Feb. 27, 1940. C. J. BATH 2,191,826

SHEARS AND THE LIKE

Filed Nov. 7, 1936 2 Sheets-Sheet 1

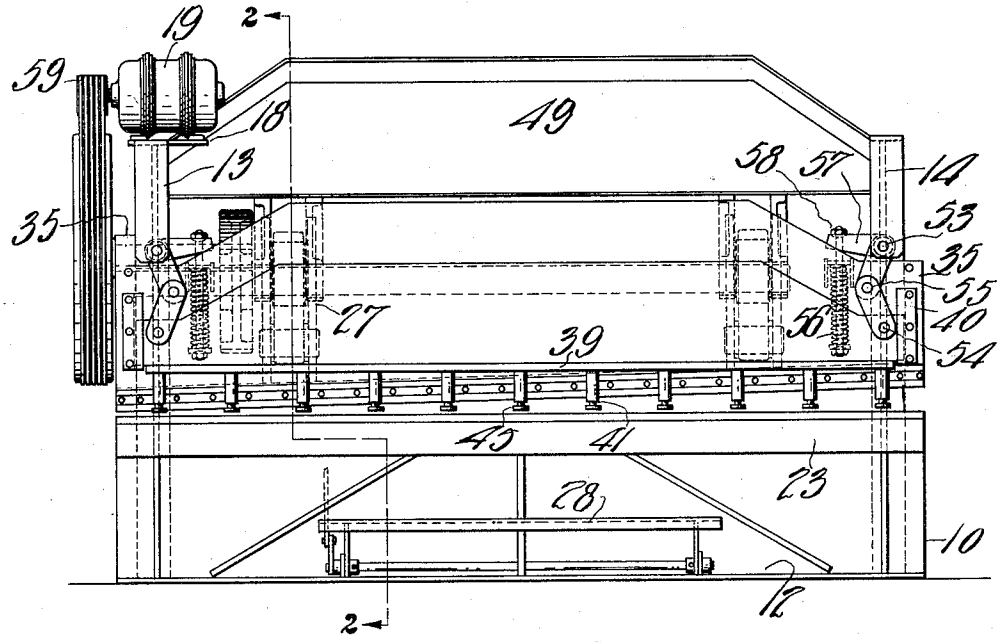


FIG.-1

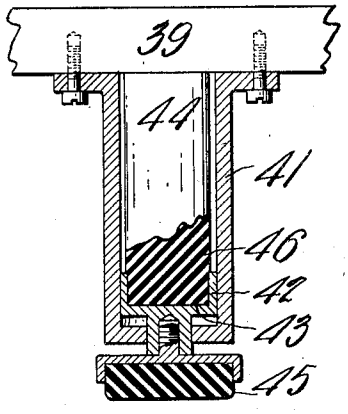


FIG.-3

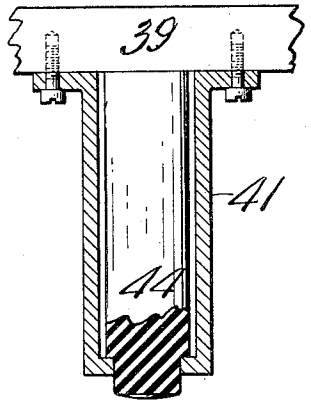


FIG.-4

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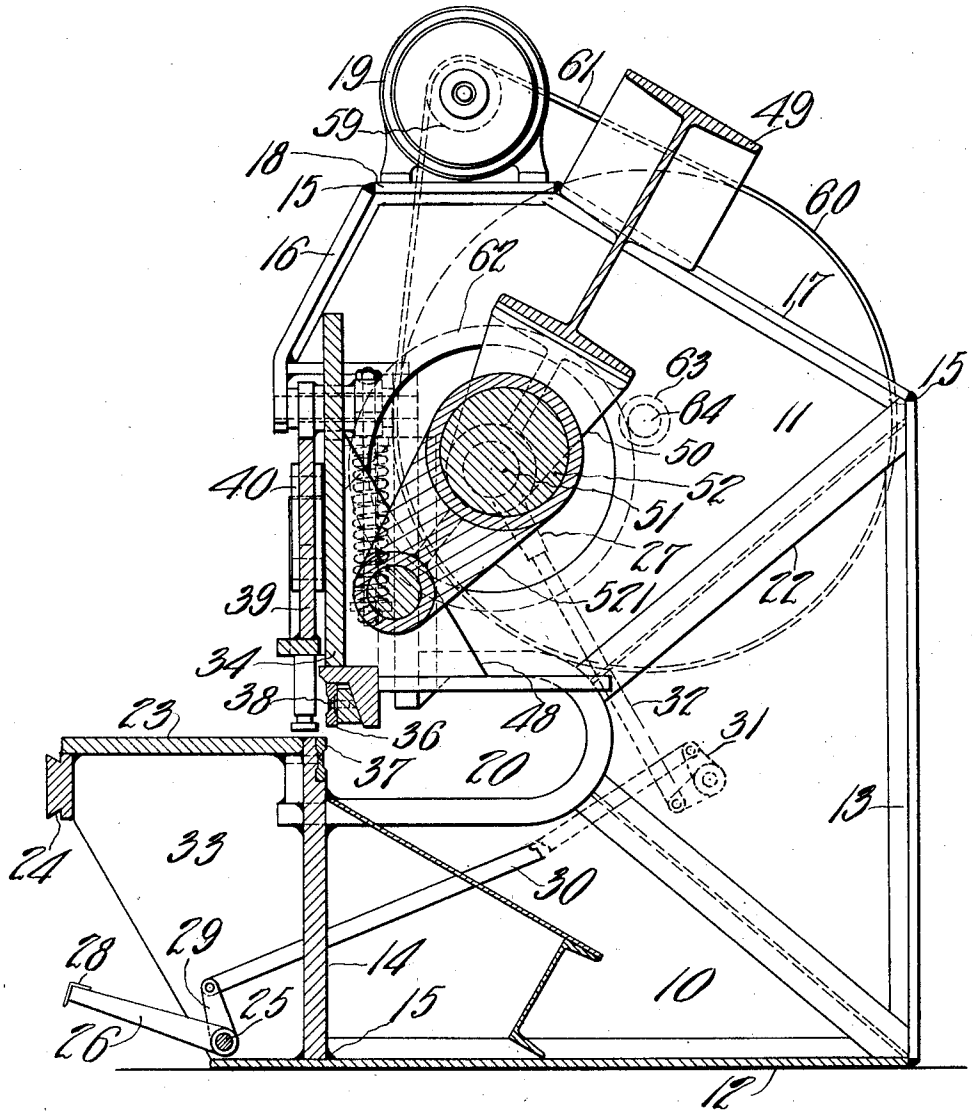


FIG.-2

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UNITED STATES PATENT OFFICE

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SHEARS AND THE LIKE

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Application November 7, 1936, Serial No. 109,700

1 Claim. (Cl. 164—47)

The present invention relates to improvements in shears and similar machines.

The general objects of the present invention are:—To improve the structure of the bed and housing or framing of such machines. To provide a re-enforcing means in such machines at places where heavy strains or stresses are directed to. To provide rigid structure in the framing and lightness of weight thereof. To locate the re-enforcing means so that the operation of the machine does not permit the knives to bow or cause the same to be bowed. Other objects will be pointed out during the description of the machine shown and described in this specification, or will become obvious or apparent or will suggest themselves upon an inspection of this specification and the accompanying drawings.

In the accompanying drawings, forming part of this specification:

Fig. 1 is a front view of a shear embodying the present invention.

Fig. 2 is a section taken on line 2—2 of Fig. 1 to show interior mechanism more clearly and on a larger scale.

Figs. 3 and 4 are sections each taken through the center of the hold down elements.

Similar reference characters refer to similar parts throughout the views.

In the prior art, the shearing knives or equivalents are moved substantially in line with the shearing cut and the moving power for the knives is applied thereto in substantially the same direction as the movement of the knives.

When such knives cut material, the tendency of the knives is to bow and get out of parallelism which is detrimental to work cut and to the knives and to the machine. Various devices and means have been used to take the bows out of the knives but such means entail additional structure and require attention and adjusting and leave the machine in a condition similar to a machine without such adjusting means when the adjustment is neglected. The human element enters largely into such machines and is fallible. The present invention builds into the machine a means to prevent bowing of the knives and thereby eliminates the necessity of adjusting the bow in knives as well as the human element regarding adjustment of the knives. In the present invention, the knives are always set properly and remain so set.

