Nov. 3, 1959 F. MARTINDELL 2,910,898

RAM ADJUSTMENT MECHANISM FOR PRESSES

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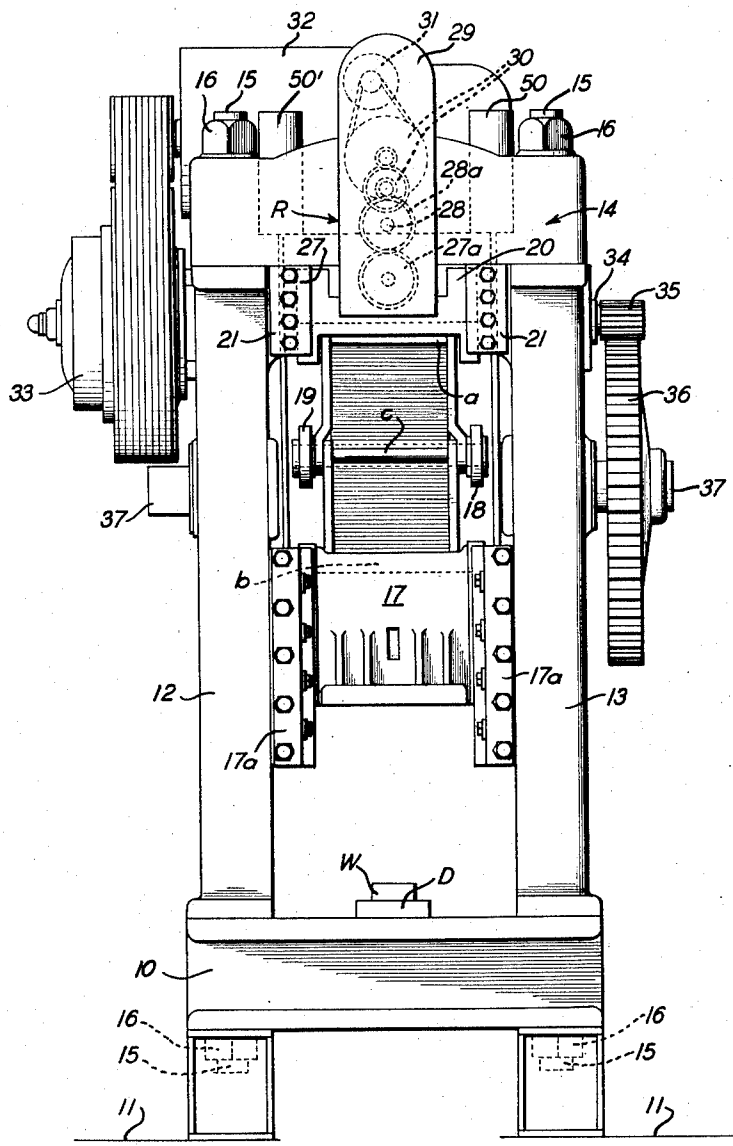


Fig. 1.

