June 7, 1960 E. W. PEARSON 2,939,358

LEDGER BLADE ADJUSTMENT MEANS FOR SHEAR MACHINE

Filed Aug. 15, 1955 3 Sheets-Sheet 1

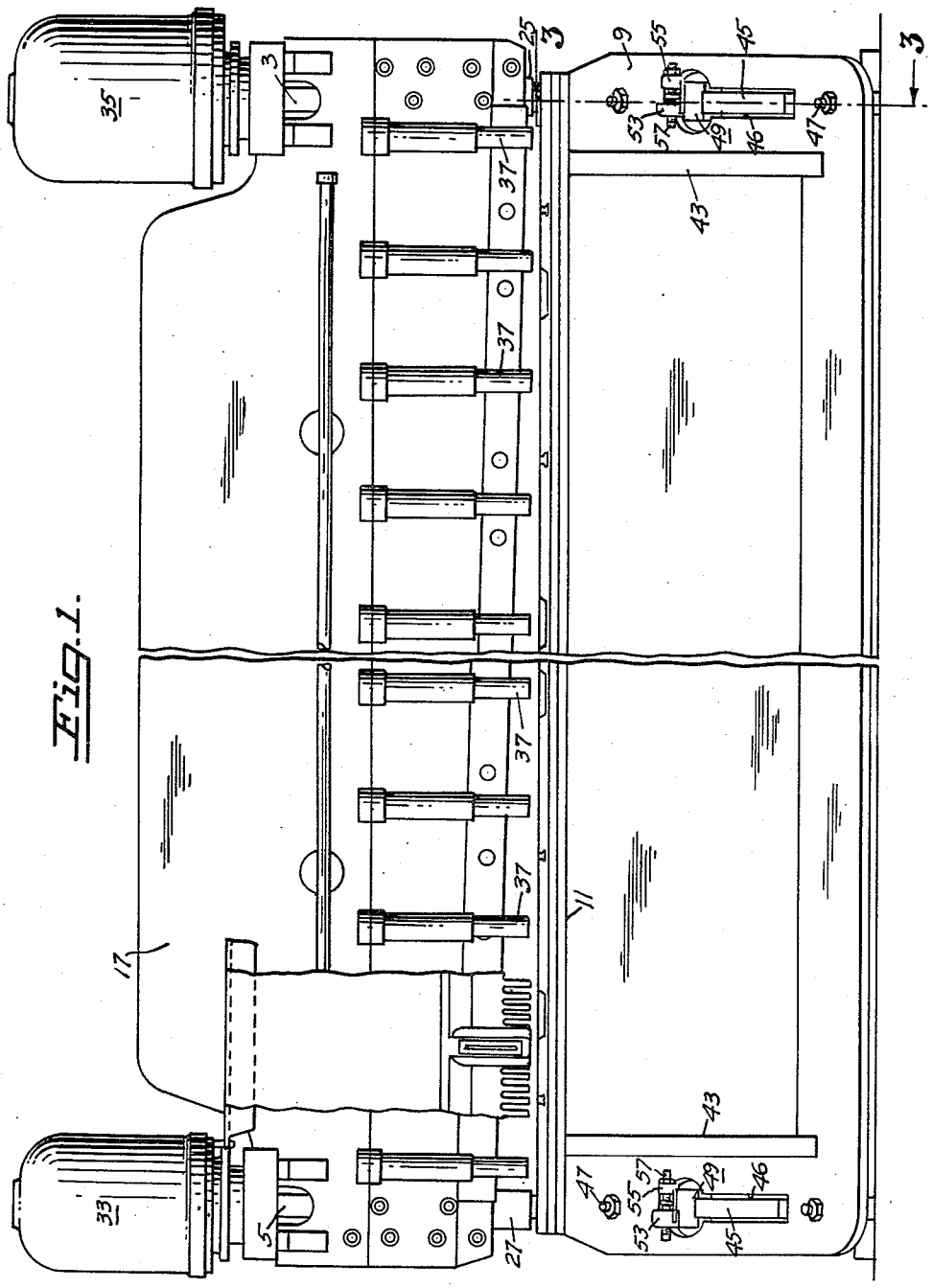


Fig. 1.

