March 20, 1951 E. K. JOHANSEN ET AL 2,546,100

METALWORKING POWER PRESS

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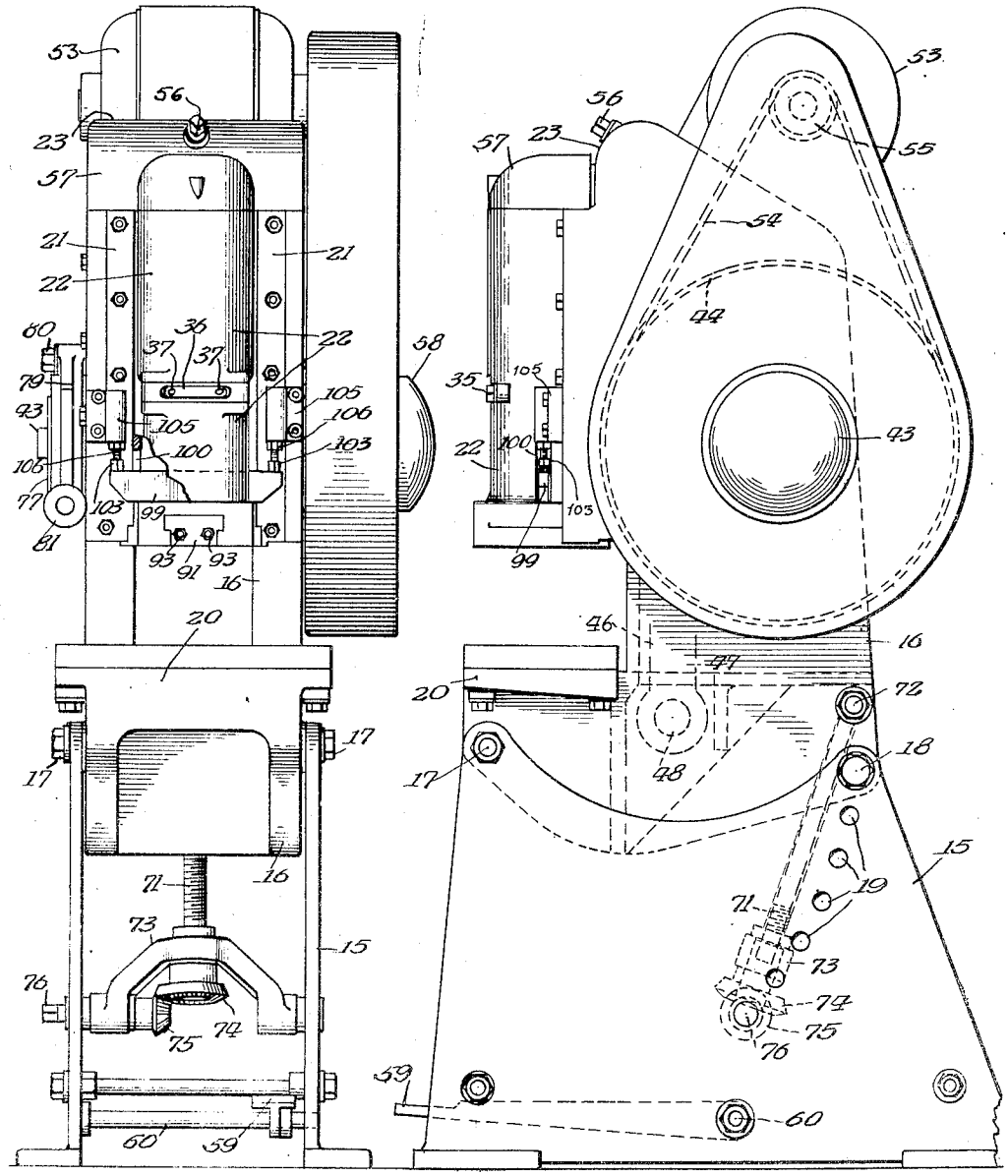

