June 17, 1941. W. W. CRILEY 2,245,573

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Filed Jan. 29, 1938 3 Sheets-Sheet 1

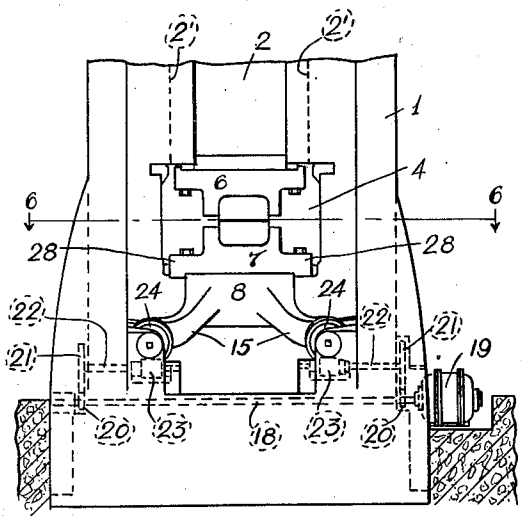


Fig. 1

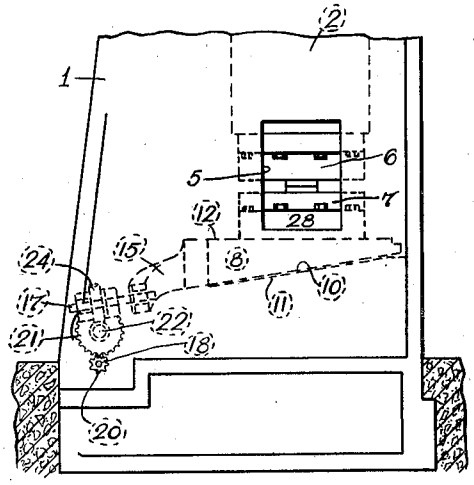


Fig. 2

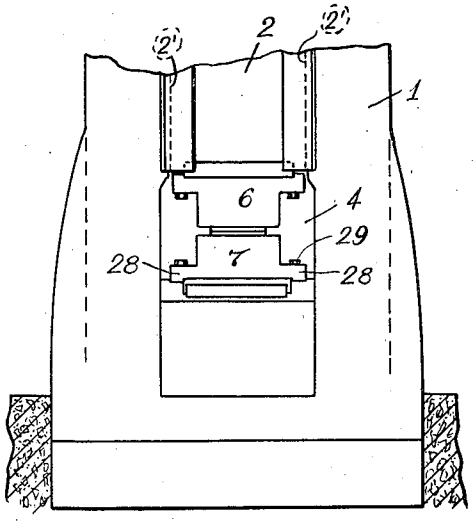


Fig. 3

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June 17, 1941. W. W. CRILEY 2,245,573

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Filed Jan. 29, 1938 3 Sheets-Sheet 2