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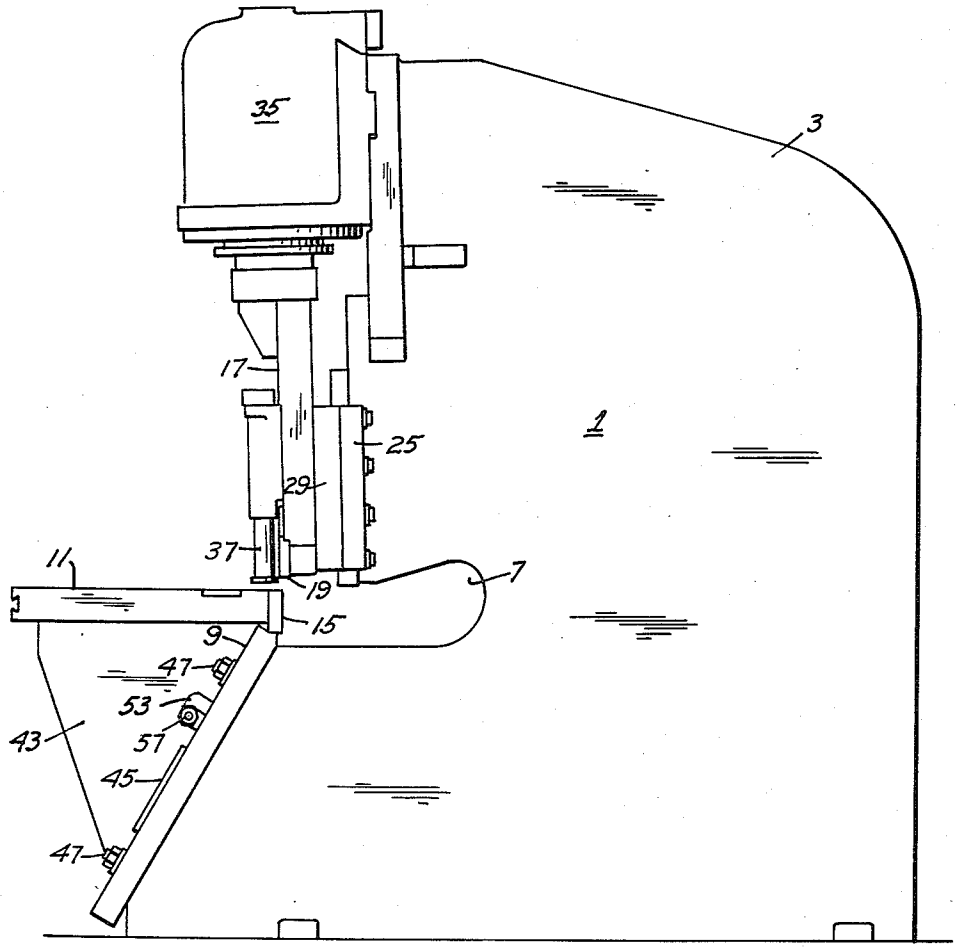


Fig. 2.

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LEDGER BLADE ADJUSTMENT MEANS FOR SHEAR MACHINE

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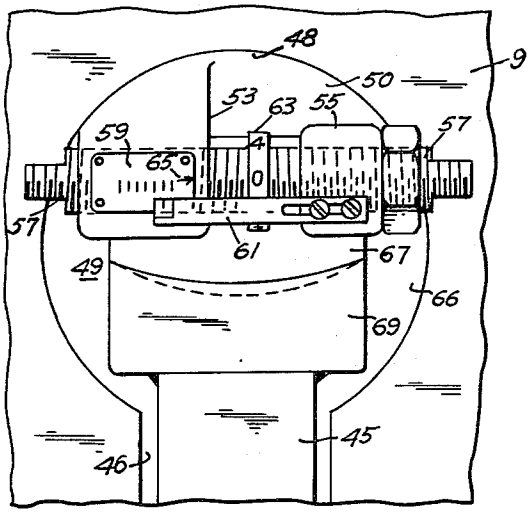


Fig. 4.

