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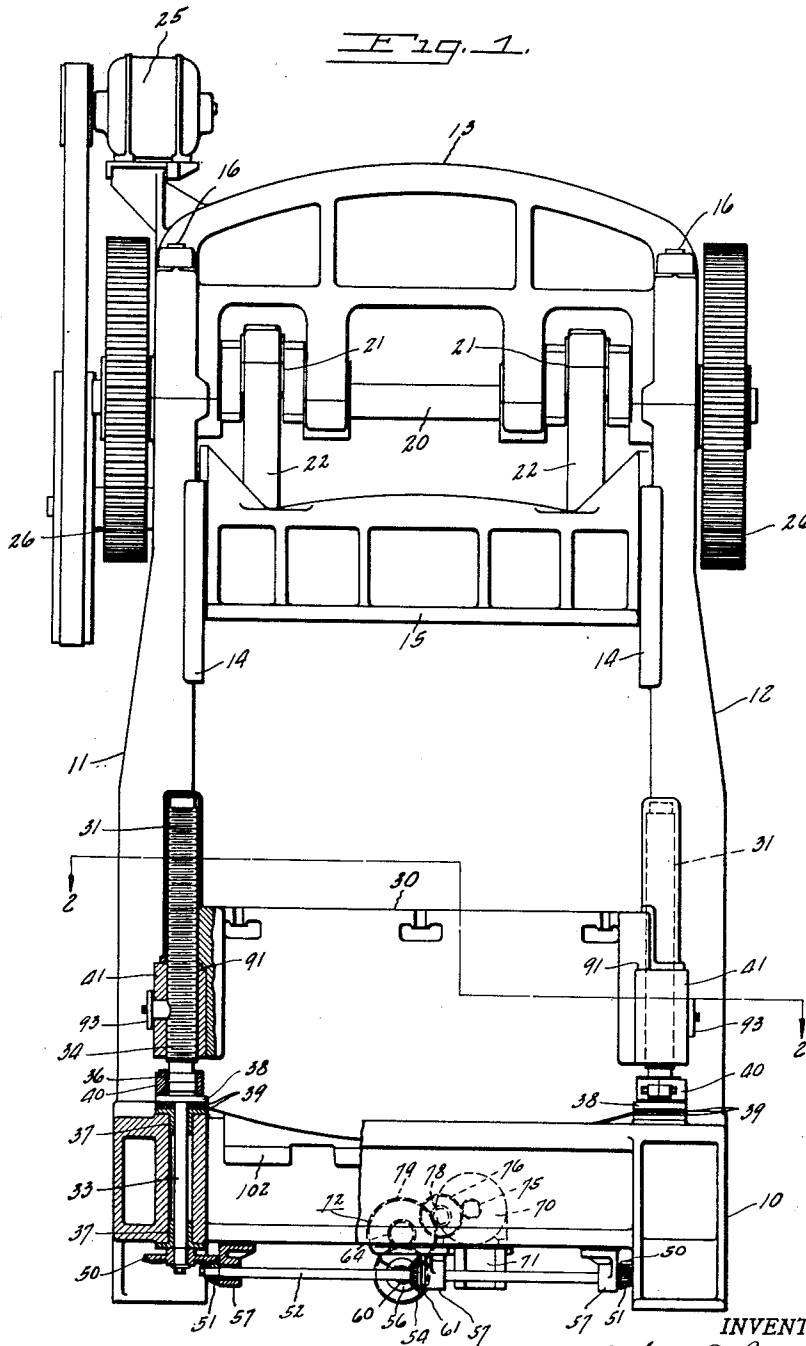
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PRESS