INVENTOR.
FRANK MARTINDELL
BY
ATTORNEY

Nov. 3, 1959 F. MARTINDELL 2,910,898

RAM ADJUSTMENT MECHANISM FOR PRESSES

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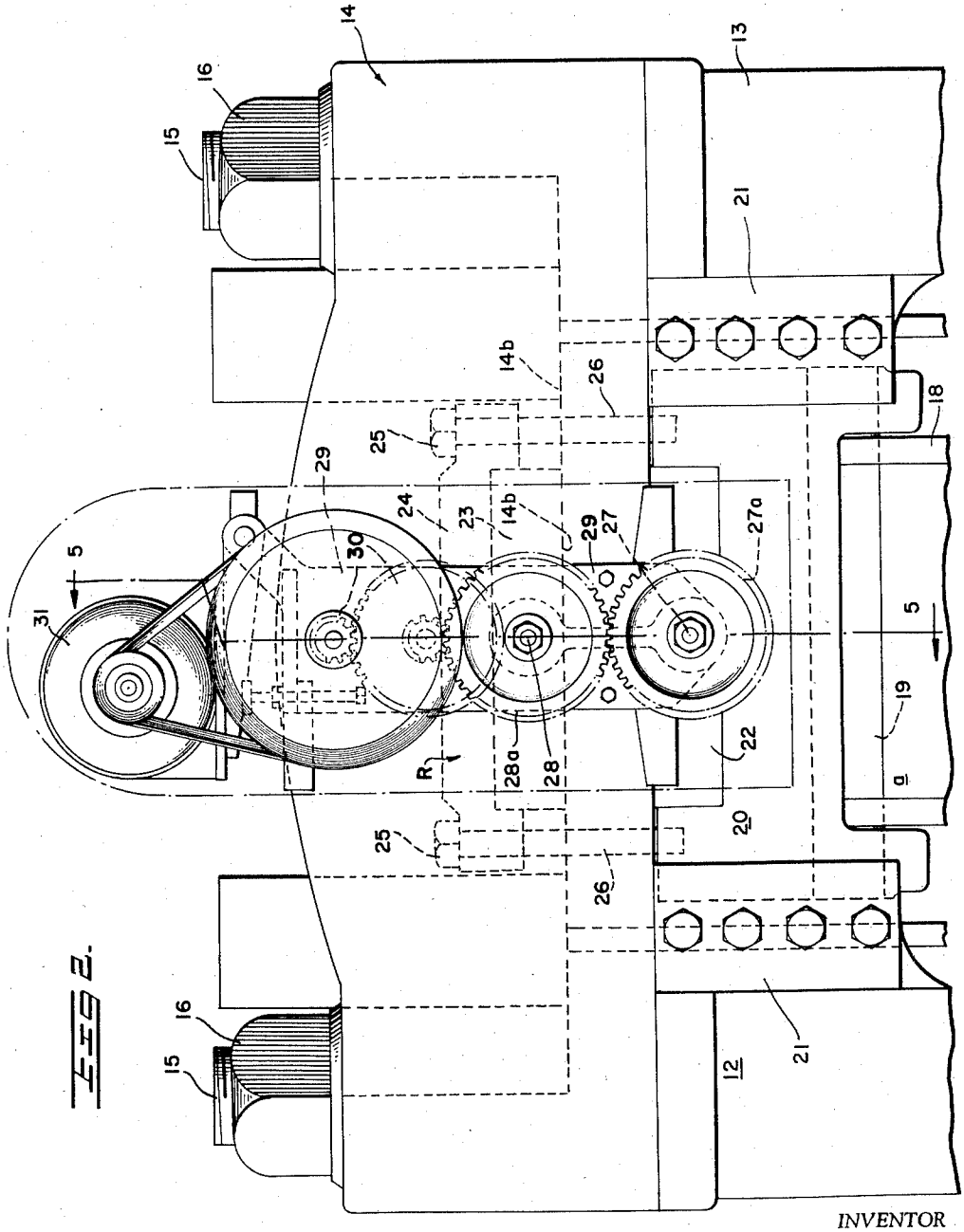


FIG 2.

INVENTOR

FRANK MARTINDELL

BY Robert P. Walters, Jr.