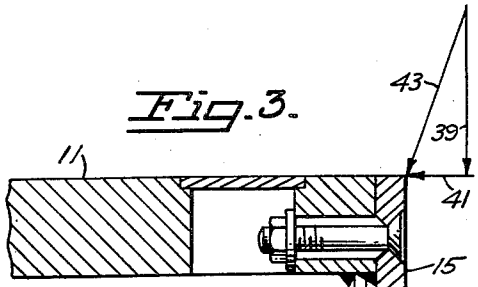


Fig. 3.

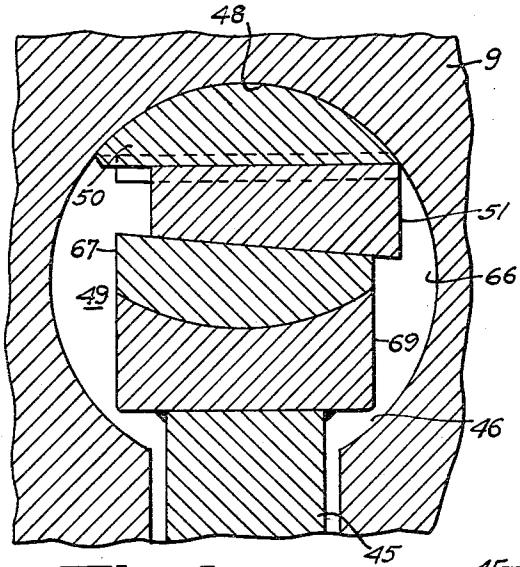
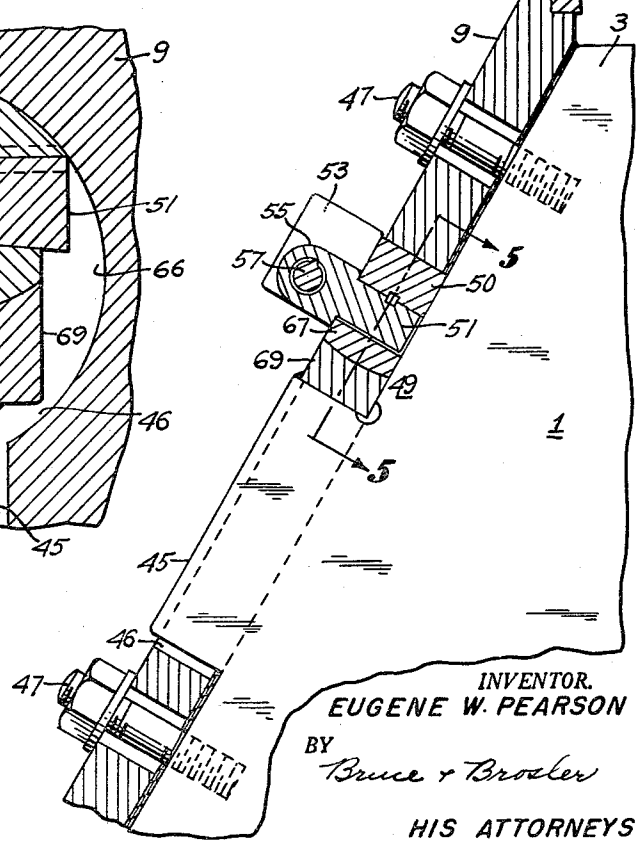


Fig. 5.



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2,939,358

LEDGER BLADE ADJUSTMENT MEANS FOR SHEAR MACHINE

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Filed Aug. 15, 1955, Ser. No. 528,396

9 Claims. (Cl. 83—641)

My invention relates to a shear or like machine, and more particularly to a knife adjustment therefor.

In cutting metal with a shear machine, clearance must exist between the cutting knives, the degree of clearance being usually determined by the minimum thickness of metal to be sheared. The knives, therefore, must be adjustable relative to each other to enable proper clearance to be obtained.

