July 14, 1953 F. E. MUNSCHAUER 2,645,287

ADJUSTABLE GUIDE FOR SHEAR KNIVES

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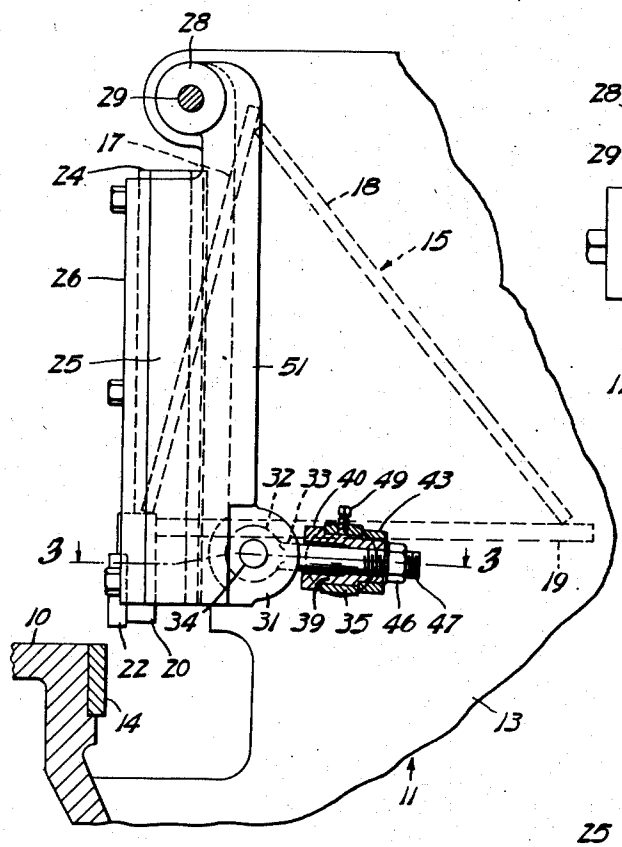


Fig. 1.

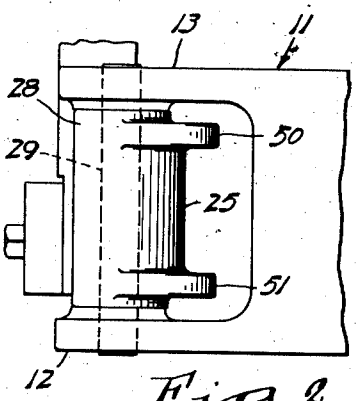


Fig. 2.

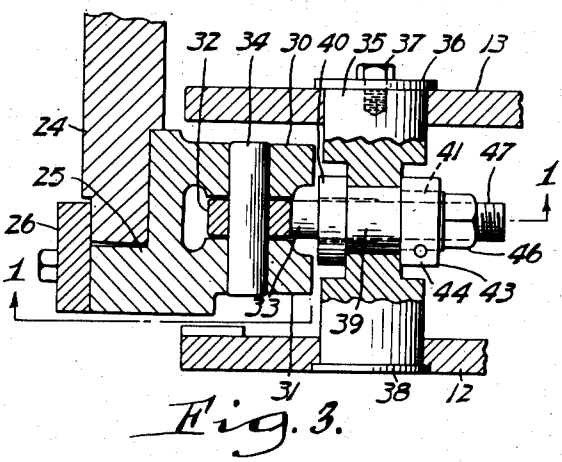
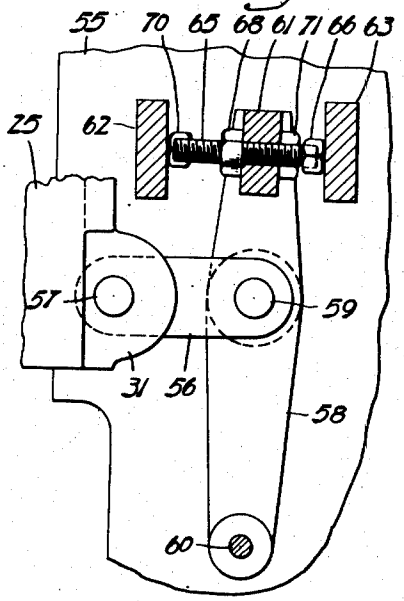


Fig. 3.

Fig. 4.



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Fig. 7.