Fig. 1

Fig. 2

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Fig. 3

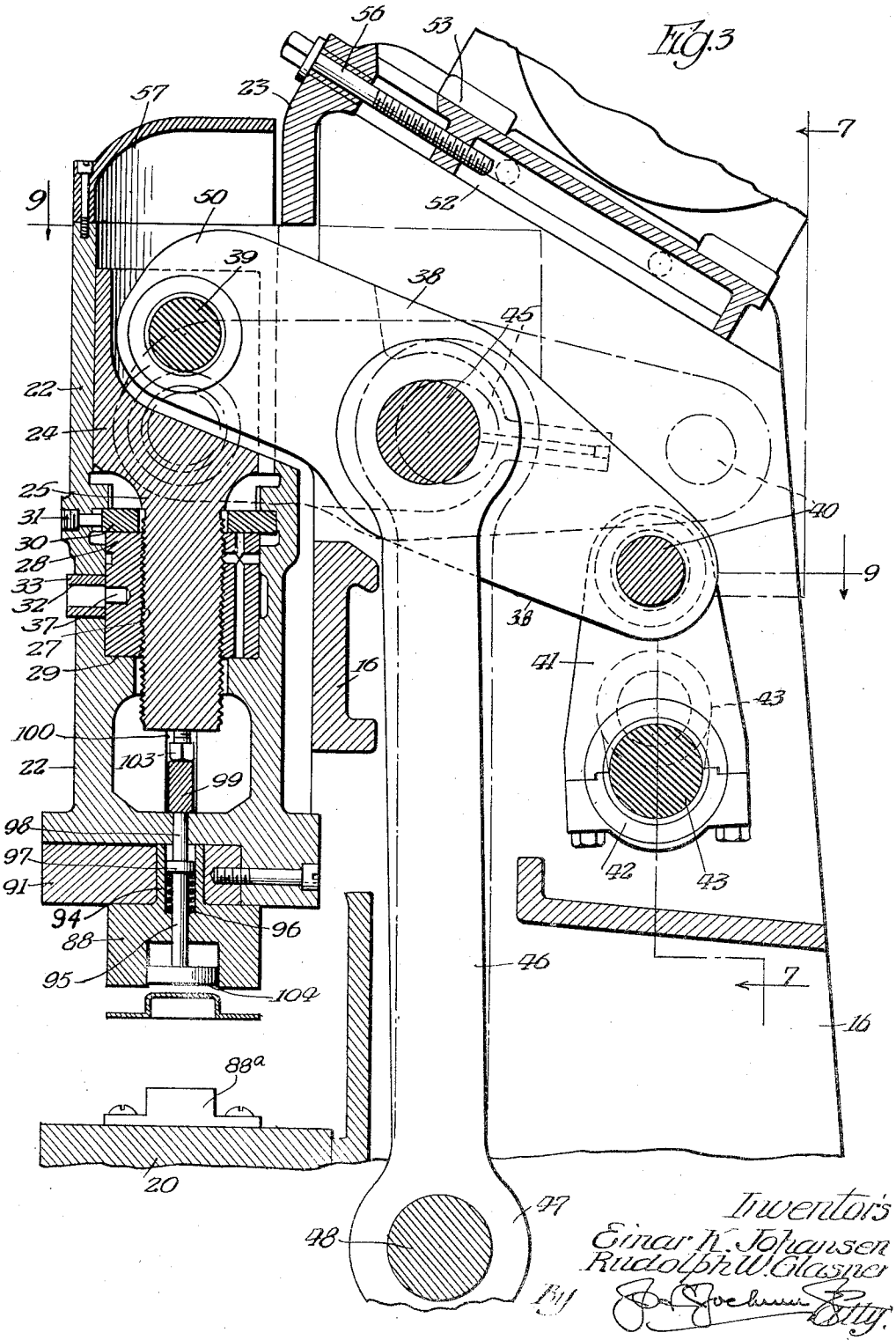

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Fig. 4

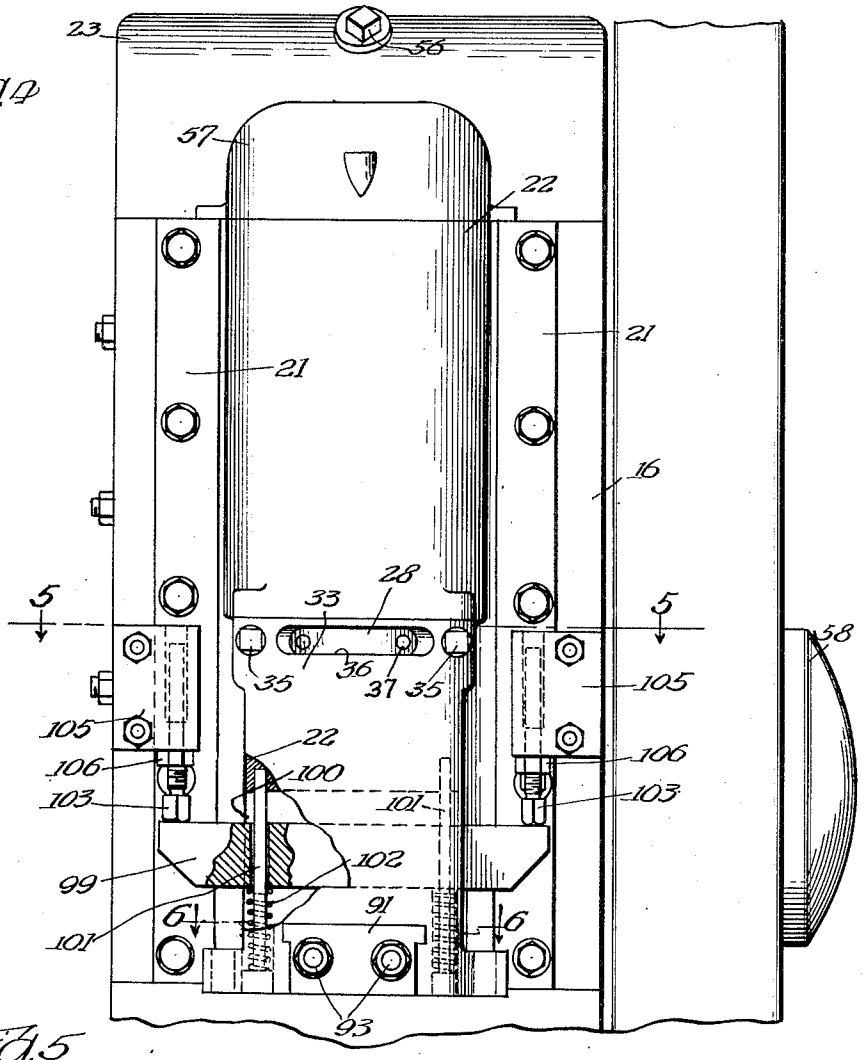