In practice, only one of the knives is made adjustable, such knives usually being the lower or stationary one, which is attached to the work bed or table.

Another problem confronting manufacturers of metal shears or like machines of the type under consideration, is created by the fact that during shearing, the knives in addition to the vertical forces exerted thereon, are also exposed to heavy horizontal components of force tending to spread them, and this must be taken into account in creating a machine capable of adequately withstanding such forces, while, at the same time, providing for such relative adjustments of the knives.

Among the objects of my invention are:

(1) To provide a novel and improved metal shear;

(2) To provide a shear machine having a novel and improved knife adjustment;

(3) To provide a shear machine having a novel and improved knife adjustment which is both simple and accurate;

(4) To provide a metal shear having a novel and improved knife adjustment which will withstand the heavy stresses developed during a shearing operation;

(5) To provide a shear machine having a novel and improved lower knife support;

(6) To provide a shear machine having a novel and improved lower knife support which will more effectively resist horizontal components of forces developed against the lower knife during a shearing operation;

(7) To provide a shear machine having a lower knife adjustment compatible with a lower knife support capable of effectively resisting the horizontal forces developed during a shearing operation.

Additional objects of my invention will be brought out in the following description of a preferred embodiment of the same, taken in conjunction with the accompanying drawings, wherein

Figure 1 is a front view in elevation of a shear machine embodying the present invention;

Figure 2 is a side view in elevation of the shear machine of Figure 1;

Figure 3 is a fragmentary view in section, through the adjusting mechanism of the present invention;

Figure 4 is a front view of such adjusting mechanism;

Figure 5 is a view in section taken in the plane 5—5 of Figure 3.

Referring to the drawings for details of my invention, the same is shown incorporated into a hydraulically powered shear machine comprising a frame 1 involving a

pair of spaced side walls 3 and 5, each formed with a relatively deep throat 7 in the front edge thereof.

Joining the side walls along the front edges below the throats, is a front wall 9 constituting a component of a work table assembly in which the table 11 extends outwardly from the front wall along its upper edge.

The front wall and table at the junction thereof, is recessed to receive a stationary knife 15.

The front edge portions of the side walls above the throats are set back somewhat to permit of supporting a ram 17 which carries the upper knife 19 of the machine in proper relationship to the fixed or stationary knife 15.

For the purpose of mounting the ram for movement, a pair of ways 25 are affixed to the upper front edges of the side walls, and the ram is slidably mounted on them by guide channels 29 affixed to the rear side of the ram and in engagement with the ways.

The operating movements of the ram are controlled hydraulically in the machine under consideration by a system including a left cylinder assembly 33 and a right cylinder assembly 35, fixed to the upper front edges of the side walls of the machine housing and coupled to the ram. Thus each end of the ram will be powered by one of these cylinder assemblies.

The work to be sheared is held to the work table by hold down means involving a plurality of hydraulically operated pistons 37. These hold down devices function in accordance with the disclosure in application for Hydraulically Powered Machine, Serial No. 439,394, filed June 25, 1954, in which I appear as a joint inventor. Inasmuch as these hold down devices do not form part of the present invention, further description thereof is not deemed necessary.

An analysis of the forces developed against the fixed knife during shearing, establishes the fact that in addition to a downward force 39, a lateral or horizontal thrust component 41 is created. The combination of the two produces a resulting force 43 at an angle to the vertical.

Insofar as supporting the lower or fixed knife in shear machines of the prior art is concerned, such knife is conventionally installed in a table assembly of which the front wall is disposed across vertical edges of the side walls of the machine and bolted thereto.

Departing from this practice and constituting one aspect of the present invention, the front wall of the table assembly is mounted on an angle of the order of 30 degrees with the vertical, preferably by extending the side walls of the machine to the front thereof and terminating them at the proper angle. With the table at a complementary angle of the order of 60 degrees to the front wall, it is rigidly maintained by gussets 43 welded into position between the front wall and the table.

By slidably mounting the table assembly on these sloping edges, any adjustment of the table assembly thereon, will involve a horizontal component of movement, and this in turn permits horizontal adjustment of the lower knife with respect to the upper knife, whereby the desired clearance may be realized.