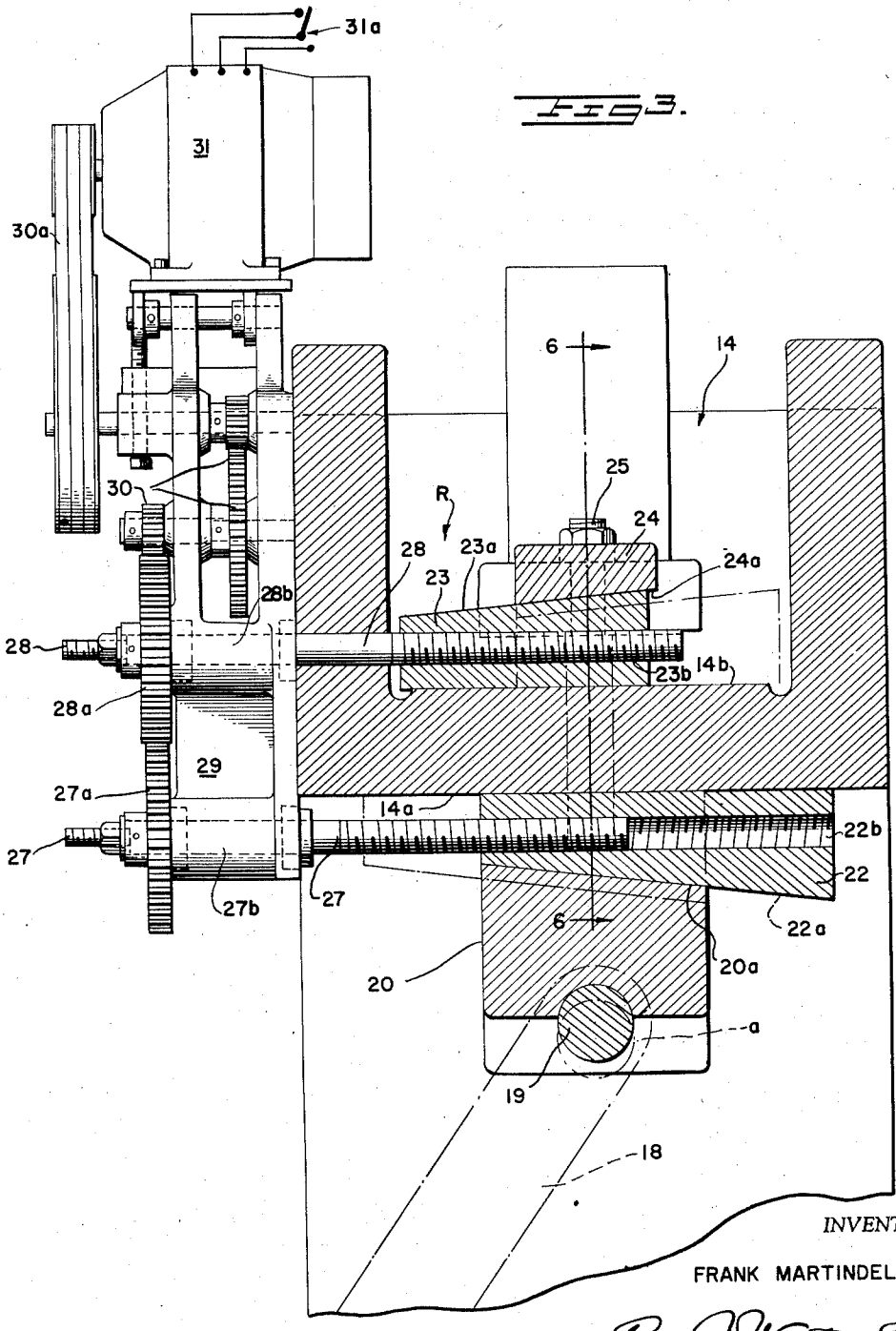
ATTORNEY

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RAM ADJUSTMENT MECHANISM FOR PRESSES

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FIG. 3.



INVENTOR

FRANK MARTINDELL

BY Edward F. Walters Jr.

ATTORNEY

Nov. 3, 1959 F. MARTINDELL 2,910,898

RAM ADJUSTMENT MECHANISM FOR PRESSES

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Fig 4.