Filed May 29, 1928

2 Sheets-Sheet 1



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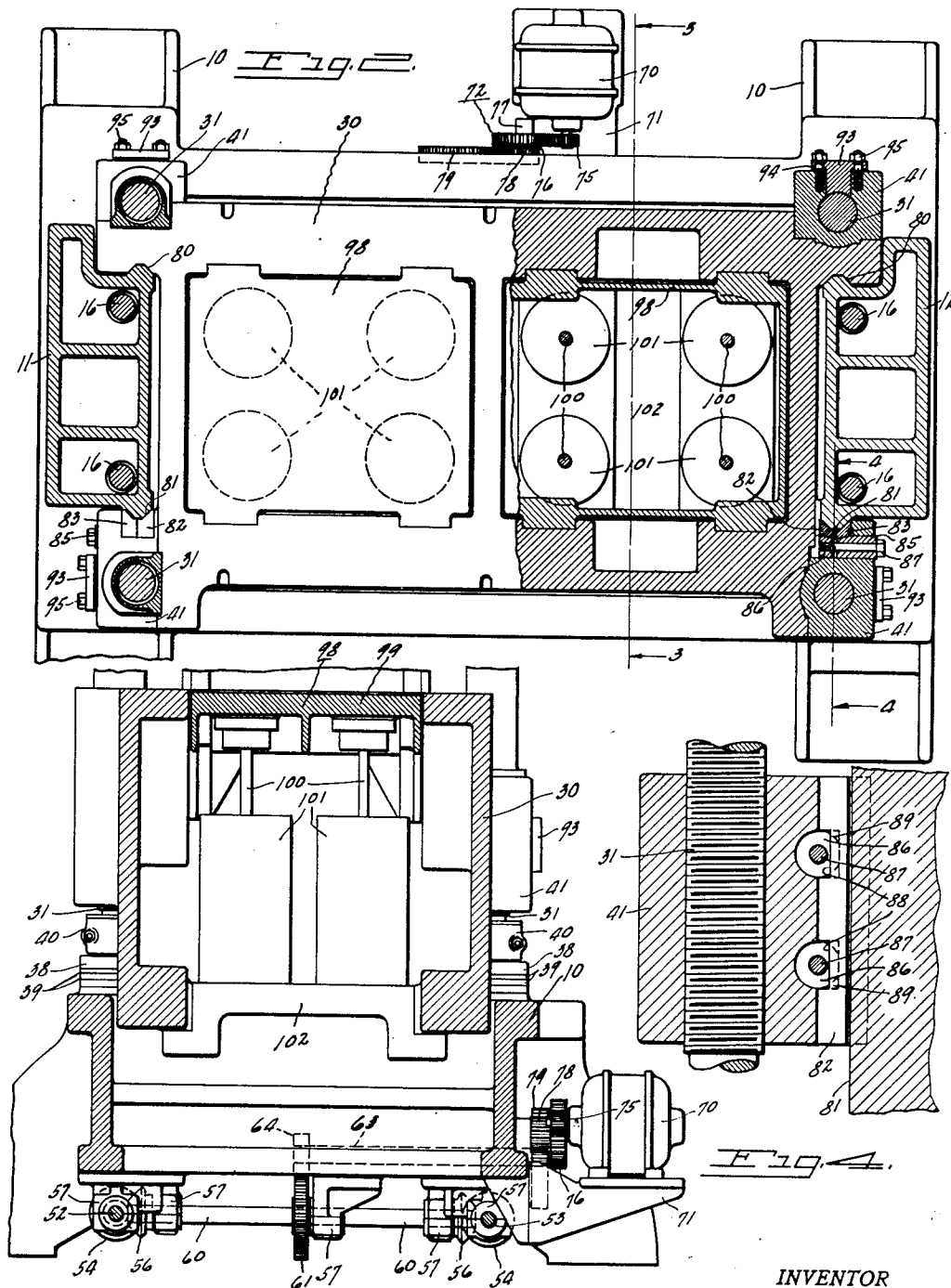


Fig. 3.

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PRESS

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This invention relates to apparatus for working metal, and more particularly to a press.

One of the principal objects of this invention is to provide a press having an adjustable bed which is constructed for a wide range of adjustment to meet varying operating conditions.

Another object is the provision of a press of this character having novel means for securely and rigidly holding the bed in any desired position of adjustment.

A further object of this invention is to provide a press having an adjustable bed which is supported for easy and quick adjustment and which is provided with adjusting mechanism constructed to insure uniformity of adjustment of all parts of the bed.