In accomplishing the foregoing results and advantages, each of the table assembly supporting walls is provided on its edge with an abutment lug 45.

The front wall adjacent each end thereof is provided with a slot 46 of a size to loosely receive the abutment lug of its associated supporting wall, the slot being of sufficiently greater length than the abutment lug to permit of sliding adjustment of the table assembly on the sloping edges of the supporting walls. The holes for the mounting bolts 47 must be elongated accordingly, to permit of such adjustment. Any such adjustment of the table assembly, involving as it does, a horizontal component of motion, results in a corresponding alteration in

the clearance between the fixed knife and the movable knife of the machine.

Actual adjustment of the table assembly is accomplished by positioning within the upper portion of each of the slots, means for altering the spacing between the abutment lug **45** and the edge **48** defined by the upper end of the slot **46**.

This space altering means involves basically a bearing block **49** welded to the upper end of the abutment lug, a bearing pad **50** engaging the upper edge of the slot in spaced relationship to the bearing block, with one or both opposing surfaces angled slightly, and a wedge **51** adapted to be driven between the bearing block and the bearing pad.

Controlled movement of the wedge in making adjustments, is quite necessary, as the movement at one end of the front wall must be duplicated at the other end with substantial accuracy. Toward this objective the bearing pad is formed with a lug **53**, while the wedge is similarly provided with a lug **55** in substantial horizontal alignment with the other. These lugs have threaded passages therethrough on a common axis, to receive an adjusting screw **57**, the threads in one passage being right-handed threads while those in the other are lefthanded threads, whereby rotation of the screw will enable controlled relative movement between the wedge and the bearing pad in either direction, depending on the direction of rotation of the screw.

Positional adjustments of the work table and affixed knife, as produced by such movements of the wedge at each end of the table assembly, may be indicated by affixing a graduated name plate **59** on the bearing pad lug and an indicating strip **61** on the wedge having an indicator marking thereon. This indicating strip is adjustably affixed to the wedge lug to permit of an accurate setting thereof with respect to the associated scale, which scale may be marked off in terms of one graduation per turn of the adjusting screw or any other suitable designations.

Finer adjustments may be read on a ring **63** encircling the screw, which ring may be divided into say five equal parts and read in conjunction with a reference arrow **65** on the lug of the bearing pad. Each graduation on the ring will thus represent one-fifth of the distance between markings of the scale.

With both adjusting screws coupled to one another across the front of the machine, so that adjustment of one will provide simultaneous corresponding adjustments at the other end of the machine, both ends of the table assembly should move simultaneously and with essentially no tilting of the table assembly.

On the other hand, however, where the adjustments at each end of the table assembly are made independently of the other, a slight tendency of the table assembly to tilt during the making of such adjustments will occur.

To take care of this type of situation, the upper end **66** of each slot is made circular; the bearing block is provided with an upper portion **67** in complementary contact with a lower portion **69** on a spherical surface; and the bearing pad **50** is shaped to provide complementary contact with the upper end of the slot along an arcuate surface.

To maintain alignment under load, the wedge is preferably keyed to the bearing pad.

Having the front wall set at an angle as described, is highly desirable from another viewpoint, namely that of structurally strengthening the machine to more effectively resist the horizontal components of force developed during loading, and this with essentially little if any change in the quantity of material involved.

This is attributable to a shift in the principal axis of inertia to a position more nearly in line with the resultant loading force **43** and the minor axis more nearly in line with the horizontal component of force **41**, which one seeks to resist in order to stabilize the fixed knife under load. In other words, the smaller angular relationship between the work table and front wall, creates a composite beam better able to withstand such forces than the right angle relationship which previously existed in the prior art. Significantly, the improved construction is compatible with the knife adjusting feature of the present invention.

It will be apparent from the foregoing that the present invention fulfills the objects previously set forth, and while I have illustrated and described the same in its preferred form, the invention is subject to modification and alteration without departing from the underlying principles involved. I accordingly do not desire to be limited in my protection to the specific details so illustrated and described except as may be necessitated by the appended claims.