Fig. 5

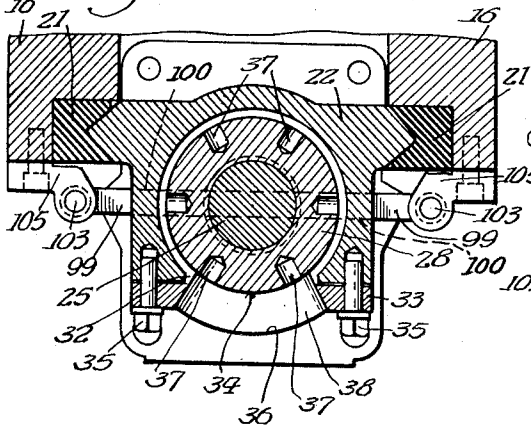

Fig. 6

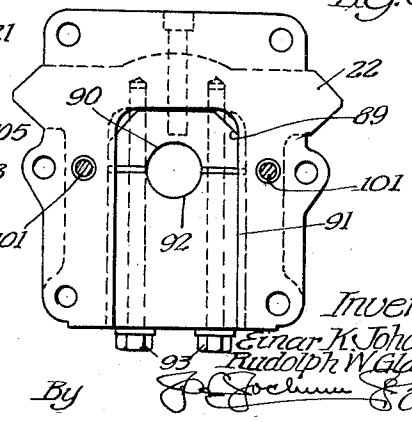

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Fig. 7

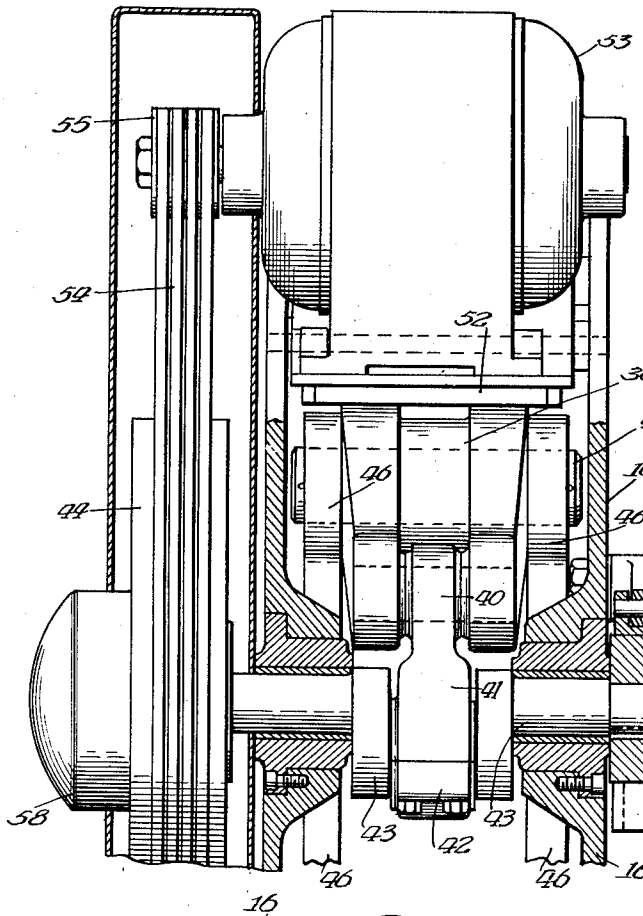
