Feb. 26, 1935. F. E. MUNSCHAUER 1,992,539

POWER SHEAR AND THE LIKE

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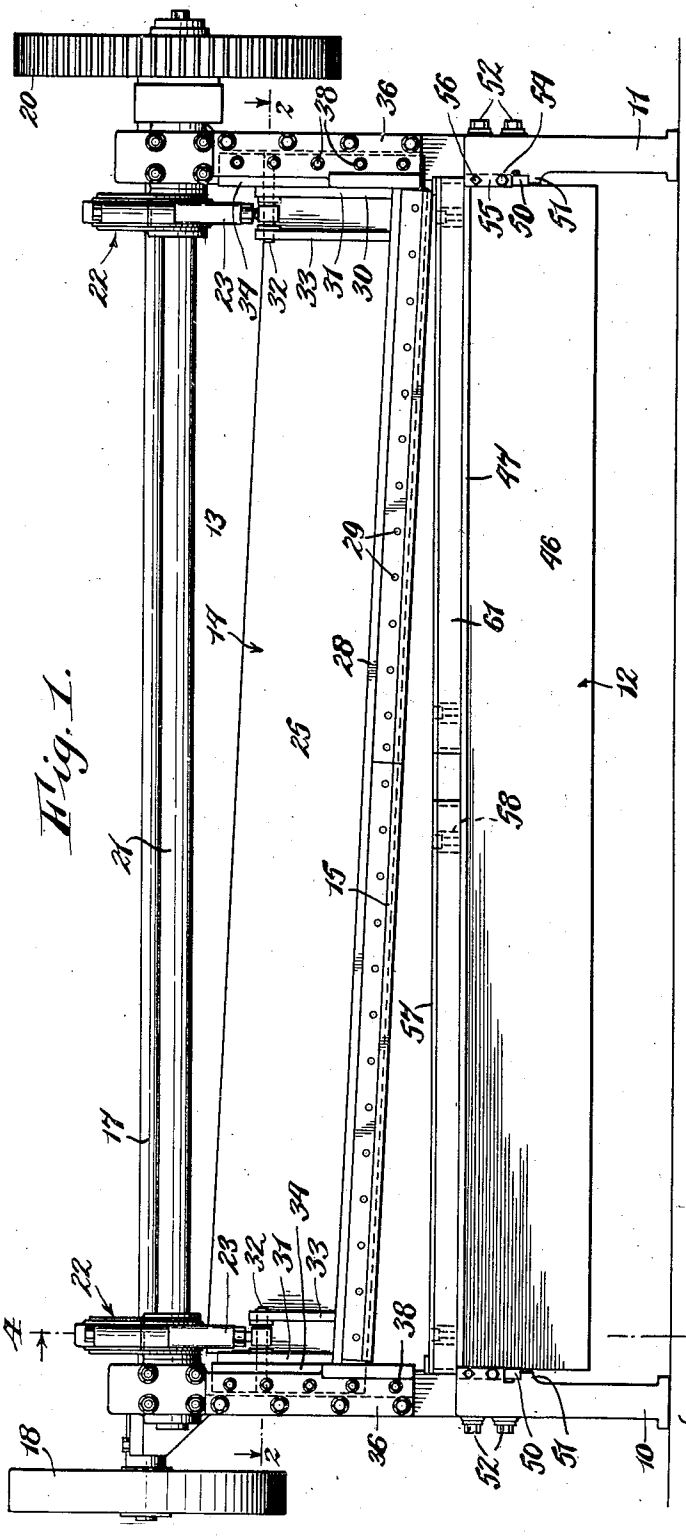


Fig. 1.