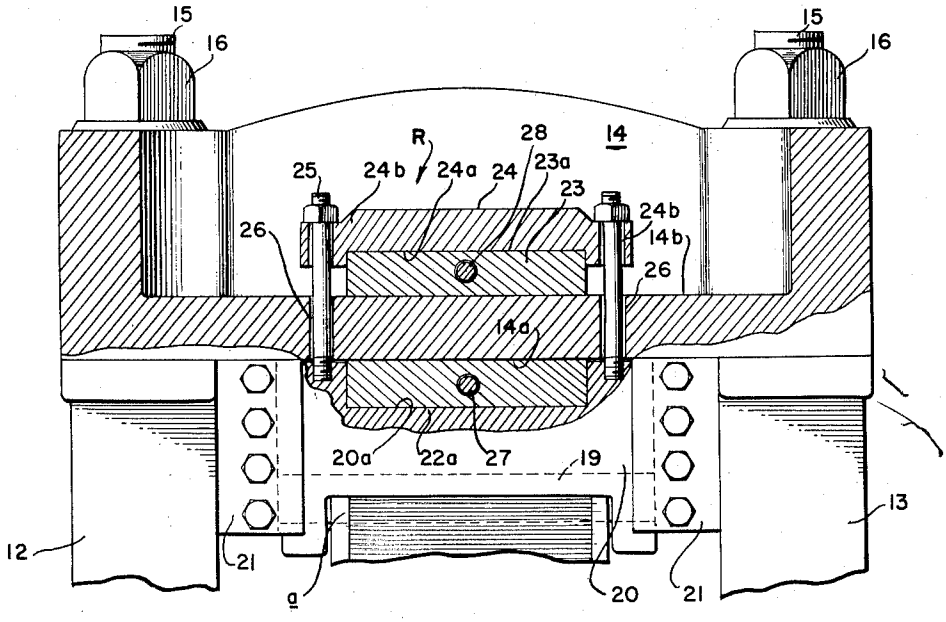
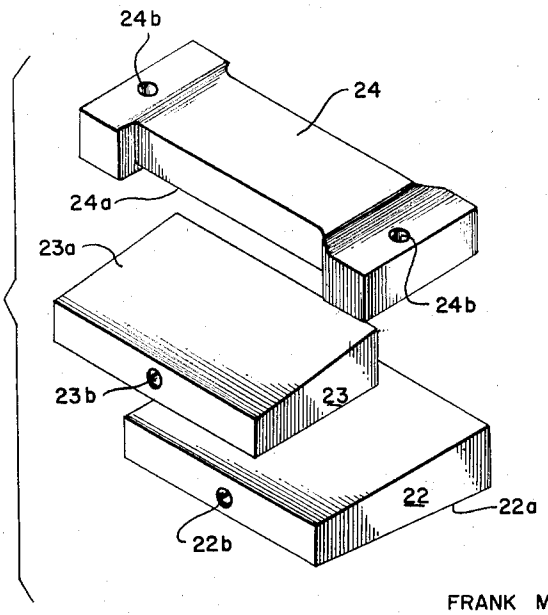


Fig 5.



INVENTOR

FRANK MARTINDELL

BY Edward P. Walton Jr.

ATTORNEY

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2,910,898

RAM ADJUSTMENT MECHANISM FOR PRESSES

Frank Martindell, Bridgeton, N.J., assignor to Ferracute Machine Company, Bridgeton, N.J., a corporation of New Jersey

Application May 2, 1957, Serial No. 656,603

9 Claims. (Cl. 78—41)

The present invention relates to improvements in presses and more particularly to an improved means for vertically adjusting the ram or tool-slide, especially of "knuckle-joint" or toggle presses.

With respect to adjustment of the ram or tool-slide, it has heretofore been proposed to adjust the ram or tool-slide of presses vertically to vary its position at the end of its stroke relative to the work-piece for purposes well understood in the art; and, to accomplish this, a wedge has been interposed between the crown of the press and a supporting block, underlying the crown, for the linkage that supports and operates the ram or tool-slide. Such arrangements have usually included a spring-suspension for the block which, in some instances, biases the block to move upwardly with respect to the frame and crown at all times (in which case, the springs must be very large and strong) and, in other instances, a spacer device is employed, permitting the block to be locked fixedly with respect to the crown after the proper wedge adjustment has been made, the springs merely serving to temporarily support the block in its position when unlocked from the crown. In either case, it is necessary to unlock the block from the crown in order to effect the desired adjustment; and, in most cases, this requires the operator to undo nuts at the top of the press which may be from 9 to 12 or more feet high, then make the proper adjustment between the block and crown and, then, relock the block to the crown.

The object of the present invention is to firmly and fixedly anchor said supporting block to the crown so as to rigidly anchor the ram or tool-slide supporting means to the crown at all times while having collocated members adjustable relative thereto and to each other so that, by simultaneous movement of said adjustable members, the block may be vertically adjusted relative to the crown without disturbing its fixed anchored relation therewith, thus eliminating the need of spring suspension and the need of first unlocking the block from the crown and then, after the adjustment, locking the block to the crown.

Another object of the invention is the provision of a power-actuated means, responsive to the will of the operator or other control means, for actuating said adjustments simultaneously to vary the position of the tool-slide at the end of its work-performing stroke.

