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LOCKING CLAMP

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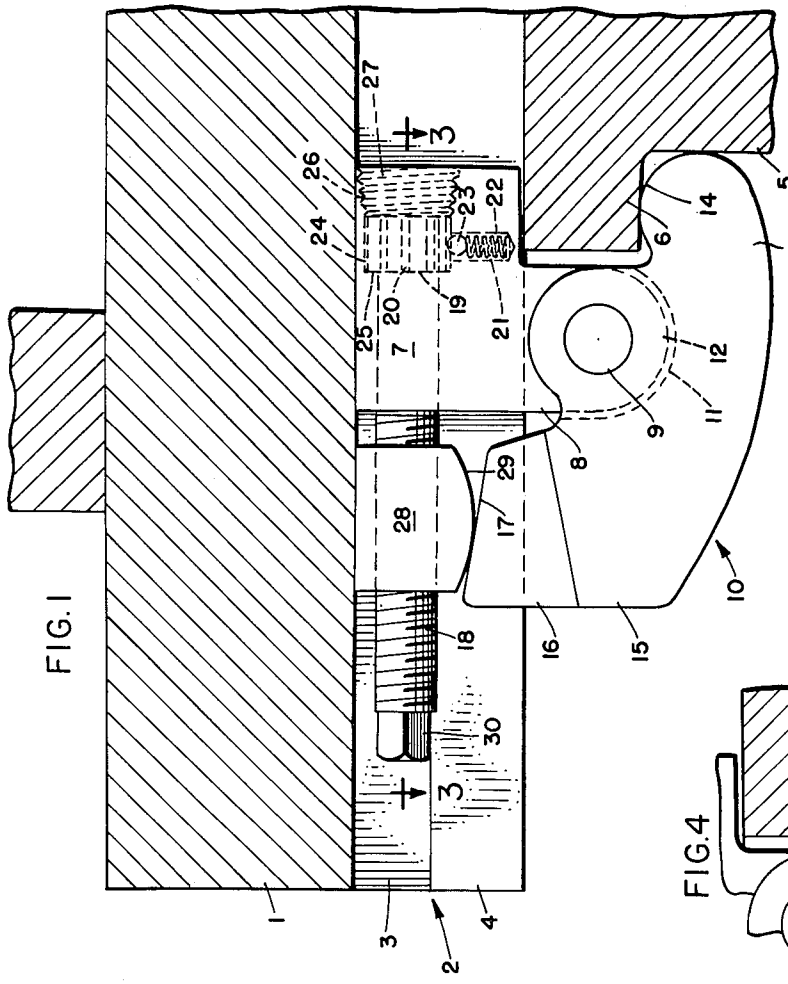


FIG. 1

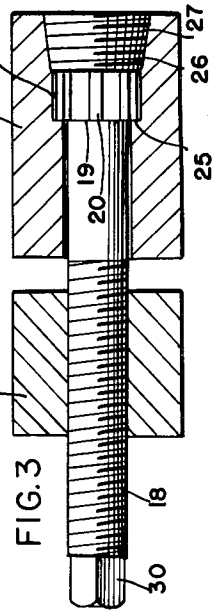


FIG. 3

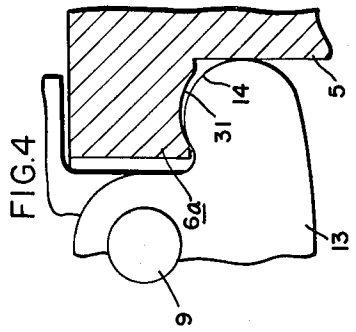


FIG. 4

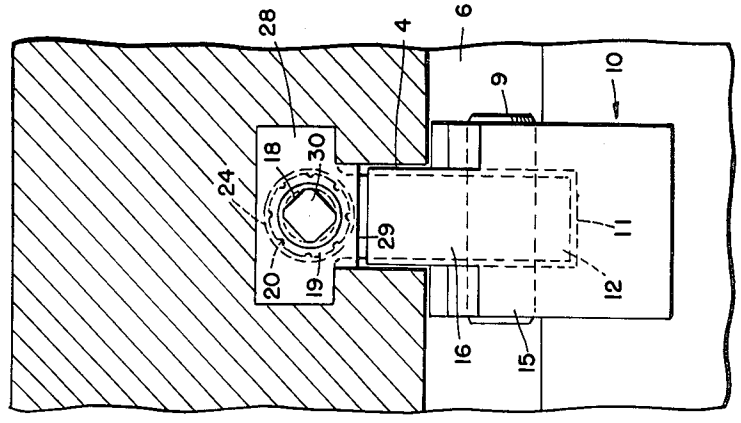


FIG. 2

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LOCKING CLAMP

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2 Claims. (Cl. 113—49)

This invention relates in general to locking devices, and in particular to a locking device or clamp for holding machine parts together such as, for example, for holding a die member against the slide of a metal working press.