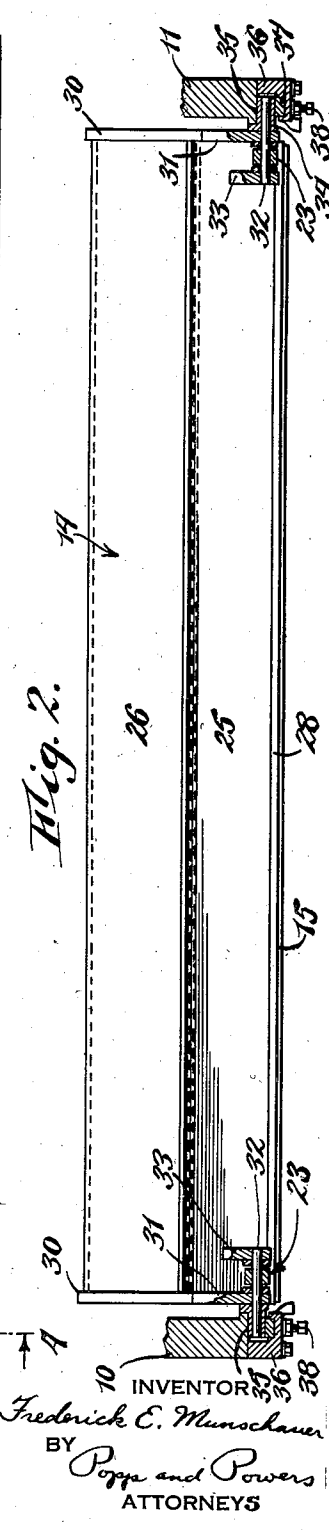


Fig. 2.

INVENTOR
Frederick E. Munschauer
BY Popp and Powers
ATTORNEYS

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Fig. 4.

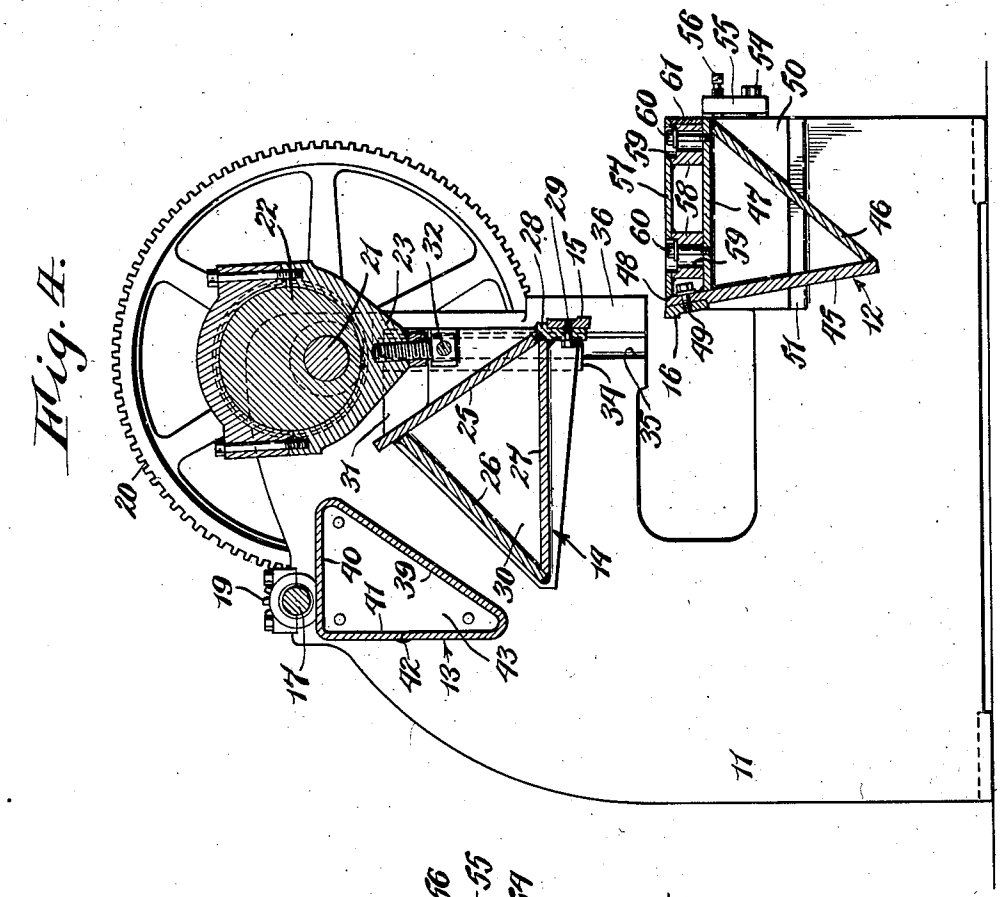
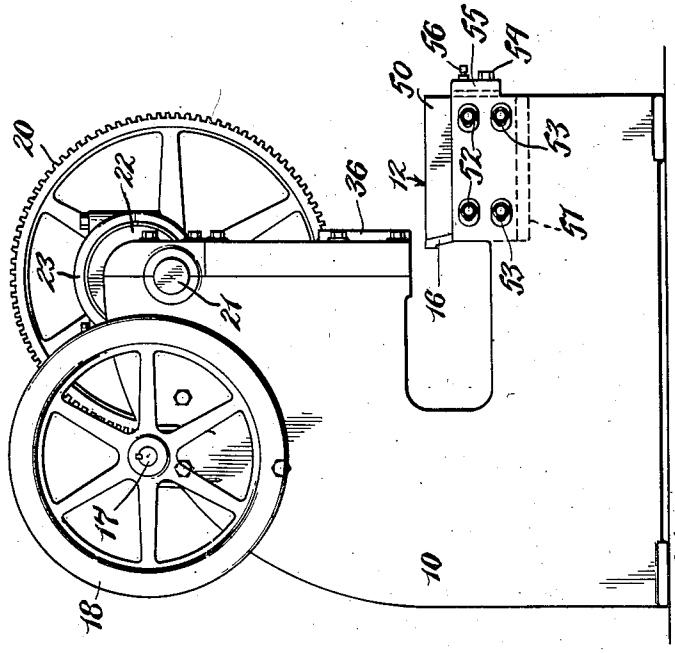


