the ram or head platen.

Fig. 8 is an enlarged section taken on line 8—8, Fig. 2.

Fig. 9 is a plan view of a portion of a platen constructed in accordance with my invention, showing a novel form of retainer bolt in connection therewith.

Fig. 10 is a perspective view of the novel form of retainer bolt shown in Fig. 9.

Fig. 11 is a vertical section through the two platens of a metallic working press illustrating shearing and forming dies, showing my invention in modified form.

Fig. 12 is a plan view of the bed or base platen and the die and shearing elements attached thereto, as illustrated in Fig. 11.

Reference being had to the drawings in detail, and considering the embodiment of my invention illustrated in Figs. 1 to 10 inclusive, 13 designates the bed or base platen of a metal-working press, which is usually built in as a stationary member of the press, and 14 is the ram or head platen movable toward or from the bed or base platen. The operating elements for these members and the manner of mounting and/or guiding the same is not illustrated, as presses vary in construction and operation, and both construction and operation are well understood by those skilled in this art.

I provide the platens with retainer grooves 15, and these are preferably of T-formation which may be formed by machining the same into the platens or applying to the under side of the ram or head platen and to the upper side of the bed

or base platen, hereinafter respectively termed upper and lower platens, T-shaped bars 16 and marginal flanged bars 17. The marginal bars 17 applied along opposite marginal portions of the platens may be wider than the T-shaped bars 16 disposed in parallel relation thereto and to each other between said marginal bars, and these marginal bars have their flanges extending along their inner edges. The T-shaped bars 16 are spaced apart equi-distantly and the two adjacent marginal bars are correspondingly spaced from the latter so that the T-shaped grooves are of even width across one of the dimensions of each platen and are arranged parallel in the direction of the other dimension of each platen.

Applied to the upper platen are die elements 18, more particularly referred to as punch elements, which may be of any desired construction, but in the form shown each comprises headers 19, 20 spaced apart and connected together by a helical spring 21. Each header 19 is provided with an outstanding flange 22 and is adapted to be positioned against the under sides of the T-bars or rails 16 at any point within the area of the platen surface, in which may be included all of the T-rails 16 and the marginal rails 17, and it may here be stated that if desired, the T-rails 16 may be substituted for the special marginal rails 17 illustrated.

The punches proper are designated by the numeral 23, and these are secured within the headers 19 in any approved manner and extend axially through the springs 21 and the headers 20. In some instances they terminate at their lower ends within the headers 20, but I have shown the same projecting below the under face of said last-mentioned headers. The headers 20 serve as strippers, as will be made clear hereinafter.

Since the particular form of perforating die or punch illustrated forms no part of this invention I have not deemed it necessary to illustrate or describe the complete details thereof. It is simply necessary that the die or punch element be provided with some means for securing the same at any point within the area of the upper platen, and in preferred form the flange 22 on the header 19 is utilized for application thereto of securing devices 24, which are in the form of clamps, each securing device or clamp comprising a bar 25, provided on its upper side and one end thereof with a contact or bearing extension or boss 26 adapted to bear against the under side of one or more rails 16 and 17, the remainder of the bar being spaced from said rails and the opposite end thereof being in contact with the flange 22 of the header 19 forming part of a die element 18.

The bar of each securing device or clamp is provided with a longitudinal slot 27 through which a bolt 28 is passed, which is retained within one of the T-shaped grooves 15 in the upper platen, the head of the bolt fitting within the enlarged portion of the T-shaped groove while the adjacent shank or body portion thereof extends through the narrow portion of said groove. These securing devices may be of different lengths and one or more bolts may be used to fasten them in place; the heads of the bolts being, of course, entered in adjacent T-shaped grooves.