In metal working or forming presses of the character wherein a die is secured to the underside of a slide and is caused to move downwardly against a metal blank supported by another die on the bed of the press, it has been customary heretofore to secure the die to the slide by means of bolts or other similar fastening means. This may be done in a relatively simple and expeditious manner if a single action press is involved. On the other hand, double action presses present a serious problem from the standpoint of reaching the bolts which secure the die to the inner slide.

In double action presses an outer slide is caused to move downwardly and hold the blank in place on the die on the bed after which the inner slide moves downwardly with the die fixed thereto for a drawing operation. Present practice has been to provide openings or windows in the sides of the outer blank holder slide to enable the die setter or operator of the press to obtain access to the inner slide for the purpose of placing bolts thereon and securing the die thereto.

It is customary to form T-slots in the underside of the inner slide for the reception of the bolt heads. The bolts will thereupon extend below the undersurface of the inner slide and present themselves for insertion through holes in an upper flange of the die as the die is moved vertically upwardly by hand whereupon nuts are screwed onto the bolts to hold the die in place.

It is not difficult to insert the bolts in the T-slots because they can be arranged opposite the openings or windows in the blank holder slide. A serious problem, however, is presented in reaching through the window and below the flange on the die to apply the nut. Such an operation is usually performed blindly by the operator and thus consumes considerable time in affixing the die to the slide.

The present invention is designed to overcome the disadvantages enumerated above and enables the die to be fixed to the slide quickly and easily, thus saving time in setting the die. Furthermore, the device embodying the present invention is designed to be utilized in connection with the conventional T-slot which is already present on the draw slide and to utilize also the flange at the upper part of the die.

It is therefore a principal object of the present invention to provide a lock or clamping device to facilitate the securing in place of a die to the inner slide of a double action metal working press.

Another object of the invention is to provide a locking device for locking a die member to the inner slide of a double action metal working press wherein the T-slot already present in the inner slide may be utilized for supporting the device which acts in cooperation with a flange on the die to clamp the die in place against the underside of the slide.

A further object of the invention is to provide a locking device for locking a die to the underside of a draw slide wherein a pivotally mounted lever supported on the slide is caused to be rotated so that one arm thereof will clamp the die to the slide by cooperation with a flange on the die.

Still another object of the invention is to provide a locking device for locking a die member to a draw slide wherein one arm of a pivotally mounted lever is caused to have a clamping action against a flange on the die and wherein the lever is caused to rotate to its clamping position by means of a wedge arrangement on the other arm of the lever.

A still further object of the invention is to provide a locking device for locking a die member to the draw slide of a metal working press wherein a pivotally mounted lever has one arm thereof operable as a clamping device and wherein the other arm thereof is operable to rotate the lever by means of a wedge arrangement actuated by a screw threaded device supported by the draw slide.

Other objects and advantages of the invention will become apparent upon reading the following description taken in conjunction with the accompanying drawing in which:

Fig. 1 is a sectional view through a portion of a draw slide and die fixed thereto showing the device of the present invention in side elevation;

Fig. 2 is an end elevational view of the locking device shown in Fig. 1;

Fig. 3 is a horizontal sectional view taken along the plane of line 3—3 of Fig. 1; and

Fig. 4 is a fragmentary elevational view of the device shown in Fig. 1 illustrating a modification thereof.

Referring now more particularly to the drawing, the draw slide, or a portion thereof, is indicated by the numeral 1 and the T-slot in the lower part of the draw slide is generally indicated at 2. There will be provided a plurality of such T-slots extending inwardly from the outer edge of the draw slide and there may be as many of these slots as may be necessary, depending upon the size of the press and the number of locking or clamping devices which it may be necessary to use for locking the die in position.

For illustration purposes, only one such T-slot is shown, it being understood that the device embodying the present invention is adapted for use in each one of the slots as may be necessary. Each T-slot includes a horizontal portion 3 and a downwardly extending portion 4 opening through the bottom side of the draw slide. Since double action presses and their construction in general are well known, it has not been deemed necessary to illustrate the relative position of the outer or blank holder slide.

The die which is adapted to be mounted on the underside of the draw slide is generally indicated by the numeral 5 and is provided with a flange 6 at the upper part thereof which extends laterally outwardly therefrom on as many sides as may be necessary.