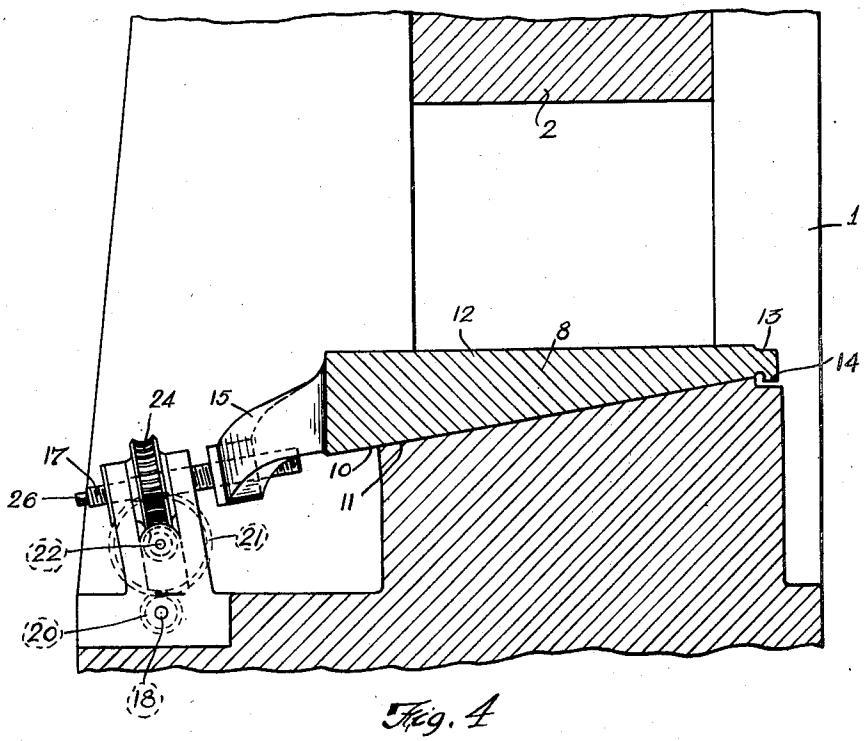


Fig. 4

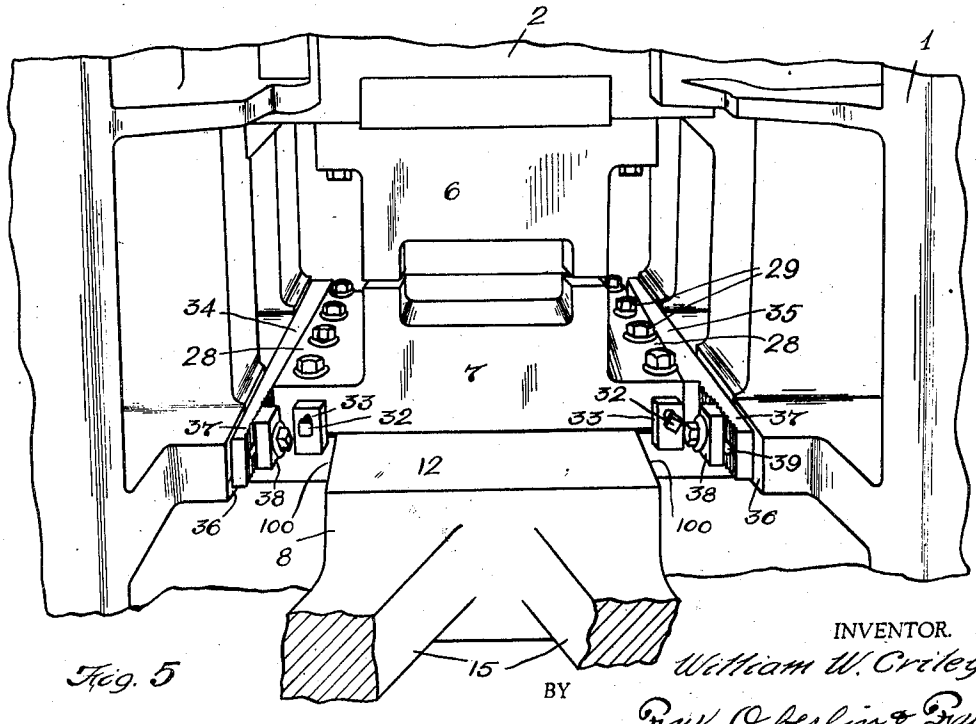


Fig. 5

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June 17, 1941. W. W. CRILEY 2,245,573

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Filed Jan. 29, 1938 3 Sheets-Sheet 3

