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HOLD-DOWN FOR SHEARS

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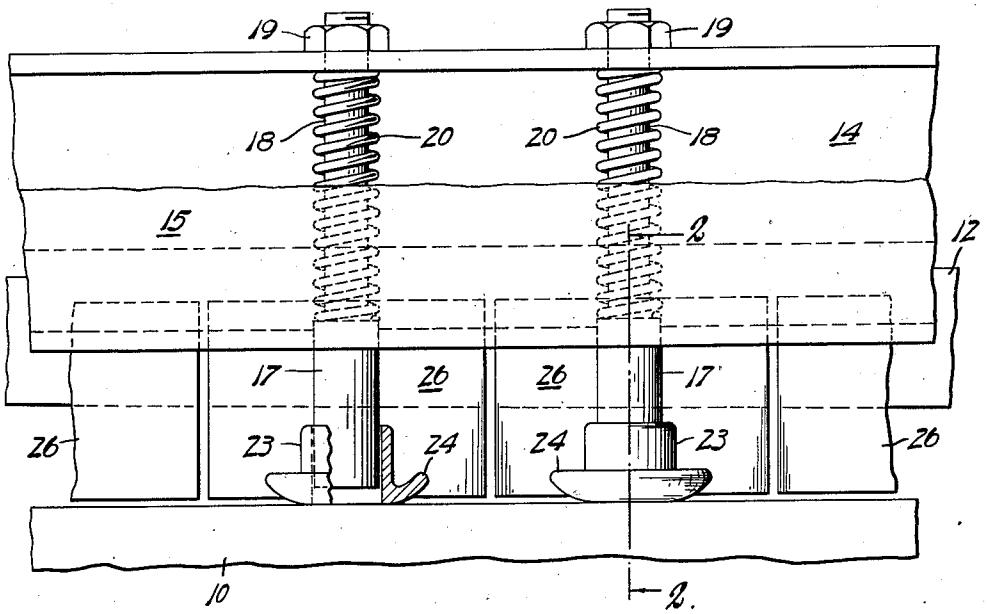


Fig. 1.

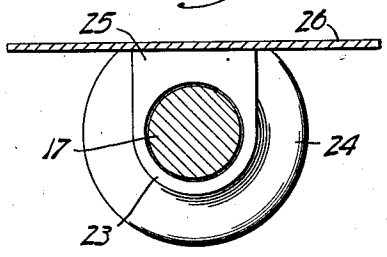


Fig. 3.

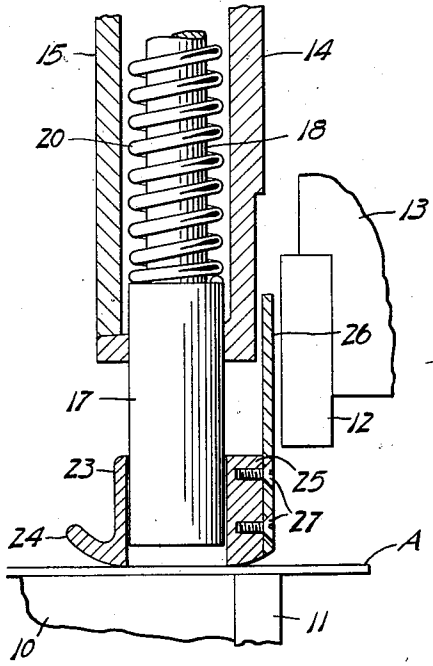


Fig. 2.

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HOLD-DOWN FOR SHEARS

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This invention relates to hold-down means for metal shears and analogous machines.

In the construction of metal shears, means are conventionally provided for automatically holding the sheet being sheared securely against the bed of the machine during the shearing stroke. In the majority of such hold-down devices, a hold-down bar is mounted for vertical reciprocation jointly with or in timed relation relative to the crosshead which carries the movable shear knife so that portions of the hold-down structure engage the sheet on the bed of the machine before the movable shear knife reaches a point where it begins the cutting operation.

One common form of hold-down of this general class includes a number of hold-down feet spaced along the hold-down bar; the feet comprising, generally, downwardly extending spring-backed pins whose lower ends yieldably engage the work sheet. In this as well as in other forms of hold-downs it is necessary, in conventional constructions, to so arrange the upward movement of the hold-down bar that in its upper position the bottom ends of the hold-down feet or other work-engaging devices associated with the hold-down bar must be spaced from the bed of the shear a distance sufficient to permit a work sheet to be freely slid thereunder.