I claim:

1. In a machine embodying a fixed substantially horizontal fixed element of substantial length and a movable element co-operating therewith to perform a change on a piece of work, means for supporting said fixed element comprising a pair of mounting walls extending to the front of said machine and terminating in sloping front edges, and a front wall spanning said mounting walls in the area of the sloping front edges, the upper edge of said front wall supporting said fixed element; and means for adjustably affixing said front wall on said mounting walls to adjustably affixing said front wall on said mounting walls to adjustably alter the relationship between said fixed and movable elements, said means including an abutment lug on each of said mounting walls, said front wall having adjacent each end, a slot of greater length than and adapted to loosely receive one of said lugs to permit of limited sliding movement of each end of said front wall along the sloping edge of the associated supporting wall, means for adjusting the spacing between the upper end of an abutment lug and the edge defined by the upper end of that slot in which said abutment lug is located, said means including a bearing block at the upper end of said abutment lug, a bearing pad in engagement with the upper edge of said slot, and means for altering the spacing between said bearing block and said bearing pad.

2. In a machine embodying a fixed substantially horizontal fixed element of substantial length and a movable element co-operating therewith to perform a change on a piece of work, means for supporting said fixed element comprising a pair of mounting walls extending to the front of said machine and terminating in sloping front edges, and a front wall spanning said mounting walls in the area of the sloping front edges, the upper edge of said front wall supporting said fixed element; and means for adjustably affixing said front wall on said mounting walls to adjustably alter the relationship between said fixed and movable elements, said means including an abutment lug on each of said mounting walls, said front wall having adjacent each end, a slot of greater length than and adapted to loosely receive one of said lugs to permit of limited sliding movement of each end of said front wall along the sloping edge of the associated supporting wall, means for adjusting the spacing between the upper end of an abutment lug and the edge defined by the upper end of that slot in which said abutment lug is located, said means including a bearing block at the upper end of said abutment lug, a bearing pad in engagement with the upper edge of said slot, and a wedge snugly fitting between said bearing block and said bearing pad.

3. In a machine embodying a fixed substantially horizontal fixed element of substantial length and a movable element cooperating therewith to perform a change on a piece of work, means for supporting said fixed element comprising a pair of mounting walls extending to the front of said machine and terminating in sloping front edges making an angle of the order of 30 degrees with the vertical, and a front wall spanning said mounting

walls in the area of the sloping front edges, the upper edge of said front wall supporting said fixed element; and means for adjustably affixing said front wall on said mounting walls to adjustably alter the relationship between said fixed and movable elements, said means including an abutment lug on each of said mounting walls, said front wall having adjacent each end, a slot of greater length than and adapted to loosely receive one of said lugs to permit of limited sliding movement of each end of said front wall along the sloping edge of the associated supporting wall, means for adjusting the spacing between the upper end of an abutment lug and the edge defined by the upper end of that slot in which said abutment lug is located, said means including a bearing block at the upper end of said abutment lug and forming a part thereof, a bearing pad in engagement with the upper edge of said slot, a wedge snugly fitting between said bearing block and said bearing pad, means for altering the position of said wedge, said means including a pair of horizontally aligned lugs, one on said bearing pad and one on said wedge, said lugs having threaded passages therethrough on a common axis with the threads in the other passage, and an adjusting screw having corresponding threads, threaded in said passages.