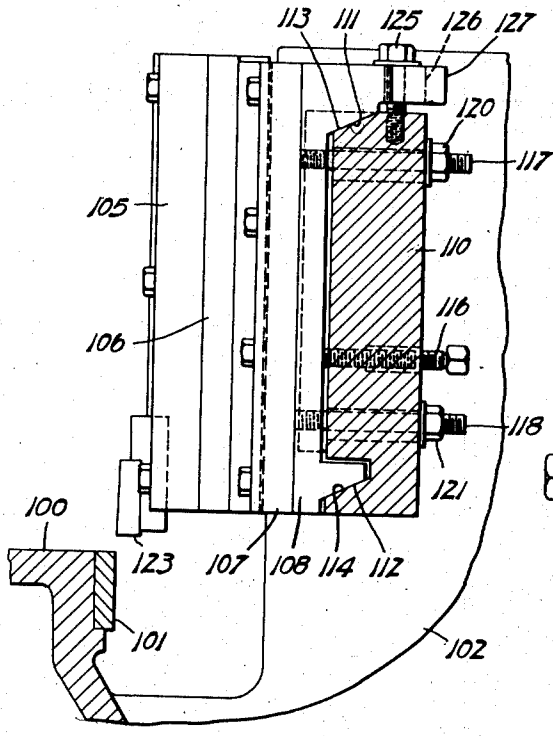


Fig. 6.

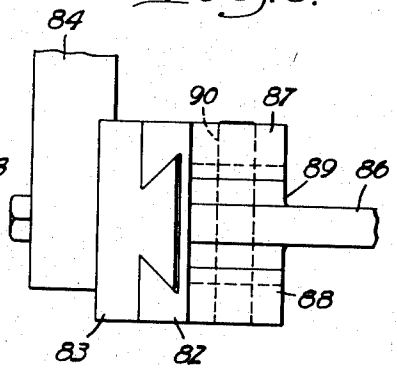


Fig. 5.

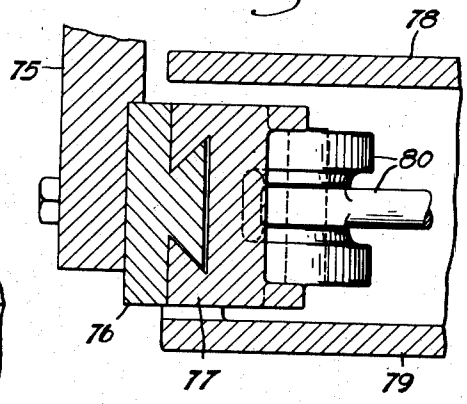
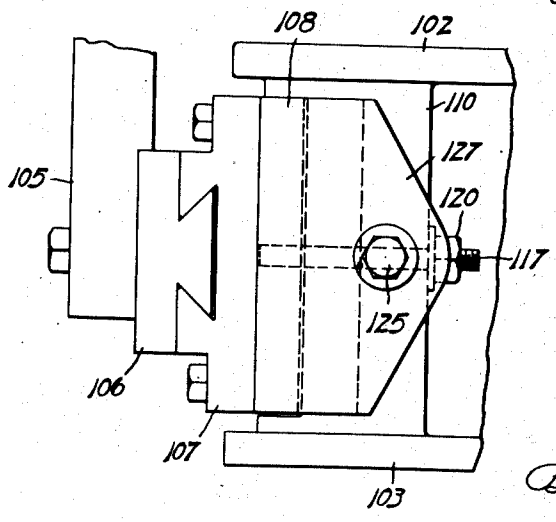


Fig. 8.



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ADJUSTABLE GUIDE FOR SHEAR KNIVES

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Application October 6, 1948, Serial No. 53,128

3 Claims. (Cl. 164—47)

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This invention relates to shears and particularly to power squaring shears of the kind commonly employed in metal fabrication.

In conventional shears of this class, a work receiving bed is supported at its opposite sides by side frames or columns, and the side frames or columns have upward extensions which are formed to guide a crosshead for vertical reciprocation. The bed and the crosshead carry cooperating shear knives which effect shearing strokes upon vertical reciprocation of the crosshead.

Conventional practice in machines of the foregoing general design is to render the bed horizontally adjustable relative to the side frames or columns, whereby the lower shear knife may be moved horizontally toward or away from the vertical plane of movement of the upper reciprocating shear knife to adjust the horizontal clearance therebetween. Adjustment of this clearance must be made to efficiently shear sheets of various thickness and, in some cases, of various metals or alloys.

If the bed of a shear can be made to comprise a fixed rigid part with the side frames or columns, the construction of the machine is simplified and far greater structural strength is attained, other conditions being equal. This is of particular importance and convenience when the joint bed and side frame or column unit is fabricated into an integral whole by building up the unit with welded steel plates.

