Sept. 21, 1954 J. KRUEGER 2,689,487

MEANS FOR ADJUSTING THE SHUT HEIGHT OF PRESSES

Filed Aug. 2, 1949 3 Sheets-Sheet 1

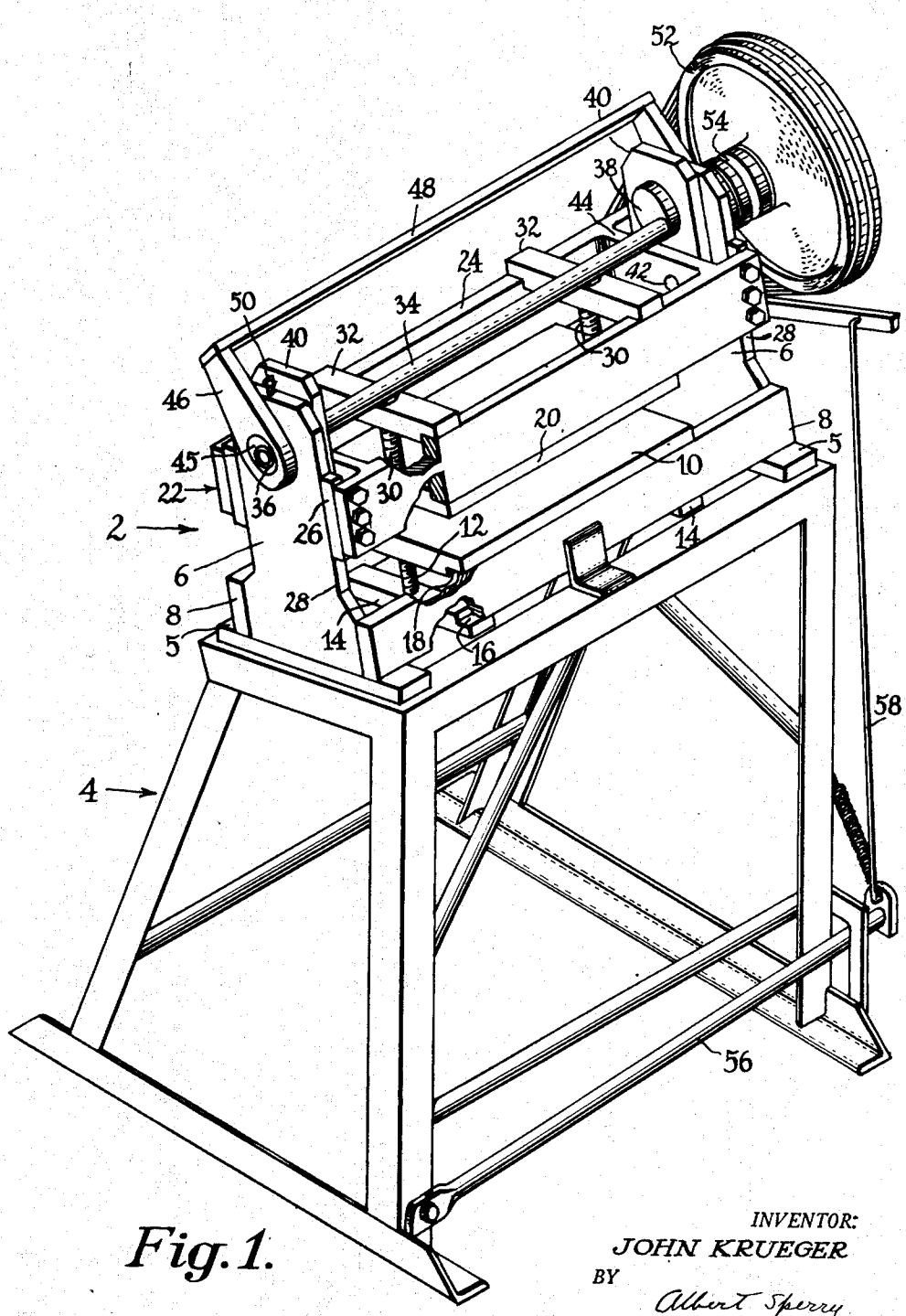


Fig. 1.