In shearing of material it has been found that, generally, about 75% of the power applied to the machine for shearing is directed against the guideways of the ram or knife carrying member in the prior art. The present invention builds means into the machine which takes practically all of this 75% load off the guideways and at the same time eliminates the bowing of the knives.

In the prior art, beds, housings and rams, together with other moving parts, are made of castings usually. Castings are heavy and require patterns and machining and fitting for assembling of the machine. In the present invention, the bed and housing or framing and the moving parts, as far as possible are made of commercial structural material which require no machining or fitting but are merely cut to lengths and welded together at the junctures thereof. This provides a machine which is light in weight and rigid in structure, which has no joints therein which could become loose by the use of the machine.

In the machine shown in the accompanying drawings:

The bed 10 and the housing 11 are one unit which may, conveniently be called bed-housing in that the bed and the housing are one structurally.

This bed-housing is made up of commercial structural material, cut to required size and the parts welded together at the junctures thereof. Welding or its equivalent is preferred since rigid structure is attained thereby. Bolting together or riveting together of the parts could be used but such joints are not rigid and are subject to becoming loose by the use of the machine. Such joints may be used for machines which are intended for light work or are quite short.

The members 12 form the base part of the bed portion to rest on a floor and have uprights 13 and 14 shown as welded thereto; the welds being indicated by the filled in corners numbered 15 at the base as well as at other places of the housing. The top members of the housing are formed of the inclined members 16 and 17 and the horizontal members 18 forming a seat for the motor 19 on the top of the housing.

The throat 20, usual in shears, may be made of structural steel and bent to suit and welded to the housing. Castings or forgings may be used for the throat and similarly secured to the housing. Braces, such as are indicated at 21 and 22 may extend from the throat to the uprights or disposed in other manners; the idea being to strengthen the housing for rigidity thereof.

The table 23 is secured to the front uprights and extends forwardly therefrom for support of material to be operated upon. The guide member 24 is secured to the front of the table and has

guideways therein for receiving gages or stops or the like to relate material to the table.

The treadle mechanism is conventional and is journaled on the shaft 25 mounted in the bed part of the machine. The treadle member 26 is located under the table and has the inner end thereof journaled on the shaft 25 and the latter is unrotatably mounted. However, it is preferred that the shaft 25 be journaled in the housing so that pressing down on the treadle will throw in the conventional clutch mechanism 27. The angle iron treadle bar 28 extends longitudinally of the bed, connects both of the treadle members 26 and is of sufficient length for convenient reach by an operator standing in different positions in front of the machine. The lever 29, either in bell crank relation with the treadle 26 or secured to the shaft 25 when the same is journaled in the bed, is pivotally connected with the arm 30 which, in turn, is pivotally connected to the bell crank mechanism 31 operating the connection 32 to operate the clutch mechanism 27 when the treadle is operated.

Commercial plate stock connects the braces and the uprights to form an inclosed casing or housing and to stiffen and strengthen the housing and the bed as a whole and to provide convenient places to secure bearings, slides and the like to the housing. The plate member 33 acts as a brace for supporting the table 23. Spot welding is preferred between the plates and the braces and the uprights and the bracing members of the housing.

The knife carrying bar 34 is conventionally guided to move vertically in the guideways 35 secured to the housing and has the upper knife or shear blade 36 secured to the lower end thereof in correct shearing relation with the lower knife or shear blade 37 secured to the bed. The bolts 38 shown render the knives or shear blades easily removable for exchange or sharpening.

The hold down carrying bar 39 is conventionally guided to move vertically in the guideways 40 secured to the housing. The hold down elements shown comprises, each, the casing 41 and the plunger 42 movable therein longitudinally thereof and has the shoulder 43 to abut the end wall of the casing to prevent the plunger from falling out of the casing. The resilient elements 44 is here shown as being made of compressible rubber although a spring or pneumatic or hydraulic or other equivalent means may be used. Rubber is here preferred since it does not deteriorate easily, is quick in response and holds its power effectively. Fig. 3 shows the plunger 42 as having the rubber pad 45 on the outer end thereof to provide friction for preventing slipping of material held down by the elements 39. This pad is not absolutely necessary although it has some advantages when used to better grip the work. When the plunger 42 is made entirely of rubber as shown in Fig. 4, a shoulder similar to the shoulder 43 of Fig. 3 is provided on the plunger 42 to prevent the same from falling out of the casing. Such shoulder should be of rather large area to prevent the rubber from upsetting and sticking in the casing. The structure shown in Fig. 3 is preferred since the plunger can move freely in the casing. The part 46 (Fig. 3) is a plug of resilient rubber, one end thereof abutting the plunger 42 and the other end abutting the longitudinal bar 47 at the botom of the casing and hold down bar 39 to which all of the holddown elements are secured preferably removably so that inspection and repairs may conveniently be carried out.