The present invention provides means which dispenses with the usual adjustable connection of the bed with the machine framework and contemplates a bed construction which is at all times rigid with respect to the machine frame and may comprise a part thereof. This is accomplished by providing an upper frame construction for the shear which includes crosshead guide means which may be adjusted to adjust the plane of reciprocation of the upper shear knife toward and away from the lower shear knife in a horizontal direction. According to the present invention, such means are provided as to render the relative horizontal adjustment between the upper and lower shear knife simpler than has heretofore been the case.

The present invention provides, in one form, crosshead guide means which has upper pivotal support, whereby its lower knife-carrying portion may be swung toward or away from the lower shear knife, with suitable means for controlling such swinging movement within micrometric limits and for securely holding the guide means in any desired adjusted position.

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In a modified form of the crosshead guide adjusting means of the present invention, the crosshead guide means is moved bodily in a horizontal or an oblique direction in such manner that the vertical attitude of the guides and the consequent truly vertical descent of the shear knife is not disturbed despite the location of the guide means in various positions of adjustment.

Several embodiments of the present invention are set forth herein by way of example and are illustrated in the accompanying drawings. However, the principles of the present invention are not limited to the precise forms shown and described, nor otherwise than as defined in the appended claims.

In the drawings:

Fig. 1 is a fragmentary cross-sectional view through a double wall supporting column at one side of a shear constructed in accordance with the present invention, taken approximately on the line 1—1 of Fig. 3;

Fig. 2 is a fragmentary top plan view of the crosshead guide illustrated in Fig. 1;

Fig. 3 is a fragmentary horizontal cross-sectional view taken approximately on the line 3—3 of Fig. 1;

Fig. 4 is a fragmentary elevational view viewed as in Fig. 1, but showing an alternative means for retaining the cross-head guides in adjusted position;

Fig. 5 is a view similar to Fig. 3, but with the adjustment holding means omitted and with a modified form of cross-head guide means illustrated;

Fig. 6 is a top plan view of an arrangement similar to that illustrated in Fig. 5 but adapted for use with a shear having a single wall side frame construction, rather than double wall column construction as in the other embodiments.

Fig. 7 is a view similar to Fig. 1 showing an alternative form of crosshead guide adjusting means;

Fig. 8 is a fragmentary top plan view of the guide and adjusting means of Fig. 7.

Throughout the several figures of the drawings like characters of reference denote like parts. In the form of the present invention illustrated in Figs. 1, 2, and 3, and referring particularly to Fig. 1, the numeral 10 designates a shear bed or work table which is formed integrally with a pair of side frames or end members, one of which is designated generally 11 in Fig. 1. The end member 11 of Fig. 1 is shown in Fig. 3 as comprising outer and inner wall portions 12 and 13, respectively. Bed 10 carries a removable lower

shear knife 14 which is fixed relative to the machine proper.

In Fig. 1 the numeral 15 designates generally a shear crosshead which is formed of inclined front and rear plates 17 and 18 and a bottom plate 19, all welded to form an integral unit. A shear knife supporting bar 20 is also an integral welded part of the crosshead assembly and has an upper shear knife 22 removably attached to its front face. The crosshead assembly also includes vertically extending end members, one of which is shown at 24 in Figs. 1 and 3, the end member being adapted to move vertically in guides associated with the side frame members 11 of the shear.

The manner in which powered shearing strokes are imparted to the crosshead 15 is conventional, forms no part of the present invention, and is accordingly not illustrated. The crosshead 15 may have connection with a crank or eccentric drive shaft by means of pivoted link connections in a manner which is well-understood in this art. Figs. 1 and 3 illustrate a guide bar 25 to the front of which is attached a gib 26 which cooperates with guide bar 25 to form a guideway for the vertically extending end member 24 of crosshead 15.

At its upper end guide bar 25 has a bearing formation 28, and a pivot pin 29 extends through bearing 28 and into the opposed walls 12 and 13 which comprise side frame member 11. At its lower rear portion, guide bar 25 is provided with a pair of spaced coaxial bearing formations 30 and 31 and a bearing 32 formed at one end of an adjusting rod 33 is pivotally retained coaxially between bearings 30 and 31 by means of a pivot pin 34.

A stub shaft element 35 bears at opposite sides in the walls 12 and 13 of side frame member 11 and is held against axial displacement with respect thereto by means of a retaining plate or washer 36 and a screw 37 which cooperate with a head formation 38 at the other end of shaft element 35.

The mid-portion of shaft 35 is flattened at its front and rear faces as is clearly shown in Fig. 3, and an opening formed through shaft element 35 at the flat faces receives a bushing 39 which has an enlarged head portion 40 at one end and a reduced portion 41 at its other. A collar 43 engages over reduced portion 41 and is held fixed relative to bushing 39 by means of a locking pin 44. Beyond the reduced portion 41 bushing 39 is provided with a nut formation 46 and bushing 39 is internally threaded to cooperate with threads formed on adjusting rod 33 as at 47 in Fig. 3.