It is to be noted that each of the securing devices or clamps, more particularly referred to as a clamp bar, has the end thereof which is in contact with the flange 22, convexed on its upper or contacting side, as at 29, so as to assure a tight bearing of the clamp bar against the die implement 18 when the bolts 28 associated with the two clamp bars securing each die implement in place are tightened, and for this purpose a washer 30 is applied to each bolt so as to bear against the under side of each clamp bar and a nut 31 threaded on the bolt and bearing against the washer. Upon tightening the nuts 31, the heads of the bolts are drawn firmly against the flanges of the T-rail 16 and in some instances against the flange of one of the marginal rails 17, while the clamp bars are forced upwardly against the flanges 22 of the die implements and thus securely fasten such implements to the under side of the upper platen, or more particularly to the under sides of the rails 16, or 16 and 17, as the case may be, depending on the particular location of the die implements.

Mounted on the lower platen or, more particularly, on the upper faces of the T-rails 16 forming part thereof, are die retainers 32. These are in the form of bars 33 having cylindrical upstanding cups 34 at one end thereof in which dies 35 are placed and secured by set screws, or otherwise.

As clearly shown in Figs. 1 and 2, the punches proper 23, and the punch-receiving openings of the dies 35 which respectively form the male and female members of the die sets, are both cylindrical and square, it being planned to punch or perforate the sheet metal, designated by the numeral 36, with two circular openings, 37, 38, and with one square opening 39 (Fig. 5); one of the circular openings being smaller than the other.

The female dies 33 have their openings extending completely through the same so that metal punched from the material 36 is directed therethrough, and enters the cup-shaped end 34 of the die retainers 32, said cup-shaped end having a lateral opening 40 therein, which directs the material punched out of the sheet onto the lower platen; from which it may be disposed of in any desired manner.

Each of the bars 33 is provided with a longitudinal slot 41 through which extends a bolt 42 which is fastened into the T-shaped grooves 15 in the lower platen in the same manner as the bolts 28 are applied to the upper platen, and these bolts have washers 43 applied thereto, which bear against the upper faces of the bars 33, and nuts 44 which bear against the washers and which, when tightened on the bolts 31, hold the die retainers 32 in desired position.

The bolts 42 may be moved along the T-shaped retainer grooves, while the bars 33 may be adjusted at any angle to the slots so that the axes of the female dies are positioned any desired distances from the axis of the bolts 42. The bars 33 may also be of different lengths, and one or more bolts passed therethrough; the bolts having their heads entered in underlying T-shaped grooves.

As shown in Fig. 2, the T-shaped bears or rails 17 and 16 are formed in sections arranged to abut end to end, the abutting ends being provided with interlocking tongues and grooves, the tongues being designated by the numeral 45 and the grooves by the numeral 46. These rails are fastened to the body portions of the platens 13 and 14 by means of countersunk securing screws 47 provided with long tapering heads having key sockets 48. The taper of the heads is arranged at an angle of approximately twenty degrees, so that the screws have the effect of dowels.

It may be stated that suitable gages 49 are provided to properly position the sheet metal or other material to be operated upon, each of said gages

comprises two arms or legs disposed at a right angle to each other, one being a vertical or gage arm or leg 50 and the other a horizontal or securing arm or leg 51 provided with a longitudinal slot 52, through which a securing bolt or bolts 53 are passed, the head or heads of the bolts being retained in a T-shaped groove in the same manner as the heads of the bolts 28 and 42. The exact points, areas, or locations in or on the sheet metal, with respect to said gages, where perforating, forming, slotting, shearing, or other operations are to be performed is therefore easily controlled. The male or female die members are positioned accordingly on their supporting platens and the mating die members positioned with respect thereto. Assuming the female die members to be first positioned, the exact centers of the female die members are determined, and the die retainers 32 carrying the same are moved to approximate position in the direction of the length of the retainer grooves 15. This is accomplished by loosening the bolts 42 and sliding them along the grooves 15. Using the bolts as centers, the die retainers 32 are positioned at any desired angle, or in any direction with respect to the bolts 42 so that the axes of the female die members are in the desired relation with respect to the gages. The exact position of the axis of each female member may be determined in any manner other than by means of adjustment with respect to the gages referred to.