The locking clamp embodying the present invention consists of a main support or body portion 7 also generally T-shaped and adapted to be received in the T-slot 2. The upper part of the support 7 may extend laterally and be received by the upper portion 3 of the T-slot. The support 7 has a downwardly depending portion 8 which is narrower than the upper part thereof and passes downwardly and outwardly through the lower part 4 of the T-slot 2.

A pin 9 is received in the lower part of the depending portion 8 and is adapted to pivotally or rotatably receive a lever 10. This lever 10 is relatively wide as may be seen more clearly in Fig. 2 and has a central recess 11 therein between the sides thereof to receive the lower curved end 12 of the depending portion 8 on the support. It will thus far be evident that the lever 10 pivoted on the pin 9 will be supported or suspended from

the support 7 and will be free to rotate or have a pivotal action thereon.

The lever 10 is provided with an arm 13 which extends generally inwardly of the press and terminates in a generally arcuate portion 14 adapted to bear upwardly against the underside of the flange 6 when in operative position as illustrated in Fig. 1.

Another arm 15 is formed integral with the lever 10 and extends generally outwardly therefrom and is provided with a substantially centrally located narrowed wedge portion 16 at the upper part thereof. The part 16 is necessarily made more narrow so that it may be received within the vertical portion 4 of the T-slot in the draw slide. The upper surface of the narrow wedge part 16 slopes downwardly and inwardly of the press as at 17 thereby providing a wedge surface thereon. It will be evident thus far that a downward pressure on the arm 15 will cause a counterclockwise rotation of the lever 10 thus urging the arm 13 upwardly against the underside of the flange 6 on the die 5. When sufficient pressure is exerted on the lever 10 the result will be to clamp tightly the die against the underside of the draw slide.

The mechanism which is provided to exert the necessary pressure against the arm 15 includes an elongated bolt or similar threaded member 18 which extends outwardly in a generally horizontal position from the support 7 and at the upper part thereof. The inner end of the threaded member 18 has fixed thereto a generally circular detent member 19 provided with a plurality of axially extending grooves 20 on the periphery thereof. Immediately below the detent 19 and within the body of the support 7 there is provided a recess 21 having a coil spring 22 therein for the purpose of urging upwardly a ball retaining member 23. The arrangement is such that when the screw 18 is rotated causing rotation of the detent 19, the ball 23 will be urged upwardly by spring 22 and will seat in one of the grooves 20 to thereby prevent inadvertent rotation of the screw.

The inner end of the opening in the body 7 which receives the screw 18 is enlarged as at 24 providing an annular shoulder 25 against which the circular detent 19 abuts. This enlarged opening 24 is then flared outwardly as at 26 and opens rearwardly of the support 7 to receive a screw threaded plug 27 thereby holding the screw member 18 against axial movement.

A movable wedge member 28 is of generally T shape and is received by the T-slot 2. This wedge member 28 is provided with a threaded opening therethrough to threadedly receive the screw member 18. The lower part of wedge member 28 is narrowed to be received by the lower part of the T-slot and terminates so that its undersurface is arcuate as illustrated by the numeral 29 or may terminate in any other suitable manner in a way which will cooperate with the downwardly and inwardly sloping surface 17 on the lever 10.

It will be evident that upon rotating the screw member 18 in the proper direction, the movable wedge member 28 will be caused to move outwardly or toward the left as viewed in Figs. 1 and 3 since it cannot rotate by reason of its fit within the T-slot. Such outward movement of the wedge member 28 will cause the lever 10 to be rotated in a counterclockwise direction about the pivot pin 9. This results from the contact between the undersurface 29 on the wedge member 28 and the upper sloping surface 17 on the arm 15 of the lever 10. This wedging action between the members 28 and 10 will urge the arm 15 downwardly and the arm 13 upwardly against the underside of the flange 6 on the die 5 thereby locking or clamping the die against the underside of the draw slide 1.

Any suitable means may be provided to enable the screw 18 to be conveniently rotated by merely reaching through the window of the outer blank holder slide. In the form of the invention shown herein, the outer end of screw 18 is provided with a non-circular end 30 adapted to receive a tool such as a socket wrench.

In assembling the device of the present invention the screw 18 with the circular detent 19 fixed to one end thereof is inserted through the opening in the support 7 from the right-hand side thereof as viewed in Fig. 1. The spring 22 and ball 23 will have previously been inserted in the recess 21. The plug 27 may then be placed in the opening 26 thereby to hold the screw 18 against axial movement. When the screw 18 is inserted in the support 7 the longitudinal movement thereof will be limited by the detent 19 abutting against the annular shoulder 25. The movable wedge member 28 may then be screwed onto the member 18 to a point thereon such that the lever 10 will have a relatively free pivotal movement so that the arm 13 thereof may be moved downwardly a short distance. The entire assembly may then be inserted in the T-slot 2 of the draw slide and the die placed in position against the underside of the draw slide. The die setter or machine operator may then reach through the opening in the blank holder slide which will be opposite the end of the T-slot and place a socket wrench or other suitable tool on the socket end 30 of the screw and turn the screw so that the wedge member 28 will move outwardly thereon. As the member 28 moves outwardly, it will force arm 15 downwardly by a wedging action and will urge arm 13 upwardly against the underside of the flange 6 on the die until the die is firmly clamped in place and locked against movement.