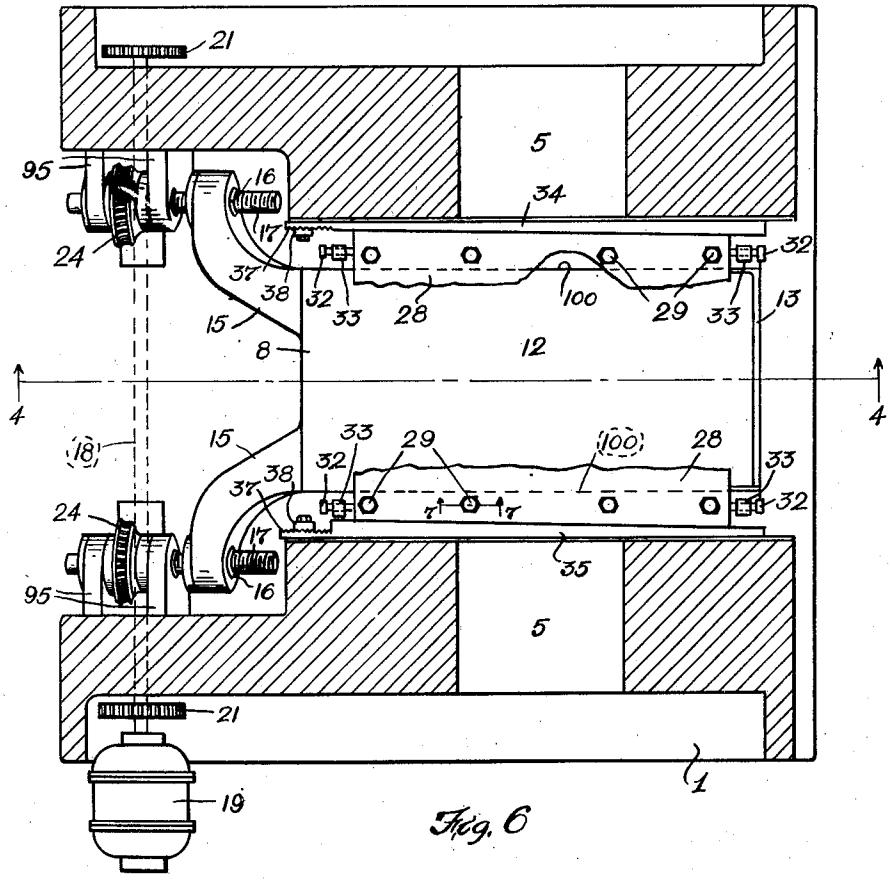


Fig. 6

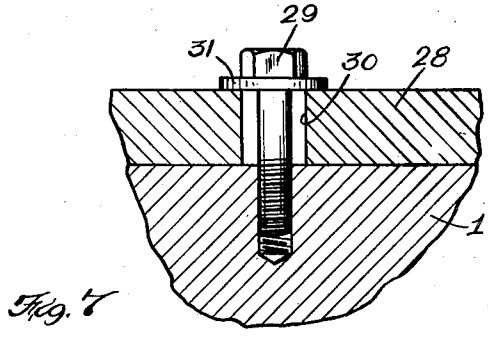


Fig. 7

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Patented June 17, 1941 2,245,573

UNITED STATES PATENT OFFICE

2,245,573

FORGING PRESS

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Application January 29, 1938, Serial No. 187,715

7 Claims. (Cl. 78—36)

This invention relates to a forging press and is particularly intended for a vertical press in which the lower part of the die is held stationary in the line of travel of the ram which carries the upper die part, and in which the final die adjustments are given to the means which hold the stationary die. In such presses the vertical adjustment of the lower die is usually accomplished by longitudinal movement of a wedge beneath the die seat. In its principal aspects my invention is particularly directed to improved means for accomplishing the adjustment of the stationary die in such a press.

One object of the present invention is to give a smoother and hence more accurate adjusting movement to the supporting wedge. Another object is to so arrange the adjusting elements that the means for vertically adjusting the lower die seat do not interfere with the operator's access to the rear of the work space for feeding work or removing work from the machine, changing dies, making adjustments, and for service generally.

Another object is to provide a means whereby the adjustment of such a wedge can be accomplished readily, smoothly and accurately by power instead of by hand, and hence reduce the time required for setting dies, diminish the strain upon the operator in making adjustments, and generally facilitate operation.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawings and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In the accompanying drawings:

Fig. 1 is a rear elevation of the lower portion of a press of the character described, showing the application of my invention thereto;

Fig. 2 is a corresponding side elevation;

Fig. 3 is a corresponding front elevation;

Fig. 4 is a vertical central section on the plane 4—4 of Fig. 6, in the direction of the arrows, omitting the die bolsters and dies;

Fig. 5 is a perspective looking into the die space from the rear, the line of vision being slightly downward;

Fig. 6 is a horizontal view partly in section and partly in plan, taken on the plane 6—6 of Fig. 1, and breaking away the central part of the lower die bolster;

Fig. 7 is an enlarged detail partly in section and partly in elevation on the vertical plane 7—7 of Fig. 6.