Still another object of this invention is to provide a press having an adjustable bed in which certain parts of the supporting and adjusting means for said bed are made readily detachable to facilitate disassembly.

Other objects and advantages of this invention will be apparent from the following description when taken in connection with the accompanying drawings.

In the drawings in which like characters of reference designate like parts throughout the several views thereof,

Fig. 1 is a front elevation of a press constructed in accordance with this invention, having parts at one side broken away and shown in section.

Fig. 2 is a horizontal sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a vertical sectional view taken on the plane of the line 3—3 of Fig. 2; and

Fig. 4 is a section on the line 4—4 of Fig. 2 through the bed holding means.

As illustrating a preferred embodiment of the invention there is shown in the drawing a press having a frame or stationary part which comprises a stationary base 10, side frame members or uprights 11 and 12, and an arch member 13, these members being rigidly held together in fixed positions by any suitable means such as tie rods 16, shown to be four in number.

The uprights 11 and 12 are provided at 14

with guides for the reception of a slide member or plunger 15 which is adapted to reciprocate upwardly and downwardly therein. The slide member 15 is actuated by suitable driving mechanism which, as herein shown, includes a drive shaft 20 rotatably mounted in the frame, cranks 21 formed on the drive shaft, and connecting rods 22 pivotally connected at one end with the cranks 21 and at the other end (not shown) to the slide 15. Any suitable driving means for the drive or crank shaft 20 may be used, and as shown an electric motor 25 actuates said drive shaft 20 through the medium of a reduction gearing illustrated at 26 which may be of any suitable character.

As is usual with presses of the character described, the metal to be worked is placed below the slide member or plunger 15 on a suitable bottom die, and is operated upon by a die carried by the plunger. The lower face of the slide member 15 is therefore so constructed that an upper die or punch may be secured thereto for movement with the slide member. The movement or stroke of the slide member 15 of course depends upon the throw of the crank 21.

The press illustrated is a double crank press. Such presses are often constructed in very large sizes. In many large-size presses the distance from the bottom of the slide member 15 to the top of the bed when the slide member is in its extreme upper position is often as much as six or seven feet, to give a wide range of operating conditions. Herefore, when the work required materially less than this maximum distance, as—for example—when thin dies are used, it has been necessary to fill or “pack up” the space between the bed and the slide member by the means of metal plates or “ring risers” which are usually constructed so as to have generally the same outside dimensions as the bed, and having an opening through them which matches the opening in the bed. The ring risers are usually constructed of varying thicknesses, so that the bed may be built up to the particular working height desired. For example a press may be furnished with two such risers, one having a thickness of

twenty inches and the other having a thickness of twelve inches; or again a press may be furnished with three risers having thicknesses of, say, eight inches, twelve inches, and twenty inches, respectively. In large-size presses these risers are extremely heavy often weighing as much as twenty thousand to twenty-five thousand pounds. The necessary and frequent change or adjustment in such a press, involving the removal or replacement of risers is obviously accomplished only with difficulty and the loss of considerable time. Further, the use of risers presents a problem in the storage of such risers when not in use.

According to the present invention the use of risers is eliminated. An adjustable bed is provided having a range of adjustment sufficient in itself to meet varying operating conditions. When dies of different height or thickness are to be used, it is only necessary to adjust the position of the bed to compensate for the variation in the height of such dies. This greatly simplifies die changes, and makes it unnecessary to provide storage space for risers, as the latter may be wholly eliminated.