It is thus obvious that the operator or die setter has avoided the inconveniences of reaching through the opening of the blank holder slide to the flange on the die in an attempt to place a nut on the lower end of a bolt passing therethrough. The present invention has the advantage that the operator can easily apply a tool to the end of screw 18 and can thereby see what he is doing. Another advantage arising out of the use of the present construction is the speed with which a die can be fixed in place. Rotating the screw 18 to a position where it will cause the lever 10 to clamp the die in place can be accomplished more rapidly than applying a nut to a bolt which cannot be seen.

Fig. 4 of the drawing illustrates a slight modification from that shown in Fig. 1 wherein the underside of the flange 6*a* on the die 5 is provided with arcuate surface as indicated at 31. In some instances this may prove to be advantageous in more firmly locking the die in place by reason of the cooperation between the curved surface 14 on the arm 13 and this arcuate portion 31 of the flange 6*a*.

In either event the advantages of the construction will be the same. It will also be clear that instead of the curved undersurface 29 of the wedge 28 this surface could be sloping in a manner complementary to the surface 17, if so desired. The specific shapes of the surfaces 17 and 29 is unimportant as long as the relative movement between the two surfaces will have a wedging action.

Changes may be made in the form, construction and arrangement of parts from those disclosed herein without in any way departing from the spirit of the invention or sacrificing any of the attendant advantages thereof, provided, however, that such changes fall within the scope of the claims appended hereto.

The invention is hereby claimed as follows:

1. A locking clamp for securing a die to the slide of a metal working press, comprising a T-shaped support adapted to be received by a corresponding T-shaped slot in the slide, said support including a leg member and a cross member, a lever pivotally mounted on the end of said leg member, said lever having arms extending outwardly in opposite directions from the pivotal point thereof and one of said arms being adapted to move in a direction to engage a portion of a die and clamp the die to the slide, the other of said arms having a cam portion at the end thereof adapted to be received by the leg of said slot, an elongated screw member hav-

ing a cylindrical end extending solely through the cross member of said support and longitudinally of the slot and rotatable therein, means to hold said end against longitudinal movement with respect to said support, a lever operating member threadedly engaging said screw member and movable longitudinally thereof into contact with the cam portion on said other arm, thereby to urge said one arm into clamping engagement with the die, said operating member having a configuration complementary to the T-shaped slot and confined therein against rotation.

2. A locking clamp for securing a die to the slide of a metal working press, comprising a T-shaped support adapted to be received by a corresponding T-shaped slot in the slide, said support including a leg member and a cross member, a lever pivotally mounted on the end of said leg member, said lever having arms extending outwardly in opposite directions from the pivotal point thereof and one of said arms being adapted to move in a direction to engage a portion of a die and clamp the die to the slide, the other of said arms having a cam portion at the end thereof adapted to be received by the leg of said slot, an elongated screw member having a headed cylindrical portion extending through the cross member of said support and longitudinally of the slot and rotatable therein, means cooperating with said headed portion to hold said screw member against longitudinal movement with respect to said support, a lever operating

member threadedly engaging said screw and movable longitudinally thereof into contact with the cam portion on said other arm, thereby to urge said one arm into clamping engagement with the die, said operating member having a configuration complementary to the T-shaped slot and confined therein against rotation and a spring loaded detent means on said support engageable with the headed portion of said screw member for retaining the latter in adjusted position.

References Cited in the file of this patent

UNITED STATES PATENTS

1,060,477	Meyers	Apr. 29, 1913
1,348,658	Nelson	Aug. 3, 1920
1,350,097	Glover	Aug. 17, 1920
1,414,839	Stuarts	May 2, 1922
1,499,843	Peterson	July 1, 1924
1,801,222	Cayo	Apr. 14, 1931
1,982,488	Weber	Nov. 27, 1934
1,995,206	Geissbuhler	Mar. 19, 1935
2,341,564	La Pierre	Feb. 15, 1944
2,390,022	Wood	Nov. 27, 1945
2,413,943	Bolduc	Jan. 7, 1947
2,482,708	Gordiner	Sept. 20, 1949
2,519,157	Stacey	Aug. 15, 1950
2,577,029	Moorehead	Dec. 4, 1951