Fig. 3.



INVENTOR
Frederick C. Munschauer
BY Popp and Powers
ATTORNEYS

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POWER SHEAR AND THE LIKE

Frederick E. Munschauer, Buffalo, N. Y., assignor to Niagara Machine & Tool Works, Buffalo, N. Y., a corporation of New York

Application August 30, 1933, Serial No. 687,417

13 Claims. (Cl. 164—47)

This invention relates to a power shear and more particularly to the construction of the cross head, bed and cross bar in a power squaring shear for shearing metal plates.

One of the principal objects of this invention is to provide such a power shear in which the front plate of the vertically reciprocating cross head, which carries one of the knives is tilted backwards. This tilting of the front plate of the cross head permits of longer connections between the cross head and the overhead eccentric shaft without cutting into the cross head, since the tipping back of this plate allows room for the connections to swing and allows them to pass down in front of this plate. This tipping back of the front plate of the cross head also enables the operator to have much better vision since he can look down upon the sheets to be cut and accurately line up the markings on the sheet with the knives. The tilting back of the front plate also brings this plate parallel to the line of the principal torsional strains imposed on the cross head and thereby provides a cross head of greater torsional rigidity.

Another object of the present invention is to provide a cross head which is of hollow triangular construction in cross section. It has been found that such a construction is extremely strong torsionally and provides a construction which does not require a multiplicity of transverse ribs or partitions such as are required where the cross head is made of a rectangular section. It is essential, especially in a shear having a long knife, that the knife does not bend rearwardly through torsional yield of the cross head and where the cross head is of rectangular construction, as heretofore constructed, the partitions or transverse ribs were necessary in order that the rectangular section retain its original form under operating strains.

Another object of the present invention is to provide such a shear in which the cross bar between the upper ends of the two end standards are also of triangular form in cross section. A cross bar of this form is not only stronger and more rigid than the cross bars heretofore used but also conforms to the triangular cross head and thereby provides an extremely compact construction, these parts moving toward and from one another during the operation of the shear.

Another object of the present invention is to provide a bed which is also of triangular hollow form in cross section so as to obtain greater rigidity, this bed carrying the lower or stationary knife. With this form of bed the same advantages, so far as torsional strength is concerned, are obtained as with the cross head.