It is believed clear from the foregoing that rotation of nut formation 46 will produce relative movement in either desired direction between bushing 39, which is retained against axial movement by the flat sides of stub shaft 35, and the adjusting rod 33. In this way the adjusting rod 33 is projected toward or away from shaft element 35 and the lower end of guide bar 25 is thus moved pivotally about pivot pin 29 to vary the longitudinal clearance between lower shear knife 14 and upper shear knife 22.

A set screw 49 may be threaded into stub shaft 35 to engage the periphery of the bushing 39 and thus lock the adjusting rod 33 against disturbance of its adjusted position. As appears best from Fig. 2, the rear face of adjusting bar 25 may have reinforcing ribs 50 and 51 which extend downwardly across the back of its rear face and terminate at the bottom in the bearing formations 30 and 31. It is to be understood that the construction at the opposite side frame member of the press will be identical with that just described, excepting that it is of opposite hand.

In the modification shown in Fig. 4 the only deviation from the embodiment of Figs. 1, 2, and 3 resides in the mode of pivotally adjusting the guide bar 25 at its lower end and only this much of the construction is illustrated in Fig. 4. In Fig. 4 the numeral 55 designates one end of a double wall side frame or column corresponding to the wall 13 of frame member 11 in the first described embodiment.

In Fig. 4 the numeral 56 designates a link which is the counterpart of adjusting rod 33 of the previous embodiment and is pivoted between bearings 30 and 31 of guide bar 25 as at 57. The opposite end of link 56 is pivotally attached to an intermediate portion of a lever 58 as at 59. Lever 58 is pivoted at its lower end to wall 55 as at 60, and its upper end is provided with a laterally projecting lug or block 61.

In Fig. 4 the numerals 62 and 63 designate lugs or projections on wall 55 which serve as stop members for the lever adjusting means. A screw 65 which is threaded into lug 61 of lever 58 has a head portion 66 which bears against the adjacent face of lug 63 when lever 58 is in locked position, a lock nut 68 serving to maintain this locked position. A second screw which lies behind screw 65 in Fig. 4 is likewise threaded into block 61 and has a head portion 70 which bears against the adjacent face of lug 62 in the locked condition illustrated in Fig. 4, a lock nut 71 serving to maintain such condition.

When it is desired to move the upper shear knife toward or away from the lower shear knife in a horizontal direction, either one or the other of the screws is screwed farther into block 61, and the other is moved out or backed off until the two heads 66 and 70 of the screws are again in locking engagement with lugs 63 and 62. Obviously, the lock nuts are loosened before this adjusting operation and retightened at its conclusion.

Fig. 5 shows a modified construction which is the same as that of Figs. 1, 2, and 3 insofar as the support and adjustment of the guide bar are concerned. The embodiment of Fig. 5 differs from that of Figs. 1 through 3 only in the fact that the crosshead end members, one of which is designated 75 in Fig. 5, are provided with vertically extending dovetail bars 76 which slide in dovetail guides formed in the front faces of guide bars 77. Guide bars 77 are otherwise identical with the guide bars of Figs. 1, 2, and 3, being pivotally mounted between opposed side walls 78 and 79 of a double wall column at their upper ends and having an adjusting means at their lower ends identical with that shown in detail in Figs. 1 and 3 and indicated fragmentarily at 80 in Fig. 5.

The embodiment shown in Fig. 6 is the same as that shown in Fig. 5, excepting that the guide bar 82 which has a dovetail groove for receiving a guide portion 83 of a crosshead 84 is associated with a side frame 86 which comprises a single wall, rather than the double wall end members of the previous embodiments. In such case the upper bearing portion corresponding to the bearing 28 of Figs. 1 and 2 is bifurcated as at 87 and 88 to straddle a bearing 89 formed on wall 86, the three bearings being pivotally related by means of a pivot pin 90.

In the form of the present invention shown in Figs. 7 and 8, means are provided whereby shear crosshead guide bars are mounted for bodily movement backward and forward to adjust the crosshead horizontally and thus adjust the clearance of the upper shear knife relative to the lower stationary shear knife. In Fig. 7 the numeral 100 designates a bed and 101 a lower stationary shear knife fixed thereto. The numeral 102 designates the inner wall of a double wall end frame member which, as appears from Fig. 8, is the right-hand end frame member of the machine. In Fig. 8 the outer wall of such end member is designated 103.