Referring to the drawings an adjustable bed 30 is interposed between the uprights 11 and 12. This adjustable bed 30 is supported by four screw members or supports 31, which are symmetrically positioned with respect to the bed preferably one at each corner thereof. Each of the screw members is preferably formed in two portions, there being a lower or shaft portion 33 and an upper or screw portion 34. The frame of the press is provided with bearings 37 in which the shaft portions 33 are rotatably mounted. Near the upper end each shaft portion 33 is enlarged as shown at 38 to provide a step bearing surface preferably integral therewith cooperating with the upper end of the top bearing 37. Washers 39 are interposed between the enlargement 38 and the bearing surface of the bearing 37 and to reduce friction of the parts such washers may, if desired, be perforated and provided with oil grooves. The top of each shaft portion 33 cooperates with the enlarged lower end of the threaded portion 34 to provide a collar construction by which the two parts of the screw members are detachably joined together as by means of the split attachment clamps 40 indicated in Fig. 1 which are securely keyed to the ends of both shaft portions to rigidly interconnect these portions in a readily detachable manner. The key, 36, which interconnects the shaft portions has a length equal to the combined collared ends of the shaft portions and extends into the split clamp 40 as well as into the collared ends of the shaft portions. Such construction, while firmly and rigidly interconnecting the shaft portions, permits the lateral removal of the upper shaft portion 34

after the key and clamp have been removed.

Cooperating with each of the screw supports 31 is a suitable bracket nut 41 detachably carried by the adjustable bed 30, and internally threaded and arranged so that the weight of the bed is evenly divided between the supporting nuts. By simultaneously rotating the screws 31 the adjustment of the bed can be varied as desired.

Suitable actuating mechanism is provided for rotating the screw supports to effect adjustment of the bed. As shown each shaft portion 33 is provided at its lower end with a bevel gear 50, which meshes with a cooperating pinion 51. As shown in Fig. 1 two pinions 51 are carried at the front of the press by shaft 52, and two at the rear of the press by shaft 53. Each of the shafts 52 and 53 has centrally mounted thereon a miter gear 54 respectively, which gears are in turn engaged by miter gears 56. The miter gears 56 are carried at the ends of a shaft 60, which has mounted thereon midway between these miter gears a spur gear 61. Suitable bearings 57 are provided for these various shafts on the press base. Mounted directly above shaft 60 is a shaft 63 which carries a pinion 64, which meshes with spur gear 61. The shaft 63 is thus the drive shaft for the adjusting mechanism. By this arrangement a symmetrical drive for the adjusting mechanism is obtained. Each of the screw supports 31 is positively actuated through a gear 50. Each of the shafts 52 and 53, which carry the pinions meshing with the gears 50 are in turn symmetrically driven through gear 54 mounted at the center of each shaft. The drive shaft 63 in turn symmetrically drives the shaft 60 through the spur gear 61 which is mounted at the center of the shaft 60. This symmetrical drive for the adjusting mechanism obviates any tendency toward uneven turning of the screws, results in certain and easy operation and minimizes wear on the parts of the adjusting mechanism.

Any suitable means may be used for actuating the drive shaft 63. As shown a reversible electric motor 70 carried by a bracket 71 which is fixed to the frame of the press, is used to drive this shaft through a suitable reduction gearing indicated generally at 72. As illustrated the motor shaft carries a pinion 75 meshing with gear 76 mounted upon a suitable stub shaft 77, and carrying pinion 78, which in turn engages gear 79, carried at the end of shaft 63. Of course, these shafts are suitably mounted for rotation in any convenient manner,—for example in brackets depending from the frame or in the frame itself.

In order to properly guide the bed 30 in its vertical adjustments and maintain the same in proper horizontal position, the uprights 11 and 12 of the frame are each provided with a rear guide surface 80 and a front guide sur-