Another object of the present invention is to provide a construction of cross head, cross bar and bed which can be made of welded or rolled construction in contradistinction to the cast metal parts now employed in long shears.

In the accompanying drawings:

Fig. 1 is a front elevation of a power shear embodying my invention.

Fig. 2 is a horizontal fragmentary section, taken on line 2—2, Fig. 1.

Fig. 3 is an end elevation viewed from the left hand of Fig. 1.

Fig. 4 is a vertical transverse section, taken on line 4—4, Fig. 1.

The shear shown consists of standards 10 and 11 which are connected by a bed 12 and a transverse bar 13. These standards also carry a vertical reciprocating cross head 14 carrying the knife 15 which cooperates with a stationary knife 16 on the bed 12. The standards 10 and 11 also carry a drive shaft 17, at one end of which is arranged the driving pulley 18 and at the other end a pinion 19 which meshes with the large gear 20. The gear wheel 20 is fast on an eccentric shaft 21, which is journaled in the standards 10 and 11 and carries a pair of eccentrics 22. These eccentrics are connected by straps 23 with the cross head 14 so that as the eccentric shaft 21 turns, the cutter head is reciprocated vertically, this cutter being suitably guided in the end heads 10 and 11 as hereinafter more fully set forth.

The reciprocating cross head 14 includes a front plate 25 which, as best shown in Fig. 4, is tilted backwardly. At its upper end this front plate is shown as welded to a rear plate 26 which extends downwardly and rearwardly and at its lower end is shown as welded to a bottom plate 27. The front edge of the bottom plate 27 and the lower edge of the front plate 25 are shown as welded to a knife holder 28 which extends downwardly and carries the movable knife 15, this knife being secured by means of cap screws 29 or by any other usual and well known means. The opposite ends of the triangular structure so formed are shown as closed by vertical end plates 30 to which the plates 25, 26 and 27 are welded or otherwise secured. The front part of each of the end plates 30 is extended forwardly, as indicated at 31 and through each of these end plates 30 a transverse pin 32 extends. Each of these pins also extends through vertical triangular plates 33 which are welded or otherwise suitably

secured to the front plate 25 and extend forwardly therefrom in spaced relation to the corresponding end plates 30. Between each of the triangular plates 33 and the end plates 30 the corresponding eccentric strap 23 connects with the pin 28. The pins 32 project outwardly from the side plates 30 of the cross head and into vertical slide blocks 34. These slide blocks are of substantial height and slide in slideways 35 formed by the corresponding standard 10 or 11 and guides 36 which are removably secured to the standards. A wear strip 37 is preferably interposed between each of the guides 36 and the corresponding block 35 and this wear strip is preferably adjustable by set screws 38 in the guide 36, which set screws are adapted to bear against the wear strip 37.

It is therefore apparent that as the eccentric shaft 21 turns its eccentrics reciprocate the guided cross head 14 vertically thereby shearing the sheet of metal placed on the bed 12 between the knives 15 and 16. It is also apparent that long connections can be used between the eccentric shaft 21 and the cross head 14 inasmuch as the tilting back of the front plate 25 of the cross head allows ample room for these connections to swing. It will also be observed that by tilting back the front plate 25 of the cross head the operator can readily look directly down along the line of the metal plate being cut and thereby readily line gage markings up with the knives. This would not be true if the front plate 25 of the cross head were vertical. The triangular construction of the cross head also provides a cross head which is extremely strong torsionally and does not require the ribs or partitions which are necessary in a cross head of rectangular section. Moreover, by tilting back the front plate 25 of the triangular cross head the torsional strains which are upward and rearward from the knife 15 are parallel with the front plate 25 and therefore the tilting back of the front plate 25 increases the torsional rigidity of the cross head.

The cross bar 13 is also of triangular form in cross section with its underside tilted rearwardly and downwardly so as to conform with the inclination of the rear plate 26 of the cross head 14 thereby permitting these plates to come close together without interference and enabling the use of the maximum size for both the cross head and the cross bar. The cross bar 13 is shown as comprising a metal plate which is shown as formed to provide a lower wall 39, an upper wall 40 and a rear wall 41. The edges of this plate are shown as brought together and welded at 42. The opposite ends of the triangular tubular body thus formed are shown as welded to end plates 43 and these end plates are bolted or otherwise secured to the adjacent faces of the end standards 10 and 11.