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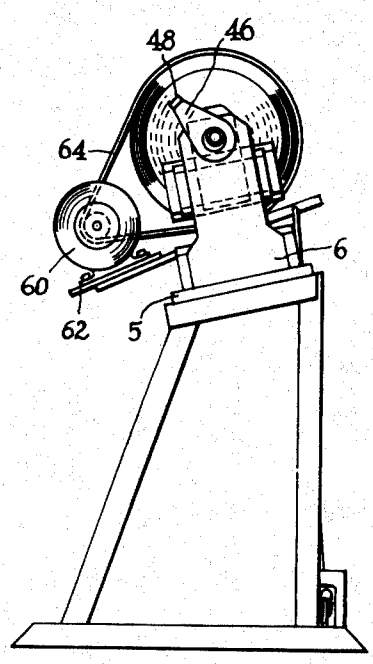


Fig. 2.

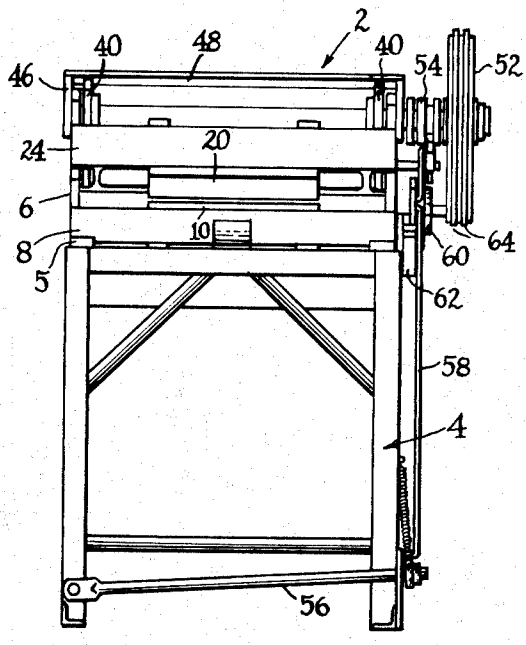


Fig. 3.

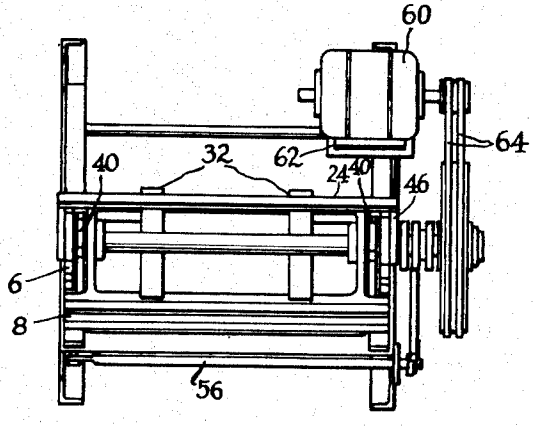


Fig. 4.