As is usual in this type of press, the mechanism is mounted in a massive cast steel frame 1 of the box type, cross-connected at top and bottom, and having a ram 2 driven in guides 2' by mechanism in the upper part of the frame, which mechanism is of a more or less conventional character and forms no part of the present invention. A large horizontal opening from front to rear, best seen in Figs. 1 and 3, provides a work space 4 open through from front to rear of the frame 1, in which space the dies and their supports are accessibly placed. The work space 4 can also be reached by somewhat smaller side openings 5, which are particularly useful for certain operations such as securing, adjusting and detaching the die bolsters, all as described in detail hereafter.

The ram 2 carries the usual upper die bolster 6 bolted thereto. The lower die bolster 7 is secured in the frame above the adusting wedge 8 by a special fastening arrangement described in detail hereafter and illustrated particularly in Figs. 5 and 6. The usual upper and lower dies are held in the bolster die spaces.

The lower surface 10 of the wedge and the corresponding seating surface 11 in the frame 1 are equally inclined, bringing the top face 12 to a horizontal plane, Fig. 4. The front edge of the wedge is downwardly lipped at 14, Fig. 4, to limit rearward travel. Two massive arms 15, preferably integral castings with the wedge body, extend outwardly, downwardly, and rearwardly from the outer rear edges of the wedge 8, as best seen in Figs. 1 and 6, thus permitting a workman to get close to the die space 4 at the rear of the machine for feeding, adjustment or any other necessary purpose. The outer ends of these arms are directed transversely to the main body of the wedge and are perforated and internally bushed and threaded as indicated at 16, Fig. 6, to take correspondingly threaded shafts 17, extending parallel to the slant seat 11. The wedge is traversed by the rotation of the shafts 17.

The preferred form of traversing mechanism comprises a cross shaft 18 driven by a motor 19. Pinions 20 near opposite ends of shaft 19 mesh with spur gears 21 fast to stub shafts 22 suitably journalled in the machine frame and each having fast upon its inner end a worm 23 engaging a worm wheel 24 fast upon the threaded shaft 17.

This arrangement, as apparent from Figs. 1 and 6, is duplicated on each side of the press. The threaded shafts 17 are supported and maintained in place by bearings in upstanding inclined lugs 95 secured to or integral with the machine frame, and the worm gears 24 bear at each face inside these lugs, preventing lateral motion. The outer ends of the shafts 17 are squared as at 26 to permit hand operation by a wrench if necessary.

The wedge movement from front to rear is between side guides 100 in the machine frame 1 and does not include any sideward component. The lower die bolster 7 is mounted in the frame in such a manner that it does not shift position either from side to side or from front to rear when acted upon by movement of the wedge, but only vertically. However, means independent of the wedge are included in the bolster mounting whereby the bolster may be shifted either longitudinally or laterally.

The lower bolster 7 has two heavy integral flanges 28 along its lower sides, extending beyond the wedge space in the frame, as best seen in Figs. 1, 5 and 6. Heavy cap screws 29 pass through these flanges to hold the bolster down. As shown in detail in Fig. 7, these cap screws pass through openings 30 in the flanges considerably larger than the shanks of the screws, so as to permit all horizontal adjustments of the bolster 7. The heads of the screws bear upon heavy washers 31 of sufficient diameter to cover the openings. These cap screws 29 are backed off before the wedge 8 is moved and are again set tight when the proper elevation of the die has been established by wedge movement.

Horizontal set screws 32 threaded horizontally through vertical poppets 33 secured to the frame 1 in front and rear of the bottom of the work space 4 determine the longitudinal position of the bottom bolster 7, as best seen in Fig. 6.

The bolster 7 is adjusted sideways by oppositely directed wedge bars 34, 35, Figs. 5 and 6, of about the same height as the flanges 28, backed against machined surfaces 36 on interior vertical walls of the machine frame 1 at each side of the bottom of the work space 4. These wedges include rear extensions 37 vertically toothed on their front faces as best shown in Figs. 5 and 6. The wedges are held in place by correspondingly toothed blocks 38 bolted through to the machine frame 1, the bodies of the bolts passing through longitudinal slots 39 in the extensions to permit longitudinal movement. It will be observed that by loosening the blocks 38 and moving both wedge bars 34 and 35 backward (toward the observer since Fig. 5 is a rear view), the lower bolster 7 will be moved to the right of Fig. 5 and by the reverse operation will be moved to the left, in either case being held against front and rear movement by the set screws 32 and against vertical movement by the face 12 of the wedge 8. It will of course be understood that the screws 29 will be loosened prior to any movement of the wedge or bolster, and tightened after adjustment is made.