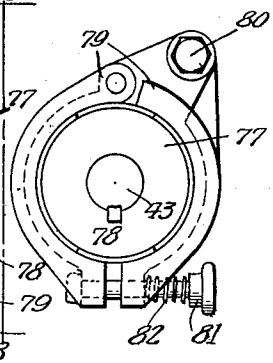


Fig. 8



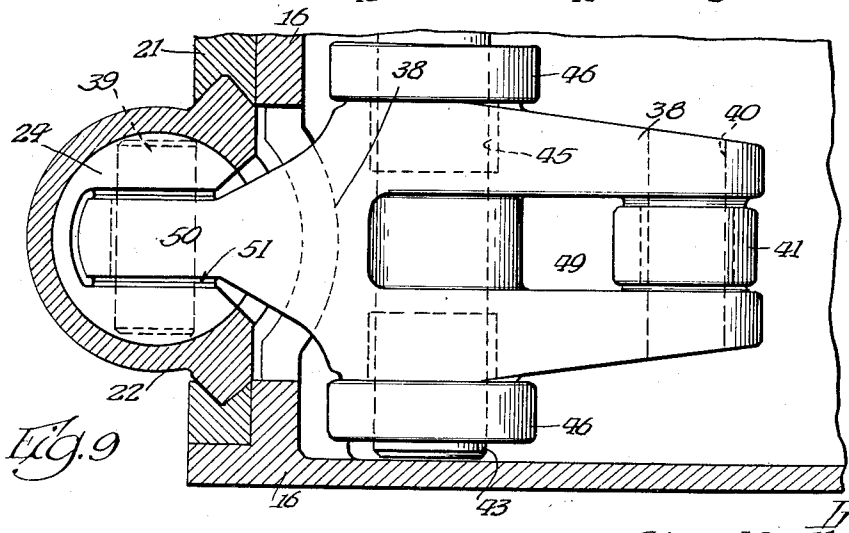


Fig. 9

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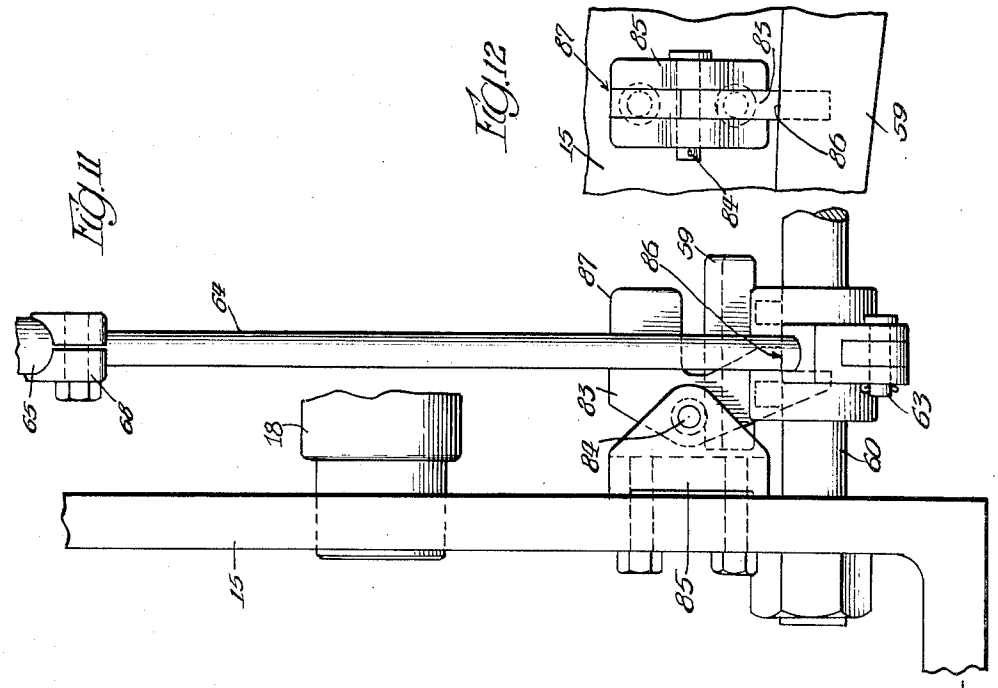