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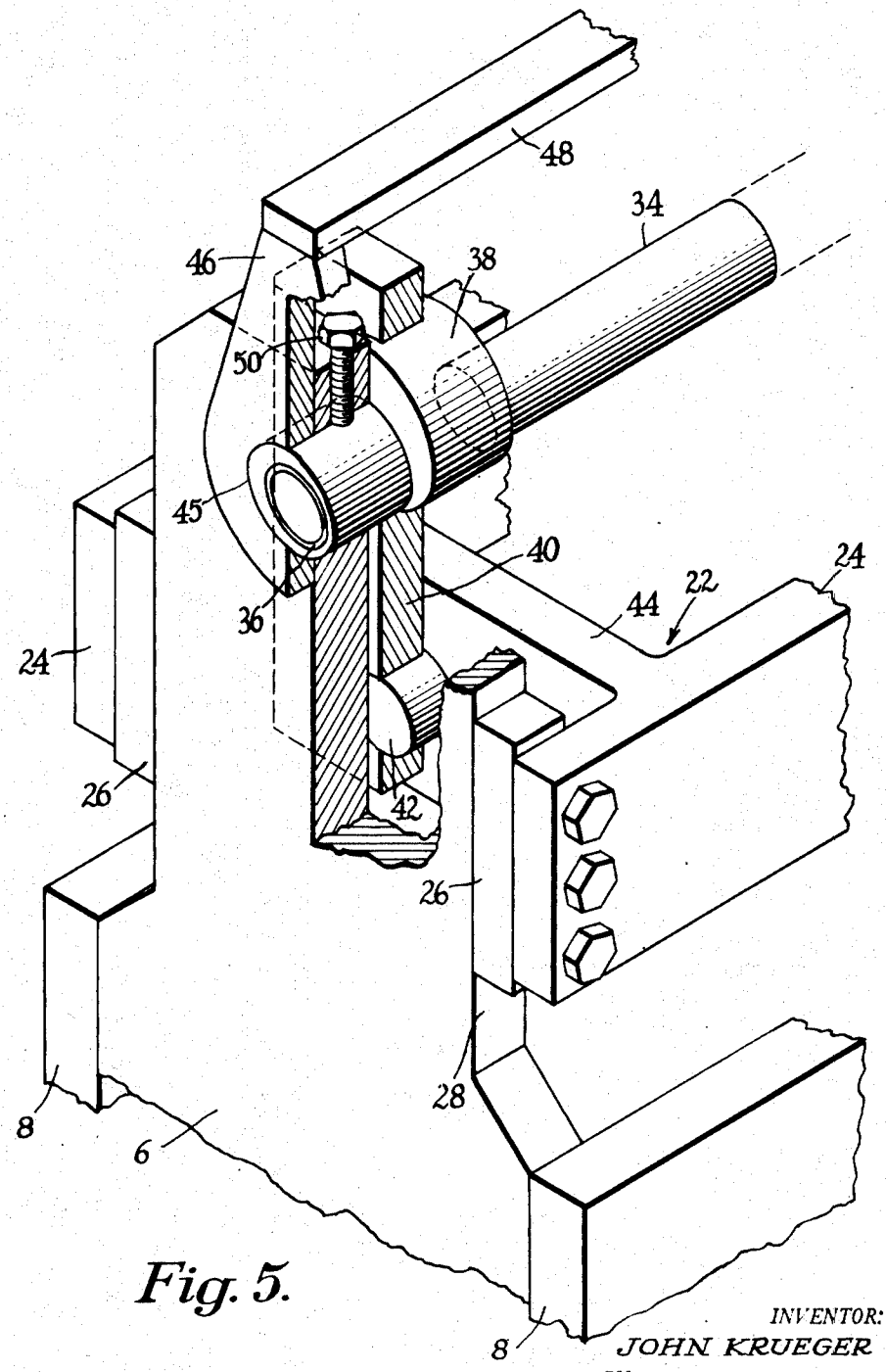


Fig. 5.

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MEANS FOR ADJUSTING THE SHUT HEIGHT OF PRESSES

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Application August 2, 1949, Serial No. 108,224

1 Claim. (Cl. 74—571)

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This invention relates to presses for punching, forming or stamping sheet material and is directed particularly to presses which are simple in construction and economical to produce and use.

Punch presses and stamping machines heretofore produced have generally been made relatively large and heavy in construction in order to be capable of operating on heavy stock. However, when so designed it is usually necessary to use heavy and expensive dies even for punching or forming light stock. Such machines also lack the necessary adaptability for use in many small shops or other plants where the operations to be performed are varied frequently. Thus, for example, in tin shops and sheet metal plants the material to be punched or formed is relatively light and inexpensive and it may not be necessary to produce more than a few hundred or thousand pieces of any one type. In such cases the original cost of conventional punch presses and the cost of operating such heavy equipment is often prohibitive.

In accordance with the present invention these objections to presses of the prior art are overcome and a simple, light but sturdy press is provided wherein changes in the closed positions of the dies can be made quickly and easily to shift from one operation to another. These advantages are preferably attained by providing the press with an open frame for receiving and supporting the dies and by employing eccentric bearings for the drive shaft which actuates the reciprocating die head whereby the drive shaft and the closed position of the dies can be varied easily.

One of the objects of the present invention is to provide a simple, light press which is quickly changeable to perform punching, forming and other operations.

Another object of the invention is to provide a press particularly adapted for use on light stock such as tin, sheet metal, fiber board and other material of varying thickness and strength.

A particular object of the invention is to provide a press having a drive shaft for reciprocating a die together with eccentric means for varying the position of the drive shaft and the closed position of the dies for various operations.