A still further object of the invention is the provision of a press having the above described features that possess a relatively simple and inexpensive construction, yet rugged to endure the tremendous pressure under which the press operates in the performance of its work and which features may be quickly adjusted to best meet the requirements of the particular work to be done, thus increasing the output of the press.

To attain these objects, as well as other 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.

In the drawings, which show, by way of example, one embodiment of the invention as at present devised:

Figure 1 is an elevation of the front side of a press equipped with the present invention;

Figure 2 is an enlarged fragmentary elevation of the upper end of the press shown in Figure 1 and illustrating the tool-slide adjustment mechanism mounted thereon;

Figure 3 is a vertical sectional view through the tool-slide adjusting mechanism and taken substantially on line 5—5 of Figure 2;

Figure 4 is a vertical sectional view through the tool-slide adjusting mechanism taken substantially on line 6—6 of Figure 3;

Figure 5 is a disassembled view of the coacting wedges and their retaining plate.

The invention may be employed with presses of different types but is here shown in connection with a, so-called, vertical column press, wherein a press bed **10** is elevated from and suitably anchored to a foundation or floor **11**; and, from the opposite ends of said bed, arise columns **12** and **13**, forming the side frames of the press, upon the upper ends of which a crown **14** is supported and spans said columns, thus overlying said bed. Tie rods **15** pass through said columns and have their opposite ends extending through openings in said crown and bed, respectively, at their four corner portions, the extremities of said rods being threaded to receive nuts **16**, which bear against the crown and bed to tie and hold the parts of the frame in fixed relation to each other.

A ram or tool-slide **17** is disposed between and mounted in suitable guideways 17^a on the columns **12** and **13** for vertical reciprocation and is supported from the crown **14** and actuated by a toggle-linkage **18** (sometimes called a "knuckle-joint"), although other suitable means may be employed. The upper end *a* of this supporting connection **18** is suspended from the under side of a bearing-block **20** by means of a pivot pin **19**. The bearing-block **20** is disposed in juxta-relation with the under side of that portion of the crown **14** overlying the ram **17** and has its end portions slidably mounted in guideways **21** carried by the side frames **12** and **13**, so that said bearing block **20** may be adjusted to vary the position of the pivot pin **19** vertically relative to the bed **10**.

In carrying out this invention, the adjustment of the ram may be effected by the mechanism R, wherein a wedge member **22** is interposed between the bottom surface 14^a of the crown **14** and the underlying surface 20^a of the bearing block **20** and a similar wedge member **23** is interposed between the top surface 14^b of the crown **14** and the under surface 24^a of a strap-plate **24** overlying the wedge **23**, as particularly shown in Figures 3, 4 and 5, so as to be simultaneously movable relative to the crown in a direction substantially transverse of the plane of the movement of the ram **17**. These parts and their contiguous surfaces are held firmly in contact by rods **25** extending through apertures 24^b in the ends of the strap-plate **24** and slidably projecting through aligned openings **26** in the crown **14** and having their free extremities threaded into the end portions of the bearing plate **20**.

In the arrangement shown for the present embodiment, the wedges **22** and **23** may be substantially identical, as shown particularly in Figures 3 and 5—except, possibly, for their length and width—and the contiguous surfaces 14^a and 14^b of the crown and the wedges are flat and parallel to the movement of the wedges; while the contiguous surfaces 22^a and 20^a of the wedge **22** and its juxtaposed bearing block **20** and the contiguous surfaces 23^a and 24^a of wedge **23** and its juxtaposed strap-plate **24** are correspondingly and cooperatively tapered. The tapers of the wedges and the coacting tapered surfaces of their opposing members **20** and **24** are, preferably, of the

same degree and extend in the same directions. Thus, when the bolt rods 25 are properly tightened to bring the parts in contact and to allow for the wedging movement, the parts are rigidly and firmly anchored to the crown plate while, at the same time, permitting the position of the pivot pin 19 to be adjusted vertically with respect to the crown when the wedges are moved simultaneously in opposite directions.

It is within the purview of the present invention that the particular position of the wedges and of their coacting tapered surfaces may be varied from that shown in the drawings, as well as the direction of movement of the wedges relative to each other, so long as the same adjusting movement is obtained while maintaining the bearing block 20 in rigid anchored position with respect to the crown.