FIG. 12

FIG. 11

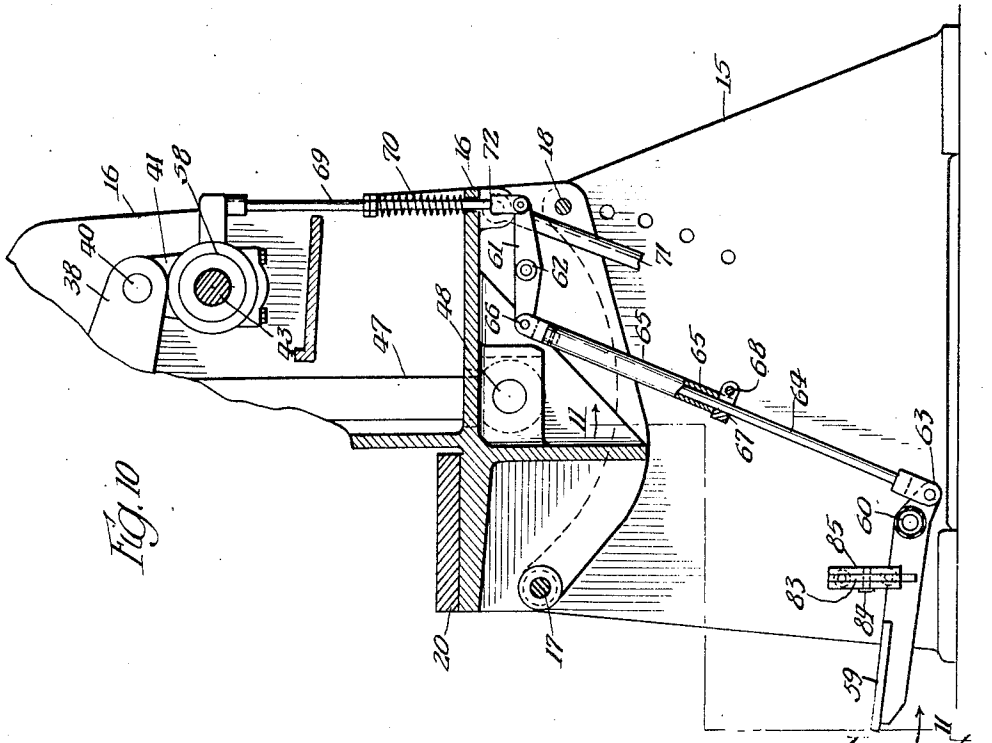

FIG. 10

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METALWORKING POWER PRESS

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Application February 14, 1944, Serial No. 522,360

2 Claims. (Cl. 113—38)

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This invention relates, in general, to metal working presses, and more particularly to that type commonly known as a C-shaped frame.

In presses of this character, and due to the working stresses of the slide upon the work and bed of the press, the frame generally springs, with the result that the slide and bed are moved out of alinement, and numerous other undesirable conditions result. Furthermore, should there be an excessive overload, the result will be that the press frame will become cracked or broken.

It is one of the objects of the present invention to provide, in a press of this character, improved means whereby these difficulties and objections will be overcome, and the operating parts will be maintained in proper working alinement.

A further object is to provide an improved structure of press, in which there will be provided extended guides for the slide, and in which structure the crankshaft, or the shaft which directly imparts reciprocation to the slide, will be located in the rear of the press and in a position out of the way of the operator.

A further object is to provide improved means for adjusting the slide with respect to its operating mechanism, to vary the size of the working space betwen the slide and the bed, and for maintaining the parts in their adjusted positions.

A still further object is to provide improved mechanism for actuating the slide.