These and other objects and features of the invention will appear from the following description thereof in which reference is made to the figures of the accompanying drawings.

In the drawings:

Fig. 1 is a perspective of a typical press embodying the present invention;

Fig. 2 is an end elevation of a portion of the press shown in Fig. 1;

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Fig. 3 is a front elevation of a portion of the construction shown in Fig. 1;

Fig. 4 is a top plan view of the construction shown in Fig. 1; and

Fig. 5 is an enlarged view of a portion of the press shown in Figs. 1 and 2 with parts broken away.

In that form of the invention illustrated in the drawing the press is indicated generally at 2 and is mounted on a suitable stand or support indicated at 4. It is often desirable for the operator to see the work during a punching or stamping operation and therefore the press may conveniently be positioned in a tilted position as shown in Fig. 2.

The press 2 is provided with a base consisting of the cross pieces 5 upon which end standards 6 are mounted. Side rails 8 extend between the end standards 6 and serve as a die bed on which a stationary die 10 is mounted. The die 10 is preferably secured in place on the die bed by tie bolts 12 which are threaded into the die and are carried by cross bars 14 which extend transversely of the die bed beneath the side rails 8. The opposite ends of the cross bars 14 may be recessed to receive the side rails as shown at 16 in order to prevent inward flexing of the side rails when the tie bolts 12 are drawn up in securing the die in place and in order to reinforce the die bed for heavy operations. Any suitable number of tie bolts and cross bars may be used to hold the stationary die in place, and they may be easily removed to substitute a new or different die whenever the operation is to be changed. The die 10 itself may also be formed with recesses 18 for engaging the side rails 8 to provide transverse reinforcement for the bed and to insure accurate positioning of the die. When the stock being punched or stamped is relatively thin or light the thickness and weight of the die may be correspondingly reduced and made relatively inexpensive.

The movable die 20 of the press is carried by a ram head 22 which comprises side rails 24 which extend from one end standard 6 to the other. The opposite ends of rails 24 are provided with slide bearing blocks 26 slidably movable along the vertical sides 28 of the standards 6. The sides 28 of the end standards thus provide ways by which the reciprocating ram head is guided during vertical movement thereof in a punching, forming or stamping operation. The upper die 20 is secured in place on the side rails of the ram head by means of the bolts 30 and cross bars 32. The general form and arrangement of the elements used for securing the movable die 20 in

place on the ram head is similar to that used for securing the stationary die 10 on the side rails 18 of the die bed. The dies may therefore be reversed and interchanged readily and each die serves to reinforce the rails on which it is mounted so as to provide a sturdy, rigid construction capable of withstanding the forces to which it is subjected. At the same time the elements themselves may be made of much lighter weight materials than in conventional punch presses of the prior art.

The ram head 22 is movable vertically and is guided by the vertical sides 28 of the end standards 6 to move the upper movable die 20 toward and away from the lower stationary die 10. For this purpose a drive shaft 34 is mounted adjacent its opposite ends in the bearings 36 on end standards 6. Ram actuating cranks in the form of the eccentric sheaves 38 are mounted on the shaft 34 adjacent the inner faces of the end standards 6 and are engaged by the upper ends of the connecting rods 40. The lower ends of the connecting rods 40 are pivotally connected at 42 to the cross bracing webs 44 adjacent the ends of the side rails 24 of the ram head and spaced from the inner faces of the end standards 6 of the press. Rotation of the drive shaft 34 therefore serves to lower and raise the ram head while the head is guided in its vertical movement by the bearing blocks 26 engaging the sides 28 of the end standards.

The position of the movable die 20 with respect to the stationary die 10 when the ram head is fully lowered is determined by the size and shape of the eccentric sheaves 38 and the position of the drive shaft 34 by which the sheaves are carried. In order to vary the "shut height" of the movable die 20 to change from a punching operation to a forming or stamping operation the present invention provides means for bodily moving the crank shaft 34 whereby the sheaves 38, connecting rods 40 and the lowered position of the ram head 24 may be varied. For this purpose the bearings 36 in which the drive shaft 34 rotates are mounted in bearing carriers 45 which are circular in form but eccentric with respect to the shaft bearing 36. The bearing carriers are rotatably mounted in the end standards 6 and are each provided with an adjusting arm 46 which has its outer end connected to an adjusting bar 48. With this construction movement of the adjusting bar 48 causes the bearing carriers 45 to be rotated within the end standards 6 to raise or lower the drive shaft 34. In this way the drive shaft and the ram head 24, and the movable die 20 are adjusted in vertical position so that the "shut height" of the movable die will be varied as desired. When the required adjustment has been made the bearing carriers 45 are secured in place by set screws 50 so as to hold the drive shaft at a fixed height in the press. The same dies or others may thus be used for both punching and forming operations and they can be positioned so as to handle different thicknesses or weight of sheet material.