Thus the lateral positioning of the lower die bolster 7 is controlled by moving the wedge bars 34, 35 forward or back, having first of course slacked off the bolts 29, while longitudinal movement is prevented by the set screws 32 in the poppets 33.

Since the inclined faces of the wedge bars 34, 35 which bear against the machined edges of the flanges 28 are vertical, the lifting or lowering of the bolster 7 resulting from forward or rearward movement of the wedge 8 is independent of any position imposed upon the bolster by the wedge bars.

Where the term "longitudinal" is used in certain of the following claims, it means with reference to the front and rear movement of the wedge.

It will be observed that the present arrangement permits ready access to the work spaces of the forging machine without weakening the frame, and particularly, that it does not interfere with access at the rear, inasmuch as the connections between the frame and the wedge, whereby adjustment is accomplished, are removed from the space directly in rear of the wedge, thus leaving the rear of the wedge accessible. Nevertheless the adjusting connections on both sides are always moved together, since each takes motion from the same shaft, which shaft is out of the way of access to the die space.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:

1. In a forging press in combination, a die seat comprising a wedge having an upper horizontal and a bottom sloping face, a sloping seat in the frame for said sloping face, and outwardly extending arms on the rear outer corners of said wedge, synchronous power means engaging said arms for moving said wedge on said sloping seat.

2. In a forging press of the class described, a die supporting and adjusting wedge, extensions on one end thereof directed outwardly, downwardly and sidewardly so as to present a clear middle space adjacent said wedge, interengaged threaded elements connecting said extensions with the press frame and adapted to transmit motion to said extensions, and simultaneous drive means for each of said motion-transmitting elements.

3. Die adjusting means for a forging press comprising a wedge and a die supported thereby, and means for moving said wedge comprising a pair of shafts each separately operatively attached to one end of said wedge outwardly from the sides of the wedge, mechanism for driving each of said shafts, each of said driving mechanisms being also laterally removed from the path of wedge travel and from the work space of the press, and a common drive shaft for both of said driving mechanisms, said drive shaft being located out of a path of access to the wedge.

4. A vertical forging press comprising in combination a seat for a stationary die and a wedge supporting said seat, a pair of arms extending outwardly, downwardly and sidewardly from one end of said wedge, and two sets of mechanism connected to each of said arms for moving said wedge forwardly and rearwardly, said sets of mechanism being disposed and connected to said wedge at positions sidewardly removed from the rear of the wedge, and a power drive connection between said sets of mechanism not substantially above the floor level of the press.

5. Die adjusting means for a forging press comprising a wedge and a die supported thereby, means for restricting the movement of the die to a vertical component of the wedge movement, and

means for moving said wedge comprising a pair of shafts operatively attached to the wide end of said wedge laterally out of the path of wedge travel, mechanism for driving each of said shafts, each of said driving mechanisms being also laterally removed from the path of wedge travel and from the rear of the work space of the press, and a common drive shaft for both of said driving mechanisms, said common drive shaft being located at or below the floor level of the press.

6. In a forging press having a die seat comprising a wedge and an inclined seat in the frame adapted to support a correspondingly inclined face of said wedge slidingly thereon with the other face of said wedge transverse to the axis of the press in combination, arms on the wedge outwardly directed from the rear of the wedge, means engaging said arms for moving said wedge on said seat, power means for driving each of said arms simultaneously, a die bolster supported on said wedge, and die-base holding and adjusting means adjacent said wedge but out of the path thereof and adapted to restrict motion of said bolster to a vertical component of the motion of said wedge.

7. A vertical die press comprising in combination a frame, a work space therein, openings in the front and rear of said frame to said work space, a die adjusting wedge at the bottom of said work space, a pair of arms extending outwardly, downwardly and sidewardly from the end of said wedge, means connecting the arms to said frame, and synchronous power means for operating such connecting means.

WILLIAM W. CRILEY.