face 81 both of which are preferably of substantially V-shape. The rear guide surface 80 is adapted to cooperate with a complementary groove or guide portion provided in the press bed. The forward guide surface 81, as shown in Fig. 2, is adapted to cooperate with a pair of gibs 82 and 83 provided in a recessed portion of each forward bracket nut 41. The gibs 82 and 83 each have rear surfaces extending from each other in rearwardly diverging relationship in a manner complementary to the shape of the fixed guide surface 81. The gibs 82 and 83 are adapted to be wedged tightly against the fixed guide surface 81 and against the bed and the bracket nut to hold the bed rigidly against the frame uprights independently of the screws 31 after the bed has been moved to the position desired. To accomplish this each bracket nut 41 is provided with a gib clamp collar 85 having a cylindrical shape where it seats loosely in a cylindrical hole in the bracket nut adjacent the recessed portion thereof which holds the gibs. At the rear of each gib clamp collar is a generally cylindrical gib clamp nut 86. The gib clamp collar and nut are partly received in the bracket nut 41 and partly within recesses in the gibs, as shown in Fig. 4. The gib clamp nut 86 is internally threaded so as to receive the threaded end of a bolt 87 which extends freely through an inner bore in the gib clamp collar, the arrangement being such that when this bolt is tightened the gib clamp collar and the gib clamp nut are drawn closer together, or when loosened these two parts may spread apart. Both the collar 85 and the nut 86 are provided with a flat wedge surface 88 inclined to the axis of the bolt 87, the two inclined surfaces 88 on the nut and on the collar being arranged in rearward diverging relationship and preferably at a different divergence from that of the V-surfaces of the guide 81. The gibs 82 and 83 are provided with recessed portions 89 where the clamp collars and nuts are provided, forming wedge surfaces complementary to the wedge surfaces 88 of the gib collar and gib nut. It is thus apparent that the bolt 87 may be tightened to draw the gib nut and the gib collar closer together, this being effective on the gibs 82 and 83 to wedge them towards the frame portion of the press. The slightest rearward movement of the gibs toward the fixed guide surfaces 81 has the effect of wedging the gibs tightly against these fixed guide surfaces and tightly against the press bed 30 and against the adjacent portion of the bracket nut 41, so that all of these parts are held tightly and rigidly in fixed position with relation to one another. However, to permit movements of the bed in a vertical direction along the fixed guide portions of the frame, the nut 87 may be loosened to permit the separation of the gib collar and gib nut,

thus loosening the wedging engagement of the bed with the frame.

The forward bracket nuts 41 are preferably detachably fastened to the outer sides of the press bed at the forward corners thereof the rear two bracket nuts being on the rear side of the press, so that the press bed may be applied to the press frame by moving it forwardly between the frame uprights and later fastening the bracket nuts in position, these bracket nuts of course being carried by the supporting members or screws 31. The bracket nuts 41 as shown in Fig. 1 are provided in inwardly recessed portions of the bed 30 to provide a shelf 91 over the top of the bracket nut for the firm support of the press bed.

It will now be apparent that the motor 70 may be set in operation to cause simultaneous and equal operation of the various supporting screws 31, the drive being transmitted to these screws in a symmetrical manner, the wedging engagement of the press bed with the press frame having first been loosened. After the press bed has assumed the proper position determined by the width of the dies employed at the time, the motor is stopped and the various gib clamp bolts 87 are tightened to firmly wedge the press bed against the frame uprights. Preferably each bracket nut 41 is also provided with a round clamp plug or segment 93 carried by a clamp face 94 which is held firmly in place by bolts 95 threaded into the bracket nut. The internally threaded portion of the segment 93 is adapted to be drawn tightly against the threaded screw 31 when the bolts 95 are tightened, so as to hold the screw 31 and the bracket nut 41 firmly and rigidly against any relative motion. These clamp segments must of course be loosened by loosening the fastening bolts 95 before the adjustment of the press bed is to be changed.

The press, as shown in Figs. 2 and 3 is of the type employing a fluid pressure system which operates a slide 98 for movement in the press bed. This slide 98 may operate as an ejector or stripper slide, and is adapted to carry suitable stripper or ejector dies. It preferably comprises two portions one on each side of the press bed and guided therein for vertical movements. As shown each section of the fluid pressure operated slide 98 comprises a top plate 99 which is supported by any suitable number of plungers 100 each of which operates in a fluid pressure cylinder 101, it being understood of course that the lower end of the plungers 100 carry suitable devices such as pistons operated vertically within the cylinders. The various cylinders 101 are carried by a bottom shelf 102 preferably integral with the lower portion of the adjustable bed 30. Suitable fluid pressure is supplied to the various cylinders 101 in any suitable manner as by means of flexible conduits, not shown.