The vertical movement of the knife carrying bar is parallel with the movement of the hold down carrying bar in the instant shown and the movement is at right angles to the bottom of the bed although this is not absolutely necessary nor essential to the present invention.

The bar 34 has re-enforcing members on the back thereof as is indicated in the drawings by the bracing members 48 to stiffen or strengthen the bar against stresses and strains brought thereon by the operation of the machine.

In order to save the larger part of this above mentioned 75% of power and to relieve the guides of the pressure thereof, the present invention applies the knife moving power at an angle with the direction of movement of the knife. This angular movement or application of power counteracts the spreading of the knives and thereby keeps the knives in sidewise relationship at all times and relieves the guides of pressure thereon, saves wear on the guides and on the bar moving therein and saves considerable power in the use of the machine.

The longitudinal stiffening member 49, shown as a heavy commercial I beam, has the ends thereof secured to the uprights at each side of the machine, preferably by welding. The transverse axis of the member 49 is inclined to the direction of movement of the bar 34 as is indicated in Fig. 2. The angle of inclination being determined by the work to be done by the machine. The object being to apply the knife moving power to the knife at such an angular relation to the movement of the knife that the greater part of the power applied is brought upon the knife in such a manner that the knife moves parallel with the guideways and the power tending to bow the knives is absorbed by the angular application of the power.

The journal bearings 50 are mounted on the lower flange of the I beam 49 and support the longitudinal shaft 51 upon which the conventional eccentrics 52 are mounted to operate the pitman 521 pivoted onto the back of the bar 34; the axis of this pivot being close to the bottom of the bar 34 to closely bring the line of action of the power to the shearing edges of the knives.

The toggle joints at each end of the machine each has the pivot pin 53 fixed relative to the housing, the pin 54 on the bar 39, a link pivotable on each of the pins and the pin 55 connecting the inner ends of the links. The springs 56 each has one end thereof held to the arm 57 by means of the rod 58 which has a nut on the other end thereof to provide an adjusting means for the spring. The toggle joints, operated by downward movement of the bar 34 to straighten out the links and move the bar 39 downward and thereby put a tension on the springs, is operated by the springs to move the bar 39 upward and relatively incline the toggle links when the bar 39 moves upward and thereby release the contact of the holddown elements on the work on the table. The straightening of the toggle links and pressure of the hold down elements on the work compresses the rubber in the casings 41 according to evenness and unevenness of the work and this compression pressure holds the work down on the table.

The motor 19 has the pulley 59 on the armature shaft thereof which drives the pulley 60 through the belt 61 and thereby rotates the gear 62 meshing into the gear 63 which drives the shaft 64 extending longitudinally of the housing and is journaled therein and carries the aforementioned

eccentric mechanism to operate the pitman and the bar 34.

Stiffening members for the bed and housing are indicated at different places in the drawings. Specific locations sizes and relations of such members must, of course, be left to the engineer.

In some instances, the action of the pitman and eccentric may not be quite desirable. In such cases the eccentric mechanism can be replaced by rack and pinion; the latter being driven by the power means and the former being in mesh with the latter and having one end thereof held to the bar 34 and the rack being inclined to the direction of movement of the bar 34 and the knife thereon.

The machine shown and described is simple of structure, is light in weight as to the machine as a whole and as to the moving parts thereof, is rigid of structure, requires less power to operate than similar machines of the prior art; eliminates a large part of the wear found in the prior art, is easily and conveniently operable and efficient in operation and does not get out of order easily and remains intact as long as the material thereof holds out; the parts subject to wear are easily replaced.

Having described my invention, I claim:

In a machine of the character described, the combination of a frame having a shear blade thereon, a member carrying a cooperating blade and reciprocable on said frame, a power shaft mounted on said frame at one side of said member, means on said shaft for actuating said member, a shaft on said member adjacent the blade thereon, a link connecting said means with the last mentioned shaft and so arranged that the direction of the force applied on the operating stroke is substantially on a line through the meeting edges of said blades and at an angle to the path of movement of said member.

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