This spacing of the bottom of the hold-down feet from the bed in upper rest position must be not only equal to the thickness of the maximum sheet to be cut, but must also allow for the fact that sheets are frequently wavy or not entirely flat, so that the spacing of the hold-down feet from the bed between shearing strokes is such that it is entirely possible for a workman to get his fingers under the feet and, in fact, the hazard is sufficiently imminent that accidents of this kind frequently occur.

Various guards and safety devices have been proposed to eliminate this hazard but prior attempts have been unduly complicated or inadequate or have been such as to render operation of the shear less convenient and thus slower. It is well-known in this art that workmen are prone to eliminate or disable safety devices which in any way hamper their work or make it more awkward to perform, particularly in instances where their earnings depend directly or indirectly on their productive efficiency.

The present invention provides simple means which may readily be associated with hold-down feet of conventional construction to eliminate the possibility of a workman accidentally getting his fingers under the hold-down feet prior to their descent. The present invention accomplishes this desirable end without in any wise hindering the workman or rendering the operation of inserting a sheet in proper position to be sheared more difficult or awkward. The present invention further includes means cooperating with the hold-down safety means for protecting the workman from contact with the shearing knives themselves.

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The accompanying drawing and the following detailed description illustrate one mode of practicing the present invention, but this form is set forth by way of example only, and it is to be understood that the principles of the invention are not limited to the precise form shown or otherwise than as defined in the appended claims.

In the drawings:

Fig. 1 is a fragmentary elevational view of a portion of a shear showing one form of the hold-down foot arrangement of the present invention;

Fig. 2 is a fragmentary cross-sectional view on the line 2—2 of Fig. 1 but on a somewhat larger scale; and

Fig. 3 is a horizontal cross-sectional view through one of the hold-down foot elements of Fig. 1.

Like characters of reference denote like parts in the several figures of the drawing, and the numeral 10 designates fragmentarily the usual bed or work receiving table of a shear. In Fig. 2 the numeral 11 shows the lower shear knife which is conventionally fixed adjacent to the rear edge of the bed and the upper movable shear knife is designated 12, it being supported by the usual reciprocating crosshead 13. All of this construction is conventional and is accordingly indicated fragmentarily and somewhat schematically in the drawing merely to properly orient the hold-down construction which forms the subject of the present invention.

A common and convenient way of constructing a hold-down bar is to employ an ordinary structural channel such as is indicated at 14 in Fig. 2 and weld a steel plate 15 across the outer edges of the flanges of the channel to produce a unitary beam of box section. This beam or hold-down bar is mounted for vertical reciprocation in timed relation relative to the upper shear knife 12 in any desired manner, the hold-down feet meeting the work before the shear knife and subsequent lowering movement of the hold-down bar being absorbed by spring devices acting between the hold-down bar and the feet.

In Fig. 1, the upper portion of plate 15 of the hold-down bar is broken away to render the upper portions of the hold-down feet visible. The hold-down pins are designated 17 and are of generally cylindrical form, having reduced upward extensions 18 which are threaded at their upper extremities to receive securing and adjusting nuts 19 which limit their downward movement relative to hold-down bar 14, 15. The main body portions of hold-down pin 17 have vertical slide bearing in the lower flange of channel 14 and the reduced upper ends 18 are similarly slidable in the upper flange of channel 14.

The spacing of the lower ends of hold-down

pins 17 from bed 10 may be adjusted by means of nuts 19, such adjustment simultaneously varying the initial tension of compression coil springs 20 which encircle the reduced portions 18 of pins 17 and seat at their lower ends against the main body portions 17 of the pins and at their upper ends against the under side of the upper flange of channel 14. So much of the hold-down disclosed in the drawing as has thus far been described is entirely conventional, and the improvement forming the subject matter of the present invention will now be described.