To the attainment of these ends and the accomplishment of other new and useful objects as will appear, the invention consists in the features of novelty in substantially the construction, combination and arrangement of the several parts, hereinafter more fully described and claimed and shown in the accompanying drawings illustrating this invention, and in which

Figure 1 is a front elevation of a press of this character, constructed in accordance with the principles of this invention.

Figure 2 is a side elevation of Figure 1.

Figure 3 is an enlarged detail view, partly in elevation, and partly in section, showing the slide operating mechanism.

Figure 4 is a front elevation of the upper portion of the press shown in Figure 1, on an enlarged scale.

Figure 5 is a horizontal sectional view taken on line 5—5, Figure 4.

Figure 6 is a detail horizontal sectional view taken on line 6—6, Figure 4.

Figure 7 is a view taken on line 7—7, Figure 3.

Figure 8 is a detail elevational view of the brake

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mechanism for the crankshaft, and as taken on line 8—8, Figure 7.

Figure 9 is a sectional view taken on line 9—9, Figure 3, with parts omitted.

Figure 10 is a detail vertical sectional view of a portion of the press, with parts omitted, showing the control mechanism.

Figure 11 is a detail elevational view as taken on line 11—11, Figure 10.

Figure 12 is a front elevation of the treadle locking means.

The press consists, essentially of a base 15, and mounted thereupon is a frame 16, which latter is pivotally connected to the base, as at 17, and is held in a fixed or stationary position with respect to the base by means of suitable fastening devices 18 which are adapted to pass through any one of a series of openings 19 in the base, whereby the frame may be inclined with respect to the base by removing the fastening devices 18 and swinging the frame about the pivot 17. Thereafter, the fastening devices may be inserted through the desired opening 19.

The frame and the base may be constructed of any suitable material, and may be formed by sheets of material secured together. Carried by the frame 16 is a work-supporting bed 20, and mounted upon the frame are guides 21 in which a slide, designated generally by the reference numeral 22, is adapted to move. The guides extend for a considerable distance along the front of the frame, and terminate in proximity to the top 23 of the frame, thereby permitting of long guiding of the slide.

Disposed within the slide 22 is a head or member 24 which is provided with a reduced portion 25 of suitable length, having external screw threads 27. A rotatable collar or nut 28 encompasses the threaded reduced portion 25 and engages the threads 27 thereon, so that when the collar 28 is rotated, the head 24, with the reduced portion or extension 25, may be adjusted longitudinally with respect to the slide 22. The collar 28 rests upon a shoulder 29 and is held against longitudinal movement with respect to the slide, preferably by means of a collar 30 which engages over the top of the collar 28 and is held in position in any suitable manner by means of suitable fastening devices 31.

The slide 22 is provided with an opening 32 (see particularly Figure 5), and mounted upon the slide, adjacent said opening, is a member 33 which forms a closure for said opening and has a portion 34 that projects into the opening 32 so as to engage and press against the face of

the sleeve or collar 28 and thereby hold the latter from rotation. The member 33 is held in position by means of suitable fastening devices 35 in the form of screws or bolts, so that by loosening the screws, the member 33 may be moved out of engagement with the sleeve or collar 28 to permit the latter to be rotated, to effect a relative adjustment of the head 24 with respect to the slide. Thereafter, by tightening the screws, the member 33, or the portion 34 thereof, may be brought into clamping engagement with the sleeve or collar. In order to effect rotation of the sleeve or collar 28, a slot 36 may be provided in the member 33, through which slot any suitable implement may be passed so as to enter the respective openings 37 in the sleeve or collar to rotate the latter. Through the medium of the parts just described, the head 24 is connected to the slide 22 for movement therewith and for adjustment with respect thereto.

The slide is adapted to be reciprocated with respect to the frame 16, and toward and away from the bed 20 by means of a lever 38 which is pivotally connected by one end, as at 39, with the head 24, and is also pivotally connected at its other end, as at 40, with a link or member 41 which in turn is pivotally connected, as at 42, with a crankshaft 43, the latter being journaled in the frame 16 and located in proximity to, but in the rear of, the bed 20 of the press, so that the crankshaft and the driving pulley 44 which is connected thereto, will be disposed in a position out of the way of the operator.