With the triangular form of cross bar 13 shown, it is apparent that the cross bar is extremely rigid and that also by inclining the front or lower wall of this cross bar it conforms to the triangular shape of the reciprocating cross head 14 so that the cross head can reciprocate close to the cross bar without interference.

The bed 12 is also of triangular construction and includes a rear plates 45 which preferably, although not necessarily inclines forwardly and downwardly. This plate is shown as welded at its lower edge to a front plate which inclines forwardly and upwardly and the upper edge of the front plate 46 is shown as welded to the front edge of a horizontal bed plate 47. The rear edge of this bed plate 47 is welded to the front side of the rear plate 45 so that the upper edge 48 of this rear plate 45 rises above the bed plate and forms a holder for the stationary knife 16, this knife being preferably secured by cap screws 49 which screw into the blade 16 from the front side of the rear plate 45. The triangular structure thus formed is provided with rectangular end plates 50 at its opposite ends, these end plates being horizontally disposed and being shown as welded to the plates 45, 46 and 47. These end plates 50 rest on supporting guides 51 which are formed integrally with the standards, as best shown in Figs. 1 and 4. The end plates are adjustably supported on the supporting guides 51 and for this purpose bolts 52 extend through horizontal slots 53 in the end standards and at their inner ends are secured to the end plates 50. The slots 53 permit the bed to the moved forwardly and rearwardly to obtain the desired clearance between the knives. This adjustment of the bed is effected by an adjusting screw 54 which is carried by a lug 55 on the front side of each of the standards 10 and 11 and is connected to the corresponding end plate 50 so as to draw the bed forwardly. A set screw 56 is also provided in each of the lugs 55 to move the bed in the opposite direction.

In order to obtain access to the cap screws 48 which hold the knife 16 and in order to bring the upper face of the bed flush with the upper edge of the knife 16 a movable bed plate 57 is mounted on the bed plate 47. This movable bed plate is spaced above the bed plate 47 by a plurality of blocks 58 to which the plate 57 is welded. Fore and aft slots 59 extend vertically through the blocks 58 and the plate 57 and in these slots are arranged countersunk cap screws 60 which screw into the bed plate 47 and hold the movable bed plate 57 in any desired adjusted fore and aft position. To the front edge of the movable bed plate 57 is also welded a front plate 61 to which extending brackets (not shown) can be secured, the purpose of these brackets being to support the sheet and carry a gage. By making the bed 12 of triangular form in cross section the same advantages, so far as torsional strains are concerned, are obtained as are obtained with the triangular form of cross head and at the same time the bed can be made of lighter construction, thereby making it easier to move.

While welded constructions have been illustrated, it is apparent that a welded construction is not essential to my invention and that the cross head, transverse bar and bed could all be made of cast iron, cast steel or a fabricated construction other than welding. The invention is therefore not to be construed as confined to a welded construction or any other details except as limited in the following claims.

From the foregoing it is apparent that the present invention provides a very compact power shear in which the cross head, transverse bar and bed are of triangular form in cross section so as to obtain the greatest degree of torsional strength and at the same time permits of long connections between the overhead eccentric shaft and the cross head thereby permitting the eccentric shaft to be lowered relative to the bed and reducing the height of the shear. The triangular form of both the reciprocating cross head and the transverse bar also permits the cross head to move close to the transverse bar without striking the same. By inclining the front plate of the cross head the operator is enabled to look directly down along the line of cutting thereby enabling him to accu-

rately gage the work with reference to the blades. All adjustments are also readily accessible thereby enabling the shear to be readily adjusted for different work as conditions may require.

It will be apparent that all of the advantages set forth with respect to an overhead shaft type of press apply equally to an underdrive type machine in which the main shaft is arranged under the cross head, except, of course, the advantage obtained by tipping or slanting the front plate of the cross head to permit closer approach of the cross head to the overhead shaft. Except as limited in certain of the following claims, the invention is not to be construed as limited to an overhead shaft type of machine, but is equally applicable to an underdrive type.