In accordance with the embodiment of the invention, as shown in the drawings, the wedges 22 and 23 are moved simultaneously in opposite directions by means of screw shafts 27 and 28, respectively. One end of each shaft is journalled in bearings 27^b and 28^b, respectively, formed in a bracket 29 which is removably mounted on the front face of the crown 14. The other ends of said screw-shafts 27 and 28 are elongated and appropriately threaded and extend, respectively, through threaded bores 22*b* and 23*b* in the wedges 22 and 23 parallel to the path of movement of said wedges. The journalled ends of each of said screw shafts have hand-change-gears 27^a and 28^a, respectively, keyed thereon and meshing with each other. These gears 27^a and 28^a are driven through a reduction gearing, generally indicated at 30, by means of a belt-pulley arrangement 30^a from a reversible electric motor 31. The motor 31 is mounted on the top portion of the bracket 29 for convenience and to provide a self-contained unit R. Thus, when a switch 31^a (Figure 3) is selectively operated by the operator, or by some other control device on the machine (not shown), the reversible motor 31 rotates in the proper direction to cause the wedges to move in opposite directions, and to the same extent of movement, for varying the vertical position of the block 20 and, as a consequence, varying the position of the end of the work-performing stroke of the tool slide as may be required or desired, without the need of the operator climbing to the top of the machine to loosen or tighten nuts, bolts, springs or the like.

The ram or tool-slide 17 is actuated by an electric motor 32 mounted on top of the crown 14 and which drives a clutch-brake mechanism 33 mounted on a back shaft 34 journalled on the side frames 12 and 13. A pinion 35 fast to the shaft 34 meshes with gear 36 fast on crank-shaft 37 extending across the back of the press frame and also journalled on side frame members 12 and 13.

A pitman-rod 38 connects the crank of the crank-shaft 37 to the center pivot *c* of the toggle linkage 18 and the lower link of said linkage is pivoted at *b* to the top of the ram or tool-slide 17, whereby the latter is reciprocated in its guideways 17^a so that the tool or die T may be moved to-and-fro relative to the work-piece W in or on the holder or die D supported by the press-bed 10.

After the work-piece W has been shaped, formed or otherwise worked upon by the tool or die T or D, it is ejected automatically from the die or holder D on the bed, after the ram or tool-slide has receded sufficiently, by the improved ejector mechanism shown and described in my copending application Ser. No. 727,016.

From the above, it should be clear that a device constructed in accordance with this invention as herein shown and described attains all of the objects aforementioned with their attendant advantages. While the preferred form of the invention has been shown and described herein, it is to be understood that various changes may be made in details of construction and in the combination, arrangement and organization of the several parts without departing from the spirit of this invention and that the invention is only to be limited by the scope of the appended claims.

That which is claimed, as new and to be secured by Letters Patent, is:

1. In a press, a frame having a bed, a tool-slide slidably mounted on said frame for to-and-fro movement relative to said bed, an adjustable bearing block for said tool-slide having bearing surfaces disposed on opposite sides of a relatively fixed portion of said frame, an operative connection between said block and said tool-slide through which working pressures are transmitted from said slide to said frame, collocated members disposed between said opposite surfaces of said frame and the adjacent surfaces on said block opposing said surfaces on said frame respectively to rigidly anchor said block to said frame, said collocated members being mounted for adjustment simultaneously to vary the position of said block with respect to said fixed portion of said frame and, hence, of said tool-slide at the end of its work-performing stroke relative to said bed, without breaking the rigid anchor connection of said block with said frame, and a single controllable means common to said collocated members and operatively connected therewith for effecting said simultaneous adjustment thereof.

2. The subject-matter of claim 1, wherein the collocated members are wedges slidably mounted for reciprocal movement transverse of the movement of said tool-slide to change the position of said block in one direction vertically relative to said fixed portion of said frame, by one direction of movement of said wedges, respectively, and to change the position of said block in the other direction vertically relative to the said fixed portion of said frame, by the other direction of movement of said wedges, respectively.