The axis of each female die member may be brought closer to or farther from the axis of the bolt 42, and if the range of the slot 41 in the die retainer will not permit of exactly locating the axis of the female die member where found necessary, the bolt 42 may be inserted in an adjacent T-shaped groove and the die retainer with its female die member located therein moved over the bolt 42 and swung to any desired angle, either to the right or left, as may be found necessary. When the female die member is exactly positioned, the associated male die member is accordingly positioned on the upper platen. This can be easily accomplished by lowering the upper platen so as to position the male die member or punch proper 23 in the female die member and then applying the securing devices or clamps 24 to the flange 22 of the male die member. These securing devices or clamps may also be arranged to trend in any direction, as may be found necessary. For example, in Fig. 3, these securing devices or clamps are mostly disposed at right angles to the retainer grooves. In one instance, however, it will be found that one of these clamps will interfere with another, and consequently it is set at an angle to the remaining clamps.

Sometimes it will be found necessary to position the clamps parallel with the retainer grooves, but in all cases the clamps are bodily movable with their securing bolts in the direction of the retainer grooves and then bodily movable with respect to the securing bolts, either in the direction of the slots in said clamps, or in a rotative manner, utilizing said securing bolts as the centers of rotation. It will be apparent therefore that both the securing devices or clamps 24 and the die retainers 32 are adjustable to enable the positioning of the male and female die members at any desired points within the areas of the platens.

It will be apparent that the most practicable way of applying the bolts 28, 42 and 53 to the platens is by introducing them into the T-shaped retainer grooves 15 from one of the other ends of said grooves. In some instances it may be found necessary to position two bolts in a single groove and under further operation place an additional bolt between two bolts already positioned in a retainer groove. Bolts having square heads, such as shown in Figs. 1, 2 and 3, would necessitate removing one of the bolts from the retainer groove in the event that a die element is to be positioned between two die elements previously positioned on the platen, and this would have to be followed by a re-positioning of the bolt removed from the retainer groove to allow of this. I therefore have designed a modified form of bolt 54, shown in Figs. 9 and 10, provided with an oblong head so that it is of greater dimension in one direction than the other and the ends of the oblong head are curved in opposite directions from their vertical centers, as at 55. In width these heads are slightly smaller than the narrow portions of the T-shaped retainer grooves so that the heads of the bolts can be inserted through the narrow portions of the grooves, and when fully entered in said grooves can be given a quarter turn, with the result that the head will be engaged behind the flanges of the T-bars or rails 16, and in some instances behind the flanges of the marginal rails 17. Slightly curving the ends of the heads along a portion of their width provides the necessary clearance to enable the heads to be turned with their greatest dimensions at right angles to the retainer grooves into which the bolts are positioned; thus, when tightening the bolts by means of nuts applied thereto, the securing devices or clamps 24 will be securely fastened in place.

In Figs. 11 and 12 I have shown a modified form of die mounting which falls fully within the scope of my invention as defined in the appended claims; and in these figures, instead of illustrating punching or perforating dies, I have illustrated shearing and forming dies. In these figures I have applied perforated plates 56 to the platens 13 and 14, the perforations in these plates being arranged in parallel rows and in the form of bolt holes 57 having squared or other non-circular enlargements 58 at their inner ends to receive the heads of the securing bolts 28 and 42.

Secured to the under side of the upper platen and to the upper side of the lower platen, or more particularly to the perforated plates 55 fastened to the platens proper, are two pairs of forming dies 59, 60, and a pair of shearing dies 61, and these are fastened in place by securing devices or clamps, similar to the securing devices or clamps illustrated in Figs. 1 and 3. It will be apparent from Fig. 12 that these forming and shearing dies may be positioned over any desired areas of the plates 55, as there are sufficient bolt holes in these plates to permit of the securing devices or clamps 24 engaging the dies regardless of their location on the plates 56. The sheet metal 36 is shown lying upon the forming and shearing dies applied to said bottom platen. In Fig. 12, the sheet metal is illustrated in dotted lines, and when the upper platen is lowered it will be sheared to a predetermined length by the shearing dies at the time of providing definitely formed panels within the sheet metal, such panels being used for embellishing a plate adapted to serve as the side of a stove, boiler, or other articles of manufacture. Under the term "perforating die", I intend to include not only punches and co-operating dies, but metal-working tools of

all kinds capable of being secured to relatively movable parts, under actuation of which some metal-operating step takes place.