When the adjustable bed 30 is vertically moved to a new position, the slide 98 and the fluid pressure operating mechanism are moved accordingly and the slide 98 cooperates in the same manner in its adjusted position after variation of the location of the bed 30.

While this invention has been illustrated in connection with a double-crank press, it is of course obvious that the invention is applicable to any type of press in which various size dies are used and in which such a bed adjustment is desirable. The invention is particularly applicable to large-size presses, as it is in these large presses that the use of risers is particularly objectionable. However, as is apparent the invention can just as readily be applied to smaller presses to eliminate the use of packing plates or risers, and to provide a construction of easily operable readily adjusted bed.

While the form of apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that the invention is not limited to this precise form of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. A press of the character described comprising a frame having bed guiding surfaces, an operating shaft rotatably supported at an upper part of said frame, an upper slide guided in said frame and operated by said shaft and adapted to support an upper die, and a bed member adjustable within said frame along said surfaces throughout a large range of adjustment, and wedge means for wedging the bed tightly against the bed guiding surfaces of said frame to hold the bed rigidly in any desired position of adjustment.

2. In an apparatus of the character described adapted for working metal, a frame having opposite bed guiding surfaces, an operating shaft rotatably supported at an upper part of said frame, an upper slide guided in said frame and operated by said shaft and adapted to support an upper die, a plurality of screw-threaded supporting means associated with said frame, a bed adjustably and symmetrically supported within said frame by said supporting means, means for simultaneously operating said supporting means for effecting adjustment of said bed, and means independent of said supporting means for fixing said bed to the bed guiding surfaces of said frame.

3. In an apparatus of the character described adapted for working metal, a frame, a bed, a plurality of screw supports therefor carried by said frame and constructed to symmetrically support said bed at peripheral portions thereof, means for rotating said screw supports to effect adjustment of said bed, and

means for wedging the frame and bed together to fix the bed in desired position.

4. In an apparatus of the character described adapted for working metal, a frame, a bed adjacent a lower portion of the frame and adapted to have a lower die rest upon it, a plurality of screw supports therefor carried by said frame and constructed to symmetrically support said bed in said frame, and means for concomitantly rotating said screw supports to effect adjustment of said bed.

5. In an apparatus of the character described adapted for working metal, a frame, a bed; and an adjustable mounting for said bed, comprising a bearing member carried by said frame, a shaft rotatably mounted in said bearing member, a detachable screw-threaded extension carried by said shaft, a co-operating nut carried by said bed and adapted to receive said threaded extension, and means for rotating said shaft and threaded extension.

6. In an apparatus of the character described adapted for working metal, a frame, a bed; and an adjustable mounting for said bed, comprising a bearing member carried by said frame, a vertical shaft rotatably mounted in said bearing member, the upper end of said shaft being enlarged and adapted to cooperate with said bearing member to form a bearing support, a screw-threaded extension carried by said shaft on the exterior of said bearing member, a nut member carried by said bed and adapted to receive said threaded extension, and means for rotating said shaft and threaded extension.

7. A press comprising a frame, a plunger, a rotatable plunger operating shaft in said frame, a bed, a plurality of threaded members for adjustably supporting said bed in said frame for a large range of adjustment, a fluid pressure operated slide guided in said bed, and fluid pressure operating mechanism for said slide supported by said bed.

8. In apparatus of the character described adapted for working metal, a frame, a bed having more than two spaced points of support, movably mounted on said frame for a large range of adjustment, adjusting mechanism for said bed, a symmetrical drive for symmetrically and equally transferring power to said adjusting mechanism for symmetrically operating said adjusting mechanism and means independent of said adjusting mechanism for securing the bed and the frame firmly together in any adjusted position.

9. In apparatus of the character described adapted for working metal, a frame, a bed movably mounted on said frame, adjusting mechanism for said bed comprising four screw supports rotatably carried by said frame and adapted to support corners of said bed, a source of power, and actuating

mechanism for said screw supports comprising a symmetrical drive to said screw supports for said source of power for uniformly actuating each of said screw supports to effect adjustment of said bed.