I claim as my invention:

1. In a machine tool of the character described, a horizontal bed, a horizontal cross head above said bed and guided for vertical rectilinear movement relative to said bed and carrying a tool at its bottom front edge, said tool being adapted to engage the work on said bed and said cross head having a front wall inclining upwardly and rearwardly from said bottom front edge and tool, said front wall being thereby inclined backwardly when said tool is in engagement with said work so as to permit the operator to aline the same accurately by permitting an unobstructed view, directly downwardly, on the tool while engaging the work and said front wall being held at a constant angle to the vertical in all positions of said cross head.

2. In a machine tool of the character described, a frame having a bed, an overhead eccentric shaft, a vertically reciprocating cross head guided in said frame between said shaft and bed and having an upwardly and rearwardly inclined front wall and eccentric straps carried by said eccentric shaft and connected to said cross head at places in advance of said inclined front wall.

3. In a machine tool of the character described, a frame having a bed, an overhead eccentric shaft, a vertically reciprocating tubular cross head guided in said frame between said shaft and bed and having an upwardly and rearwardly inclined front wall, end plates for said tubular cross head, eccentric straps carried by said eccentric shaft and each connected to said end plates in advance of said inclined front wall, a shearing knife carried at the lower advance edge of said front wall and a stationary shearing knife arranged adjacent said bed and cooperating with the knife on said cross head.

4. In a machine tool of the character described, a reciprocating cross head of tubular triangular form in cross section.

5. In a machine tool of the character described, a reciprocating cross head of tubular triangular form in cross section, the front wall of said cross head being inclined rearwardly and upwardly.

6. In a machine tool of the character described, a reciprocating cross head of tubular triangular form in cross section, the front wall of said cross head being inclined rearwardly and upwardly and the lower wall being arranged substantially horizontal in one view.

7. In a machine tool of the character described, a frame having a bed, an overhead eccentric shaft, a vertically reciprocating tubular cross head of triangular form in cross section guided in said frame between said shaft and bed and having an upwardly and rearwardly inclined front wall, eccentric straps carried by said eccentric shaft and connected to said cross head in advance of said front wall, a knife holder at the lower edge of said front wall, a knife carried by said knife holder and a stationary knife arranged adjacent said bed and cooperating with said first named knife.

8. In a machine tool of the character described, end standards, a cross bar connecting said end standards and a reciprocating cross head carried by said end standards, said cross bar being of tubular triangular form in cross section.

9. In a machine tool of the character described, end standards, a cross bar connecting said end standards, a tubular cross head of triangular form in cross section carried by said end standards and reciprocable toward and from said cross bar, said cross bar being of tubular triangular form in cross section and the adjacent walls of said cross head and cross bar being substantially parallel.

10. In a machine tool of the character described, a frame, and a bed carried by said frame, said bed being of tubular triangular form in cross section.

11. In a machine tool of the character described, a frame and a bed carried by said frame, said bed being of tubular triangular form in cross section and the upper wall thereof being horizontally disposed.

12. In a machine tool of the character described, a frame, a vertically reciprocating cross head carried by said frame, a knife carried by said cross head, a bed supported at its ends in said frame, said bed being of tubular triangular form in cross section and the upper wall thereof being horizontally disposed, the rear wall of said bed rising above said upper wall and a knife carried by the said upward extension of said rear wall and cooperating with the knife of said cross head.

13. In a machine tool of the character described, a frame, a vertically reciprocating cross head carried by said frame, a knife carried by said cross head, a bed supported at its ends in said frame, said bed being of tubular triangular form in cross section and the upper wall thereof being horizontally disposed, the rear wall of said bed rising above said upper wall, a knife carried by the said upward extension of said rear wall and cooperating with the knife of said cross head and a movable bed carried by said first bed and having an upper plate substantially flush with the said upward extension of said rear wall.

FREDERICK E. MUNSCHAUER.