The lever 38 is pivotally supported intermediate its ends, as at 45, by means of a fulcrum such as links 46, the other end 47 of each of the fulcrum links being pivotally connected, as at 48, to the frame 16, so that when the frame is moved about its pivot 17, the superstructure will be moved therewith, and the slide operating means will remain intact. The lever 38 is preferably bifurcated, as at 49 (see Figure 9), and the end of the link or member 41 extends into the bifurcation. The forward extremity 50 of the lever projects into an opening 51 in the head 24.

The upper extremity 23 of the frame is shaped to form a support 52, upon which a motor 53 is mounted, and a belt 54 passes over the pulley 44 and a pulley 55 on the motor shaft for actuating the crankshaft 43. An adjusting screw 56 may be provided for shifting the motor 53 upon the supporting surface 52, for controlling the tension of the driving belt 54. If desired, a cap or cover 57 may be provided on the slide 22.

As the crankshaft 43 rotates, a rocking movement will be imparted to the lever 38, and as the fulcrum links 46 are pivotally connected to the frame, they will oscillate sufficiently to compensate the rocking movement of the lever 38. Furthermore, with this construction, and as the slide operates upon the work, the resistance strains will be exerted upon the frame 16 of the press at points remote from the bed 20, thereby eliminating any strain or stresses of the frame itself, with the result that the slide will always be maintained in operating alinement with the bed, and the slide and bed will also be prevented from being sprung one with relation to the other.

The numeral 58 designates, generally, a clutch mechanism, which may be of any suitable construction, and is provided for controlling the rotation of the crankshaft 43. This clutch may be operated by means of a suitable treadle or foot lever 59, pivotally supported, as at 60, upon the base 15. A lever 61 is pivotally supported intermediate its ends, as at 62, to the frame 16 of the press, and one end of this lever is connected to the foot treadle, as at 63, through the medium of a link formed of telescoping members 64—65, the member 65 being pivotally connected, as at 66, with the lever 61.

Mounted upon the member 64 is a collar 67 which is adapted to be clamped thereto by means of a suitable clamping device 68, and this collar 67 abuts the proximate end of the member 65, so that when the treadle 59 is depressed, the collar 67 engaging the end of the member 65, will rock the lever 61 in a direction to draw upon the rod 69, and thereby operate the clutch mechanism. A resilient section 70 may be provided in the rod 69, if desired.

With this construction, it will be manifest that when the frame is rocked about its pivot 17 so as to change its angular position with respect to the base 15, the telescoping sections 64—65 of the connecting rod, and the collar 67, will permit or compensate such adjustment.

Any suitable means may be provided for swinging the frame 16 about its pivot when the fastening devices 18 are removed, and for that purpose there may be provided a rod or link 71 which is pivotally connected to the frame, as at 72. This rod is mounted in a suitable bearing 73, and has threaded connection with a gear 74, and with which gear 74 another gear 75 meshes. The gear 75 is provided with a shaft 76 having an angular portion for the reception of an actuating crank to rotate it.

If desired, a brake device may be applied to the other end of the crankshaft 43 (see particularly Figures 1, 7 and 8), comprising a drum 77 that is secured to the end of the crankshaft, preferably by means of a key device 78. A sectional brake band 79 encompasses the drum 77, and the sections may be pivotally supported, as at 80, an adjusting screw or member 81 being provided to draw the sections together, to create friction upon the drum. A spring 82 may be provided between the head of the adjusting device 81 and one of the brake sections. This brake is provided for the purpose of preventing overthrow of the crankshaft, and also prevents the shaft from "kicking back."

The clutch mechanism 58 is of a construction that it will remain normally inactive, but when the foot treadle 59 is depressed, it will become active to actuate the slide 22, and when the treadle is released, the motion of the slide will be arrested. However, if it is desired to have the slide operate continuously, a suitable latch 83 may be provided (see particularly Figure 11), which latch is pivotally supported intermediate its ends, as at 84, upon a bracket 85 that is secured to the frame 16 adjacent the foot treadle 59. This latch is provided with a shoulder 86 adapted to engage over the treadle 59, as shown in Figure 11. When the treadle 59 is depressed, the latch will swing by gravity into a position to lock the treadle against return movement, and thereby maintain the clutch in an active position. When it is desired to release the treadle, the latch may be swung into an inoperative position by pressure exerted at 87 on the latch, either by hand or foot.

