

Aug. 26, 1930.

R. W. STROUT

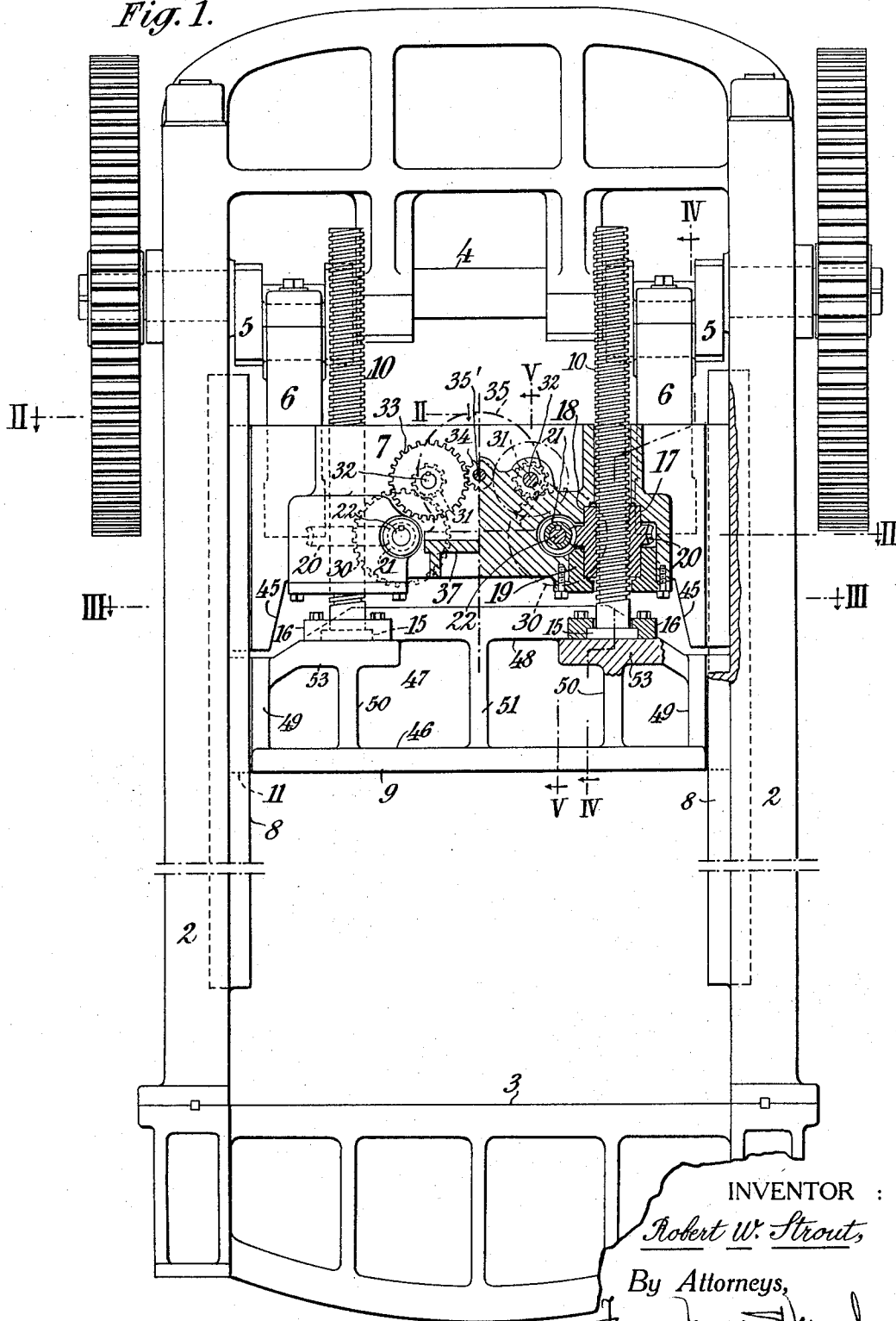
1,774,245

ADJUSTABLE FLATEN POWER PRESS

Filed May 3, 1929

3 Sheets-Sheet 1

Fig. 1.