A sleeve-like element 23 is slidably disposed over the lower end of each hold-down pin 17 and at its base portion has an outwardly extending and upwardly flaring flange 24 which may extend generally about the sleeve 23. In the illustrated form flange 24 is interrupted at the rear of sleeve 23 by a rearward extension 25 to which is secured a guard plate 26, as by means of screws 27. Guard plate 26 extends upwardly between the hold-down bar 14, 15 and upper shear knife 12 in all vertical positions of the hold-down bar and upper shear knife, and in this manner loosely restrains sleeve 23 against rotation without introducing any considerable frictional forces and without any tendency toward binding. As appears clearly from Fig. 1, the guard plate 26 at the rear of each sleeve 23 extends laterally in opposite directions to points where it almost meets the guard plates of the sleeves 23 lying at both sides of any given hold-down pin 17.

Flanges 24 of sleeves 23 rest continually on bed 10 even when the hold-down pins are in the upper position illustrated in Figs. 1 and 2, excepting when a work sheet is slid thereunder when they raise to the amount that they are cammed upwardly by the work sheet and then rest thereon. Sleeves 23 have through openings so that hold-down pins 17 are perfectly free to descend to a work sheet, one of which is shown at A in Fig. 2 in the conventional manner. It is believed obvious that there is substantially no likelihood of a workman accidentally getting his fingers beneath one of the hold-down pins. It would, in fact, require a deliberate raising of sleeve 23 with its auxiliary guard plate 26 by a workman to injure himself in this manner.

In addition to the hold-down pin guarding function of the present invention the plates 26 of the several sleeves 23 provide a substantially continuous guard in a plane between the hold-down feet and the movable shear knife to guard the workman from contact with the latter. In the illustrated form, guard plates 26 extend downwardly not quite to the bottoms of the sleeves 23 so that a workman has a certain amount of vision therebeneath to observe the cutting line if he desires to do so or if it is necessary to do so. It will be noted that the several guard plates 26 raise with sleeves 23 when a sheet is inserted beneath the flanges 24 and accordingly a uniform amount of vision beneath the lower edges of guard plates 26 is maintained regardless of the thickness of the sheet that is placed in position to be sheared.

What is claimed is:

1. In a shear having a work-receiving bed and an upper movable shear knife, a hold-down bar reciprocable to and from said bed, means on said bar for engagement against the upper surface of a work sheet to hold the same, said engaging means being normally spaced upwardly from the bed a distance sufficient to permit a sheet to be freely slid thereunder, and protective means comprising a guard normally resting on said bed and loosely surrounding said engaging means and being thus restrained against lateral displacement, said guard having an upwardly flaring lower portion to permit a sheet to be freely slid therebeneath when the work-engaging means is in raised position, and a vertical plate carried by said guard and extending upwardly between the hold-down bar and the movable shear knife to shield the latter.

2. In a shear having a work-receiving bed, and a shear knife reciprocable toward the bed, a hold-down bar reciprocable to and from said bed and having a work-engaging foot extending downwardly therefrom, hold-down guard means normally resting on said bed and extending loosely about said foot to be laterally restrained thereby, and a shear knife guard plate fixed to said hold-down guard means and extending upwardly between the hold-down bar and the shear knife.

3. In a shear having a work-receiving bed, and a shear knife reciprocable toward the bed, a hold-down bar reciprocable to and from said bed and having a work-engaging pin extending downwardly therefrom, hold-down guard means comprising a sleeve element normally resting on said bed and extending about said pin to be laterally restrained thereby, and a shear knife guard plate fixed to said sleeve element and extending upwardly between the hold-down bar and the shear knife to prevent rotation of the sleeve element about said pin and shield the reciprocable shear knife.

4. In a shear having a work-receiving bed, and a shear knife reciprocable toward the bed, a hold-down bar generally parallel to the shear knife and reciprocable to and from said bed and having a row of work-engaging feet therealong extending downwardly therefrom, hold-down guard means for each of said feet normally resting on said bed and extending loosely about each foot to be laterally restrained thereby, and a shear knife guard plate fixed to each hold-down guard means and extending upwardly between the hold-down bar and the shear knife.

5. In a shear having a work-receiving bed, and a shear knife reciprocable toward the bed, a hold-down bar generally parallel to the shear knife and reciprocable to and from said bed and having a row of work-engaging feet therealong extending downwardly therefrom, hold-down guard means for each of said feet normally resting on said bed and extending loosely about each foot to be laterally restrained thereby, and a shear knife guard plate fixed to each hold-down guard means and extending upwardly between the hold-down bar and the shear knife, each of said guard plates being of such width as to provide jointly with the other guard plates a substantially continuous guard along the shear knife.

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