10. In apparatus of the character described adapted for working metal, a frame, an adjustable bed carried by said frame, adjusting mechanism for said bed comprising a plurality of screw supports rotatably carried by said frame and adapted to support said bed, a gear for driving each screw support, a cooperating gear associated with each of said driving gears, and means for actuating each of said cooperating gears, said actuating means including a motor, a reduction gearing, and a shaft adapted to be operated by said motor through said reduction gearing and operatively connected to each of said cooperating gears.

11. In an apparatus of the character described adapted for working metal, a frame including spaced uprights, wedge shaped guides carried by said uprights, a bed mounted for adjustment within said uprights, a plurality of screw supports for said bed carried by said frame and constructed to symmetrically support the bed in the frame for a large range of adjustment, wedge means carried by said bed adapted to cooperate with said guides, and means for forcing said wedge means tightly against the guides to hold said bed against movement.

12. In apparatus of the character described adapted for working metal, a frame, a bed, and an adjustable mounting for said bed, comprising a plurality of uniformly spaced bracket nuts carried by said bed, means detachably fastening said nuts to corners of said bed, an adjusting screw for each of said bracket nuts, a plurality of bearing members carried by said frame and each rotatably receiving one of said adjusting screws, and means for rotating the said screws.

13. In a press, a frame, a base, a plurality of vertical screw supports rotatable in said base, a press bed, brackets detachably fastened to said bed at the corners thereof two of said brackets being at one side of the bed and two of said brackets being at two other sides of the bed, the bed and frame being directly engaged adjacent the first named brackets.

14. In a press, a frame, a base, a plurality of vertical screws rotatable in said base, a bracket nut for each screw, a bed carried at its corners by said bracket nuts, means for releasably fixing said brackets to said screws, means operable for wedging the bed to the frame against movement in a plurality of directions, and means for simultaneously operating said screws equal amounts.

15. In a press, a frame, a base, a plurality of vertical screws rotatable in said base, a bracket nut for each screw, a bed carried at

its corners by said bracket nuts, means for releasably fixing said brackets to said screws, means operable for wedging the bed to the frame against movement in a plurality of directions, and means for simultaneously operating said screws equal amounts, said wedging means comprising a wedge block movably carried by a bracket nut, a member in wedging engagement with said wedge block and said frame and means for adjustably moving said wedge block in relation to the bracket nut.

16. A press of the character described comprising a frame, a bed member adjustable in said frame throughout a large range of adjustment, means for adjusting the position of said bed in said frame, and wedge means for holding said bed in any desired adjusted position, said wedge means acting to hold the bed to the frame against movement in any direction in a horizontal plane.

17. In an apparatus of the character described adapted for working metal, a frame having bed guides, a crank shaft rotatably supported at an upper part of said frame, an upper slide guided in said frame and operated by said crank shaft and adapted to support an upper die, four screw threaded supporting means associated with said frame, a bed adjacent a lower portion of the frame adapted to have a bottom die rest upon it, said bed being adjustably carried at its peripheral corner portions by said supporting means, means for simultaneously and equally operating said supporting means for effecting adjustment of said bed throughout a large range of adjustment, and means for laterally securing said bed to the bed guides of the frame to firmly position the bed in any of its various positions of adjustment.

18. In a power press, the combination of a main frame, a bed mounted for vertical adjustment therein, a sub-frame beneath said bed and rigidly connecting the sides of the main frame, screw adjusting means at each corner of the bed and comprising male and female members, one member of each pair being secured to the bed and the other member being rotatably mounted in the sub-frame, interconnected gearing beneath the sub-frame and in driving relation to said rotatably mounted members, means for driving said gearing to adjust the bed up or down, and a slide guided for vertical reciprocatory movement above said adjustable bed.

19. In a power press, the combination of a main frame, a bed mounted for vertical adjustment therein, a sub-frame beneath said bed and rigidly connecting the sides of the main frame, screw adjusting means at each corner of the bed and comprising male and female members, one member of each pair being secured to the bed and the other member being rotatably mounted in the sub-frame, shafts and gearing beneath the sub-

frame and operatively connecting said rotatably mounted members in pairs and in driving relation thereto, driving means connected to said shafts to drive them simultaneously to adjust the bed up or down, and a slide guided for vertical reciprocatory movement above said adjustable bed.