A die member 88 may be connected to the slide 22 by means of clamping mechanism which preferably consists of a member 89 having a recess 90 therein, and a co-operating member 91 having a recess 92 therein. This latter member is adapted for a sliding movement into and out of position

with respect to the member 89, these parts being held together by means of suitable clamping screws 93. The die 88 is provided with a reduced portion 94 adapted to be seated and clamped within the recess formed by the portions 90 and 92 of the members 89 and 91. The die 88 cooperates with an alined die 88a, carried by the press bed 20.

An ejector 95 is preferably carried by the die 88, and is held in position with respect thereto, preferably, by means of a spring 96 which engages a collar 97 on the ejector 95. This spring tends normally to project the end 98 of the ejector above the die. An ejector bar 99 is carried by the slide 22, and is of a size to project through slots 100 in the slide, and beyond the slide, the slots being of a length considerably greater than the height of the ejector bar. This ejector bar may be supported in position in any suitable manner with respect to the slide, preferably by means of pins or members 101 which pass through the ejector bar, and a spring 102 encompasses each of the pins and serves as a yielding support for the ejector bar. The ejector bar will therefore move with the slide, and is capable of movement with respect to the slide. When the slide is in an elevated position with respect to the bed, the ejector bar will be supported by the springs 102, and when the slide is lowered to cause the die 88 to operate upon the work, the ejector bar will travel with the slide, during which movement the springs 102 will hold the ejector bar against the upper ends of the slots 100.

After the work has been formed, and when the slide moves upwardly, the ejector bar will move with the slide, as will also the die 88 and the ejector 95. During this movement the ejector bar will remain in this position with respect to the slide, and will be returned with the slide as the latter moves upwardly, until the ends of the ejector bar contact stops or abutments 103 arranged in the path of movement of the ejector bar. As soon as the ejector bar contacts the stops 103, its motion will be arrested, and the slide may continue its movement in an upward direction. This may be accomplished by reason of the slots 100. As the slide continues to move upwardly, and as the ejector bar is arrested in its movement, the ejector member 95 will be moved in the die 88 against the stress of the spring 96, to eject the work 104 from the die, as shown in Fig. 3. These stops 103 are preferably in the form of screws or bolts adjustably mounted in suitable brackets 105 secured to the press frame, and after the stops have been adjusted, they may be maintained in their adjusted position by suitable nuts or collars 106.

With this improved construction, the load and stresses on the press are taken directly by the fulcrum links 46, thereby obviating the danger of causing the frame to spring, or bringing the punch and die out of working alinement. Also, with this present construction, the crankshaft which operates the slide is located a considerable distance back in the frame, and in a position so as not to be in the way of the operator when the press is operating. Furthermore, the long guiding surface of the slide insures better operation of the slide, and the adjustment screw which connects the parts of the slide will always be in a right angle position with respect to the bed, and allows for considerable adjustment of the slide. The entire strain of the press is taken by the fulcrum links which support the operating lever, with the result that it is not necessary that the

frame be constructed of heavy material, since it will only be necessary to provide sufficient rigidity to guide the slide and support the crankshaft and moving parts.

While the preferred form of the invention has been herein shown and described, it is to be understood that various changes may be made in the details of construction and in the combination and arrangement of the several parts, within the scope of the claims, without departing from the spirit of this invention.

What is claimed as new is:

1. In a metal working power press, a frame mounted on a base, a work supporting bed, a reciprocable slide, a die carried by the slide and cooperating with an alined die carried by said bed, a guide for the slide, a driving shaft, an operative connection between the shaft and said slide for reciprocating the latter, means whereby the slide and bed may be inclined with respect to the base, said connection embodying a lever, a fulcrum link for the lever separate from said frame, a pivotal connection between the lever and said fulcrum link, and means forming a rocking connection between the fulcrum link and said frame remote from said bed, whereby the slide, the guide and the work supporting bed will be maintained in proper working alinement under all stresses of the slide upon the work and in any position of the slide and bed with respect to said frame.

2. In a metal working power press, a frame, a work supporting bed on the frame, a reciprocable slide, a die carried by the slide and cooperating with an alined die carried by said bed, a guide for the slide, a driving shaft, an operative connection between the shaft and said slide for reciprocating the latter, said connection embodying a lever, a fulcrum link for the lever separate from said frame, a pivotal connection between the lever and said fulcrum link, and means forming a rocking connection between the fulcrum link and said frame remote from said bed, whereby the slide, the guide and the work supporting bed will be maintained in proper working alinement under all stresses of the slide upon the work, said driving shaft being disposed in proximity to, in the rear of and spaced from said bed.

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