As appears from Fig. 8, an end portion 105 of the shear crosshead is provided with a dovetail guide element 106 which is slidable in a dovetail guiding formation of a crosshead guide element 107. Element 107 is secured to a vertically extending adjustable guide supporting block 108. The guide elements 107 and supporting blocks 108 are made separately and screwed to each other merely to permit the replacement of elements 107 when their dovetail guide formations become unduly worn.

A rigid block 110 extends between side walls 102 and 103 and may be welded or otherwise fixed therebetween. Block 110 is provided with upper and lower inclined guide surfaces 111 and 112 and guide supporting block 108 has mating upper and lower inclined surfaces 113 and 114.

Referring particularly to Fig. 7, a screw 116 threaded into block 110 abuts the adjacent vertical face of block 108 to limit movement of block 108 rearwardly toward block 110. A pair of studs 117 and 118 are threaded into block 108 at their inner ends and pass freely through vertically elongated slots in block 110. At the rear face of block 110 studs 117 and 118 are provided with nuts 120 and 121, respectively, which may be drawn up to urge block 108 rearwardly and thus hold the inclined surface 111 through 114 in secure seating engagement.

Assuming that screw 116 were backed off somewhat to permit rearward adjustment of the upper shear knife designated 123 in Fig. 7, the tightening movement of nuts 120 and 121 would move block 108 rearwardly and upwardly by sliding movement of inclined faces 111 and 112 of block 102. A screw 125 passes freely through a slot 126 in an overhanging ledge formation 127 of block 108 and is threaded into block 110. This screw is subsequently tightened to lock the blocks 108 and 110 securely to each other with the inclined faces in firm and accurately aligned seating engagement. It will be seen from the foregoing that knife 123 in this embodiment is moved forwardly and rearwardly without in any way affecting its vertical attitude or its vertical plane of reciprocation.

It will be noted that in all of the various embodiments described in the foregoing the vertical height of the crosshead and the upper sheer knife is not altered by adjustment of the crosshead guide bars. The relative vertical position of the crosshead is determined by the adjustment of its connection with the drive shaft of the machine and any vertical movement of the guides incident to horizontal adjustment merely produces movement of the guides upwardly or downwardly along the engaging surfaces of the crosshead.

What is claimed is:

1. In a machine for shearing metal sheets and the like, a pair of end frame means and a bed extending therebetween and fixed rigidly thereto, said bed including a work table having a stationary lower shear knife fixed to the rear edge thereof, a reciprocable crosshead including an upper shear knife attached thereto adjacent the lower edge of the crosshead and vertically extending slide guide formations at opposite sides thereof, means carried by each of said end frame means having vertical guide formations cooperating with the guide formations of the crosshead for guiding the opposite ends of the crosshead in a generally vertical path of movement whereby the upper shear knife is movable past the lower shear knife to effect shearing strokes, said guide means being pivoted at their upper ends to said end frame means and having screw threaded means engaging between their lower ends and said end frame means for pivotal adjustment in a generally horizontal direction transverse to the plane of the shear knives for adjusting the clearance between the shear knives.

2. In a machine for shearing metal sheets and the like, a pair of end frame means and a bed extending therebetween and fixed rigidly thereto, said bed including a work table having a stationary lower shear knife fixed to the rear edge thereof, a reciprocable crosshead including an upper shear knife attached thereto adjacent the lower edge of the crosshead and vertically extending slide guide formations at opposite sides thereof, means carried by each of said end frame means having vertical guide formations cooperating with the guide formations of the crosshead for guiding the opposite ends of the crosshead in a generally vertical path of movement whereby the upper shear knife is movable past the lower shear knife to effect shearing strokes, each of said guide means being pivoted at its upper end to its end frame means and having adjustable locking means acting between its lower ends and its end frame means for pivotal adjustment in a generally horizontal direction transverse of the plane of the shear knives for adjusting the clearance between the shear knives.

3. In a machine for shearing metal sheets and the like, a pair of end frame means and a bed extending therebetween and fixed rigidly thereto, said bed including a work table having a stationary lower shear knife fixed to the rear edge thereof, each of said end frame means comprising a wall portion extending above and rearwardly of said work table, said wall portions being spaced in the direction of shearing, a reciprocable crosshead including an upper shear knife, slideway means for guiding the opposite, end portions of said crosshead in a generally vertical path of movement to effect shearing strokes, means pivotally connecting said slideway means to the forward ends of said wall portions at the upper ends of said slideway means, and means on said end frame means for selectively pivotally adjusting the slideway means in a direction transverse to the plane of the knives for adjusting the clearance between the knives.

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