20. In a power press, the combination of a main frame, a bed mounted for vertical adjustment therein, a sub-frame beneath said bed and rigidly connecting the sides of the main frame, screw adjusting means at each corner of the bed and comprising male and female members, one member of each pair being secured to the bed and the other member being rotatably mounted in the sub-frame, connecting shafts and gearing mounted beneath the sub-frame and operatively connecting said rotatably mounted members in pairs and in driving relation thereto, a common drive shaft journaled beneath the sub-frame and geared to said connecting shafts substantially mid-way between their ends, means for actuating said drive shaft to adjust the bed up or down, and a slide guided for vertical reciprocatory movement above said adjustable bed.

21. In a power press, the combination of a built up frame having vertical tie rods in each end thereof, a bed mounted for vertical adjustment between the ends of the frame, a sub-frame beneath said bed and rigidly connecting the end members of the main frame, screw adjusting means at each corner of the bed and comprising male and female members, one member of each pair being secured to the bed adjacent the respective tie rod and the other member being rotatably mounted in the sub-frame, interconnected gearing in driving relation to said rotatably mounted members, and means for driving said gearing to adjust the bed up or down, the screw adjusting members and the tie rods at either end of the press being all in the same transverse plane.

22. In a power press, the combination of a built up frame having vertical tie rods in each end thereof, a bed mounted for vertical adjustment between the ends of the frame, a sub-frame beneath said bed and rigidly connecting the end members of the main frame, screw adjusting means at each corner of the bed and comprising male and female members, one member of each pair being secured to the bed adjacent the respective tie rod and the other member being rotatably mounted in the sub-frame, shafts and gearing operatively connecting said rotatably mounted members in pairs and in driving relation thereto, and driving means connected to said shafts to drive them simultaneously to adjust the bed up or down, said screw adjusting means and the tie rods at either end of the press being all in the same transverse plane.

23. In a power press, the combination of a built up frame having vertical tie rods in each end thereof, a bed mounted for vertical adjustment between the ends of the frame, a sub-frame beneath said bed and rigidly connecting the end members of the main frame, screw adjusting means at each corner of the bed and comprising male and female members, one member of each pair being secured to the bed adjacent the respective tie rod and the other member being rotatably mounted in the sub-frame, connecting shafts and gearing mounted in the sub-frame and operatively connecting said rotatably mounted members in pairs and in driving relation thereto, a common drive shaft journaled in the sub-frame and geared to said connecting shafts substantially midway between their ends, and means for actuating said drive shaft to adjust the bed up or down, the screw adjusting means and the tie rods at either end of the press being all in the same transverse plane.

24. In a power press, the combination of a main frame including vertical spaced uprights, a bed guided for vertical adjustment between said uprights, screw threaded means for effecting the adjustment of the bed, gibs associated with the bed, and means for securing said gibs to clamp the bed to the uprights, after the bed has been adjusted to the desired position.

25. In a power press, the combination of a main frame including vertical spaced uprights, a bed guided for vertical adjustment between said uprights, said uprights having vertical channels formed therein, gibs associated with said bed and engageable with the uprights, and means carried by the gibs for clamping the same to the bed and to the uprights, whereby to secure the bed in any position to which it may be adjusted.

26. In a power press, the combination of a built up frame having vertical tie rods in each end thereof, a bed mounted for vertical adjustment between the ends of the frame, vertical screw threaded members secured to the bed and extending downwardly from a portion of the bed at each end thereof and adjacent the respective tie rods, complementary screw threaded members rotatably supported in operative relation to said first mentioned members respectively, interconnected gearing supported beneath the bed and connected in driving relation to said complementary members, and means for driving said gearing to adjust the bed up or down, the threaded members and the tie rods at either end of the press being all in the same transverse plane.

In testimony whereof I hereto affix my signature.

ARTHUR A. BYERLEIN.