From the foregoing description, it will be apparent that I have provided universally adjustable die and punch settings, or, more broadly considered, metal-working tool settings, as distinguished from present known adjustments for such elements confined solely to movement along two dimensions, or in directions at right angles to each other, under which arrangement it is impossible to set the working tools in parallel planes, whether transversely or longitudinally disposed with reference to the working area of the machine to which such tools are applied, except when such planes are spaced apart considerable distances; thus leaving at all times not only points, but considerable areas in which positioning of the tools cannot take place.

Having thus described my invention, what I claim is:

1. In a metal-working press, the combination of relatively movable platens having a plurality of pairs of perforating dies and means carried by said platens to enable one pair of perforating dies to be positioned in any transverse plane within the area of each of said platens regardless of the position of the remaining perforating dies.

2. In a metal-working press, the combination of platens relatively movable toward and from each other, a plurality of punches for one of said platens, cooperating dies paired with said punches for the other platen, and punch and die securing means carried by said platens for securing any paired punch and die in co-axial alinement at selected points in any transverse plane within the areas of said platens regardless of the position of the remaining perforating dies.

3. In a metal-working press, the combination of platens relatively movable toward and from each other, punches for one of said platens, cooperating dies for the other platen, and means carried by said platens for positioning said punches and dies in pairs in co-axial alinement at any points within the areas of said platens in transverse or longitudinal planes spaced lesser distances apart than the cross-sectional dimensions of said punches.

4. A mounting for dies, comprising platens movable relatively toward and from each other, said platens being provided with bolt-retaining means permitting the positioning of securing bolts at different points along one dimension of each of said platens, securing bolts relatively positioned in said bolt-retaining means, die members for each of said platens, and securing devices applied to said securing bolts and movable at any angle to said dimension and also rotatively on said bolts, said securing devices engaging said die members and being secured in adjusted positions by said securing bolts.

5. A mounting for dies, comprising platens movable relatively toward and from each other, each of said platens being provided with die-securing elements positioned at selective points on said platens, said die-securing elements comprising die-retainer parts having their axes adjustable in all planar directions with respect to said selective points, and dies retained by the die-retainer parts of said die-securing elements.

6. A mounting for dies, comprising platens relatively movable toward and from each other, each platen being provided with openings trending along one dimension of the platen, securing bolts selectively applied in said openings, die elements for each of said platens, and clamps adjustable on said securing bolts and engaging said die elements.

7. A mounting for dies, comprising means to retain securing bolts at selective points of the mounting, and means associated with said bolts adjustably arranged to secure dies at any points or over any areas of the mounting.

8. A mounting for dies, comprising a platen provided with means for securing bolts thereto at various points along two dimensions thereof, a metal-operating element for said platen, and clamps adapted to engage said metal-operating element comprising slotted members through which said bolts extend, said clamps being movable in the direction of the slots therein and also rotatively on said bolts, said bolts serving to secure said clamps in desired adjusted position.

9. A mounting for dies, comprising a platen having means to receive and support securing bolts at various points in the length and width thereof, slotted clamp bars through which said bolts are passed, said clamp bars being longitudinally and rotatively movable on said bolts, and metal-operating elements on said platen fastened in desired position by means of said clamp bars.

10. A mounting for dies, comprising a platen having parallel T-shaped grooves, securing bolts fitted into said grooves and projecting therefrom, metal-working elements applied to said platen, and clamp bars applied to the projecting portions of said bolts engaging said metal-working elements, said clamp bars being adjustable on said bolts in the direction of said T-shaped grooves or at any angle thereto and being rotatively adjustable on said bolts.