4. In a machine embodying a fixed substantially horizontal fixed element of substantial length and a movable element cooperating therewith to perform a change on a piece of work, means for supporting said fixed element comprising a pair of mounting walls extending to the front of said machine and terminating in sloping front edges making an angle of the order of 30 degrees with the vertical, and a front wall spanning said mounting walls in the area of the sloping front edges, the upper edge of said front wall supporting said fixed element; and means for adjustably affixing said front wall on said mounting walls to adjustably alter the relationship between said fixed and movable elements, said means including an abutment lug on each of said mounting walls, said front wall having adjacent each end, a slot of greater length than and adapted to loosely receive one of said lugs to permit of limited sliding movement of each end of said front wall along the sloping edge of the associated supporting wall, means for adjusting the spacing between the upper end of an abutment lug and the edge defined by the upper end of that slot in which said abutment lug is located, said means including a bearing block at the upper end of said abutment lug and forming a part thereof, a bearing pad in engagement with the upper edge of said slot, a wedge snugly fitting between said bearing block and said bearing pad, means for altering the position of said wedge, said means including a pair of horizontally aligned lugs, one on said bearing pad and one on said wedge, said lugs having threaded passages therethrough on a common axis with the threads in one passage reversed with respect to the threads in the other passage, an adjusting screw having corresponding threads, threaded in said passages; and means for indicating wedge adjustments in terms of the relationship between said fixed and movable elements.

5. In a machine, embodying a fixed substantially horizontal fixed element of substantial length and a movable element cooperating therewith to perform a change on a piece of work, means for supporting said fixed element comprising a pair of mounting walls extending to the front of said machine and terminating in sloping front edges making an angle of the order of 30 degrees with the vertical, and a front wall spanning said mounting walls in the area of the sloping front edges, the upper edge of said front wall supporting said fixed element; and means for adjustably affixing said front wall on said mounting walls to adjustably alter the relationship between said fixed and movable elements, said means including

an abutment lug on each of said mounting walls, said front wall having adjacent each end a slot of greater length than and adapted to loosely receive one of said lugs to permit of limited sliding movement of each end of said front wall along the sloping edge of the associated supporting wall, means for adjusting the spacing between the upper end of an abutment lug and the edge defined by the upper end of that slot in which said abutment lug is located, said means including a bearing block at the upper end of said abutment lug and forming a part thereof, a bearing pad in engagement with the upper edge of said slot, a wedge snugly fitting between said bearing block and said bearing pad, means for altering the position of said wedge, said means including a pair of horizontally aligned lugs, one on said bearing pad and one on said wedge, said lugs having threaded passages therethrough on a common axis with the threads in one passage reversed with respect to the threads in the other passage, an adjusting screw having corresponding threads, threaded in said passages; means for indicating wedge adjustments in terms of the relationship between said fixed and movable elements; and means permitting slight tilting of said front wall while making individual end adjustments, said means involving said bearing block having an upper portion in complementary contact with a lower portion on a spherical surface and a bearing pad having a complementary contact with the upper edge of said slot along an arcuate surface.

6. In a shearing machine having a vertically movable knife cooperating with a substantially horizontal fixed knife of substantial length and also having a horizontal work table provided with an upper surface substantially flush with the upper surface of said fixed knife, a combination of means for supporting said movable knife, said fixed knife, and said table comprising: a frame movably carrying said movable knife and including a pair of side frame walls extending to the front of said machine and terminating in front edges inclined at an acute angle to the vertical; a front wall parallel to and spanning and supported on said front edges, said front wall having an upper edge supporting said fixed knife along substantially the entire length thereof; means for supporting said table on and in fixed relation to said front wall, said front wall being approximately in line with the resulting thrust of said fixed knife when material is being sheared between the knives; means including opposing abutments on said front edges and on said front wall for transmitting said thrust to said side frame walls; and means between said abtuments for adjustably displacing said front wall along said edges to thereby adjust a clearance between said knives.

7. The structure defined in claim 6 in which the angle is of the order of 30°.

8. The structure defined in claim 6 in which the abutments include an abutment lug on each of said front edges received in a slot of greater length in the front wall.

9. The structure defined in claim 8 in which the displacing means is disposed between the upper end of each lug and the upper edge of its corresponding slot.

References Cited in the file of this patent

UNITED STATES PATENTS

421,537	Aiken	Feb. 18, 1890
1,529,971	Vance	Mar. 17, 1925
1,636,538	Whipple	July 19, 1927
1,885,438	Hazelton	Nov. 1, 1932
1,890,095	Pullan	Dec. 6, 1932
1,992,539	Munschauer	Feb. 26, 1935
2,397,896	Wehr	Apr. 2, 1946