3. In a knuckle-joint press, a frame having a bed and a head-end portion, said head-end portion having opposite surfaces in planes substantially parallel to said bed; a tool-slide slidably mounted on the frame between said bed and said head-end portion; a block disposed at the head-end portion of the frame and having surfaces opposing the surfaces on said head-end portion; a toggle-linkage connecting said tool-slide with said block; means for actuating said toggle to reciprocate said tool-slide; a pair of wedges, one of which is disposed between one of said surfaces on the block and the opposing surface on said head-end portion and the other of which is disposed between the other surface of said block and the opposing surface of said head-end portion, and both said wedges being in contiguous bearing contact with the opposing adjacent surfaces of the block and the head-end portion, whereby the head is rigidly anchored to the head-end portion of the frame; the surfaces contiguous with the tapered surfaces of the wedges being cooperatively tapered, whereby the block may be adjusted relative to the bed when said wedges are moved simultaneously with corresponding withdrawing and inserting movements, respectively, without disturbing said rigid anchor connection.

4. In a press, a frame having a bed and a crown, a tool-slide mounted on the frame for reciprocation between the crown and said bed, a block disposed between the slide and said crown and having surfaces opposing top and bottom surfaces of the crown, a wedge interposed between the top face of the crown and the opposing surface of said block and another wedge interposed between the bottom face of the crown and the opposing surface of said block, the surfaces contiguous with the wedge surfaces of the wedges being correspondingly and oppositely tapered to coact therewith and all of the contiguous surfaces being in bearing contact whereby the block is rigidly secured to the crown and may be adjusted to and from the bed when said wedges are moved simultaneously to withdraw one wedge and insert the other wedge in corresponding degrees, a linkage between the

block and said tool-slide, and means for actuating said linkage to reciprocate the slide to and from said bed.

5. The subject-matter of claim 4, wherein said faces of the crown engaged by said wedges are parallel planar surfaces and the surfaces of the wedges engaging the surfaces of the block are oppositely tapered coacting surfaces.

6. The subject-matter of claim 4, wherein each wedge member has threaded therein a journaled screw-shaft, a gear train connecting said shafts to rotate the same simultaneously to move one wedge inwardly and the other wedge outwardly in corresponding wedging degrees, and controllable means for actuating said gear train in either direction of rotation.

7. A tool-slide adjusting means for presses, to vary the end position of the work-performing stroke of the tool-slide, said adjusting means comprising a bearing block supporting the tool-slide, said bearing block being disposed under a fixed portion of the frame of the press, means suspending the bearing block from said fixed portion of the press including a member overlying said fixed portion of the press, a wedge interposed between the lower surface of said fixed portion of the press and said bearing block and another wedge interposed between the upper surface of said fixed portion of the press and the overlying member of said suspension means for the block, whereby the block is rigidly anchored to said fixed portion of the press when said wedges are in full contact with the adjacent opposing surfaces of said other parts, and controllable means for moving said wedges simultaneously with corresponding withdrawing and inserting movements, respectively, whereby the block may be adjusted relative to said fixed portion of said press.

8. An adjusting means for presses for varying the relative positions of two parts of the press which perform work on a work-piece in the press wherein at least one of said parts is movable to-and-fro relative to said other part, said adjusting means comprising a member adapted to be connected to said movable part and having surfaces disposed in opposing relation to opposite surfaces of a portion of the frame of the press, a wedge interposed

for slidable inserting and withdrawing movement between each of said opposing surfaces of said member and said frame, respectively, with the surfaces contiguous to the tapered surfaces of the wedges being correspondingly tapered to coact therewith and with all of the contiguous surfaces being in bearing contact, said wedges being positioned in compensating order to shift said member in one direction, when said wedges are slid simultaneously in one of their respective inserting and withdrawing movements, and to shift said member in an opposite direction, when said wedges are slid simultaneously in the other of their respective inserting and withdrawing movements; and a single means for actuating said wedges simultaneously.

9. An adjusting means as set forth in claim 8 wherein the single actuating means includes a shaft for each of said wedges journaled in a fixed bearing and having a thread feeding connection with its wedges, a change-gear on each of said shafts, a controllable and reversible motor, and a drive connection from said motor to said change-gears for actuating said shafts simultaneously to effect said movements of said wedges.

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