11. A mounting for dies, comprising a platen having parallel bolt-retaining grooves, securing bolts selectively fitted into said grooves and at any desired points along their lengths, slotted clamp elements adjustable on said bolts, and metal-working elements secured to said platen by means of said clamps.

12. A mounting for dies, comprising a platen having parallel bolt-retaining grooves, securing bolts selectively fitted into said grooves and projecting therefrom at any desired points along their lengths, metal-working elements bearing against the face of said platen, and securing elements associated with said securing bolts fastened against said platen and said metal-working elements by means of said bolts, said securing elements being adjustable on said platen to permit of positioning said metal-working elements over desired points or areas of said platen.

13. A mounting for dies, comprising a platen having bolt-securing openings spaced apart over the face thereof, securing bolts selectively applied in said openings according to the position a die to be secured to the platen is to be maintained, securing means associated with said bolts and movable toward and from a predetermined point or area on said platen, and a die member engaged by said securing means.

14. A mounting for a die, comprising a platen, groove-forming elements applied to said platen, securing bolts selectively inserted into grooves formed by said groove-forming elements and positioned at any points in the lengths of said grooves, a clamp bar applied to each of said bolts and having a slot extending longitudinally therein through which a securing bolt is passed, and a die bearing against said groove-forming elements and engaged by said clamp bars.

15. A mounting for a die, comprising a platen having bolt-retaining grooves of T-formation, securing bolts inserted selectively into said grooves and positioned at any points along the lengths thereof, the heads of said bolts fitting into the wide portions of said T-shaped grooves and the shanks thereof projecting beyond the faces of said platen, clamp bars having extensions at one of their ends bearing against said platen, and die elements engaged by the other ends of said clamp bars, said clamp bars having slots extending longitudinally therethrough through which said bolts are passed.

16. A mounting for dies, comprising a platen having a series of bolt holes arranged over the area thereof, bolts selectively insertible into said bolt holes, a die applied to said platen, and securing elements cooperating with said bolts to securely fasten said die to said platen.

17. A mounting for dies, comprising a platen having bolt holes arranged in parallel rows, at least in one direction, each of said bolt holes having non-circular portions, securing bolts selectively fitted into said bolt holes and having non-circular heads to fit the non-circular portions of said bolt holes, a securing element carried by each of said bolts, and a die engaged by said securing elements and tightened against said platen by means of said bolts.

18. A mounting for dies, comprising platens movable relatively toward and from each other, said platens carrying a plurality of cooperating die members arranged in different planes, and universally adjustable means on said platens for fastening said die members to said platens at any alined points or areas thereof.

19. In a metal-working press, the combination of relatively-movable platens having a plurality of pairs of perforating dies, and means carried by said platens to enable one pair of perforating dies to be positioned in any longitudinal plane within the area of each of said platens.

20. A mounting for a die, comprising a platen adapted to be moved in a direction perpendicularly to its face, a die-securing element secured to said platen by a connection adapted to permit adjustment in all directions across the face of said platen, and a die adapted to be engaged by said die-securing element.

21. A mounting for dies, comprising platens movable relatively toward and from each other, each of said platens being provided with die-securing elements adjustable in all directions parallel to said platens, and co-axial dies retained by said die-securing elements.

22. A mounting for dies, comprising platens movable relatively toward and from each other, each of said platens being provided with die-securing elements, said die-securing elements comprising die-retainer parts co-axially disposed on said platens and having their axes adjustable in all directions in planes parallel to said platens, and dies retained in the die-retainer parts of said die-securing elements.

23. A mounting for dies, comprising two platens movable relatively to increase or diminish the space between the two, each of said platens being provided with die-securing elements positioned at coincident selective points on said platens, said die-securing elements having die-retainer parts and being adjustable to position the axes of said die-retainer parts at any point within a circular region having said coincident selective points as its center, and dies retained in the die retainer parts of said die-securing elements.

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