The drive shaft 34 is provided with a fly wheel 52 and a clutch 54 is interposed between the fly wheel and the drive shaft to connect the fly wheel to the drive shaft whenever a punching or pressing operation is to be performed. Operating means such as the foot treadle 56 are connected to the clutch 54 by the link 58 or otherwise to control the operation of the press. The form of operating means and clutch employed may be conventional and do not alter the assembly of the press. However, the clutch also should be movable with the drive shaft in varying the "shut height" of the movable die.

As shown in the drawings the press is powered by a motor 60 mounted on a support 62 and connected to the fly wheel 52 by the belt 64. When the adjustment of the drive shaft is made the fly wheel moves with the drive shaft. The displacement of the fly wheel will generally be accommodated by a slight tightening or loosening of the belt 64. However, when necessary the motor support 62 may be changed in position to prevent undue loosening or tightening of the driving belt.

In using the press described the operator places a sheet or other piece of stock in the space between the dies 10 and 20 and actuates the foot pedal 56 or other control means for the clutch 54. The fly wheel 52 is thus connected to the drive shaft 34 and the shaft then rotates whereby the eccentric actuating sheaves 38 are rotated with the drive shaft to lower the ram head 22 and the movable die 20. The die 20 is thus brought into operative relation with the stationary die 10 and is guided in such movement by the slide bearings 26. The final lowered position of die 20 is determined by the position of the drive shaft 34 in its end bearings 36 and the position of the latter bearings is established by adjustment of the bearing carriers 45 in the end standards 6.

When it is desired to vary the relative position of the dies as they are brought together to perform a different operation the set screws 50 are unloosened to release the bearing carriers 45. The adjusting bar 48 is then moved to rotate the adjusting arms 46 of the eccentric bearing carriers 45 whereby the drive shaft 34 and its bearings 36 are raised or lowered to raise or lower the "shut height" of the ram head and the upper die 20. When the dies have been properly positioned the set screws 50 are tightened again so that the bearing carriers and drive shaft are securely held in their new adjusted position.

The vertical adjustment of the drive shaft 34 is accompanied by a measure of lateral displacement of the shaft due to rotation of the eccentric bearing carriers 45. However, the pivotal connection 42 between the connecting rods 40 and the cross bracing web 44 of the ram head prevents any binding of the ram head as it reciprocates on the slide bearings guided by the sides 28 of the end standards 6 of the press.

Although the press is particularly adapted for use on light sheet metal or fibrous stock it may also be used on heavier gauge metals and its adaptability lends itself for many uses in both large and small shops. The dies may be made of any suitable weight and thickness and they may be reversed or changed as required for various operations. It will also be apparent that the press may be mounted in any desired position and actuated by whatever source of power is most convenient. In view thereof it should be understood that the particular form of the invention shown in the drawings and described above is intended to be illustrative only and is not intended to limit the scope of the invention.

I claim:

In a machine having a pair of spaced standards with a rotatable drive shaft extending therebetween, means for bodily displacing said shaft both vertically and transversely with respect to said standards comprising bearing carriers mounted on said standards and rotatable

thereon about a common axis, a pair of spaced shaft bearings in which said drive shaft is rotatably mounted, said bearings each being supported by one of said carriers and positioned eccentric to said axis, common adjusting means connected to both carriers and movable to rotate both carriers simultaneously and in an indentical manner to displace said shaft bearings and said drive shaft with respect to said standard, a crank connected to said shaft, a reciprocating head located between said standards, a link rotatably connected at one end to said crank and pivotally connected at its other end to said head, and fixed guide means on said standards and

head for guiding said head in all adjusted positions of the drive shaft.

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