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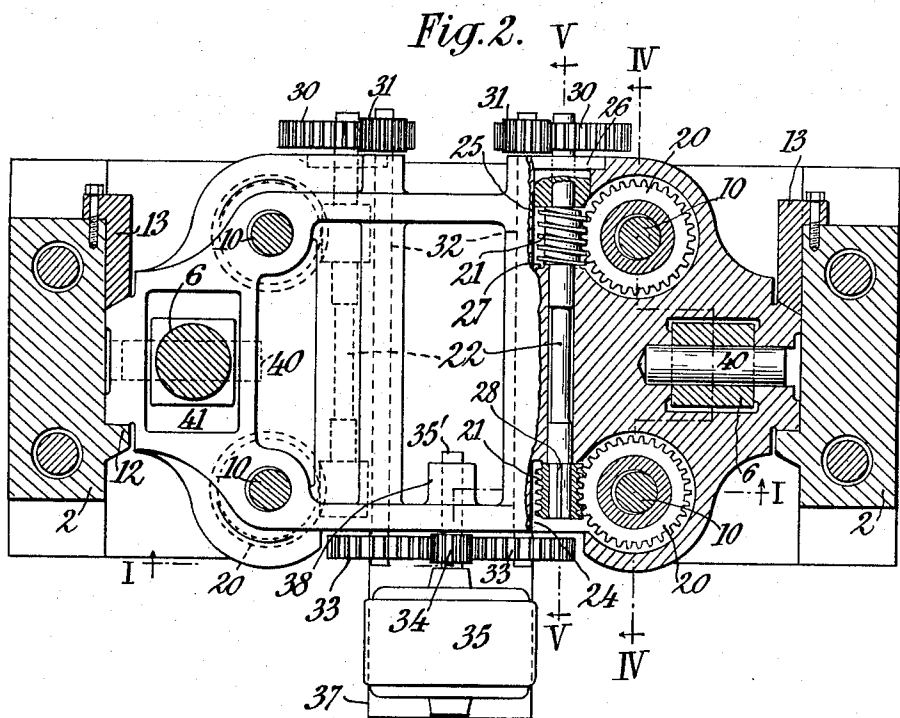
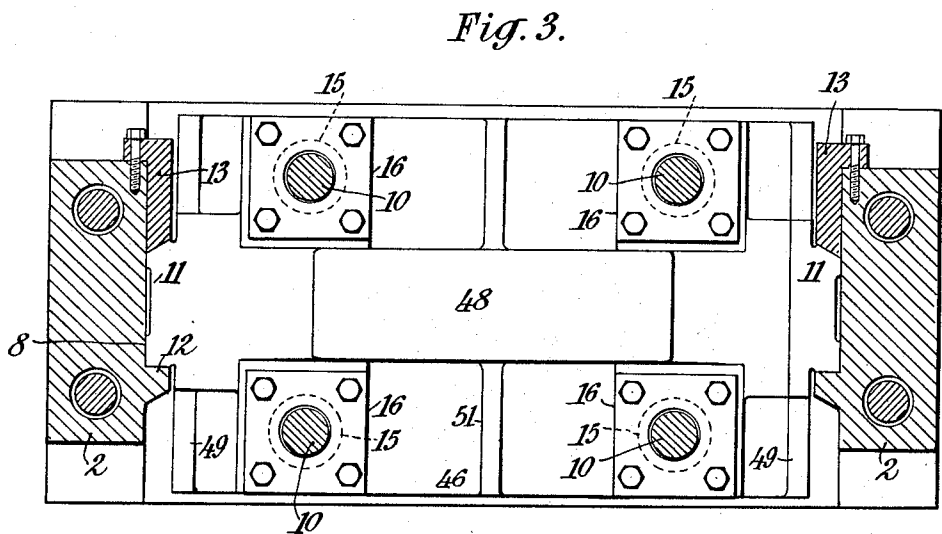
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Fig. 4.

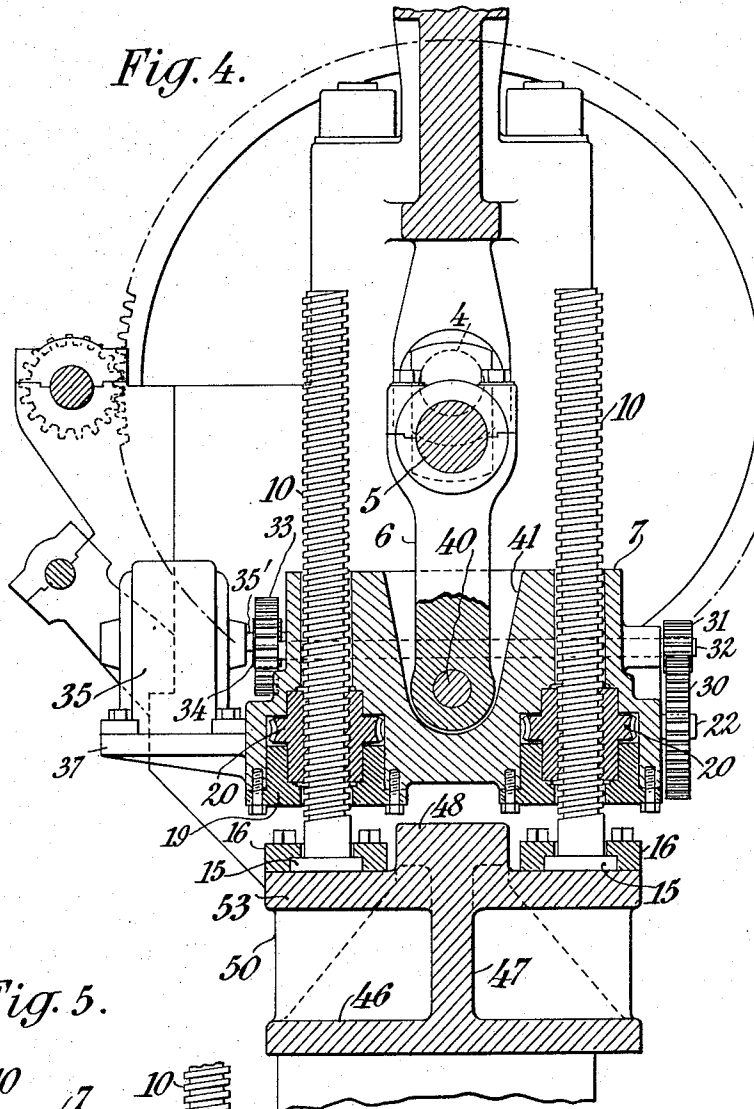
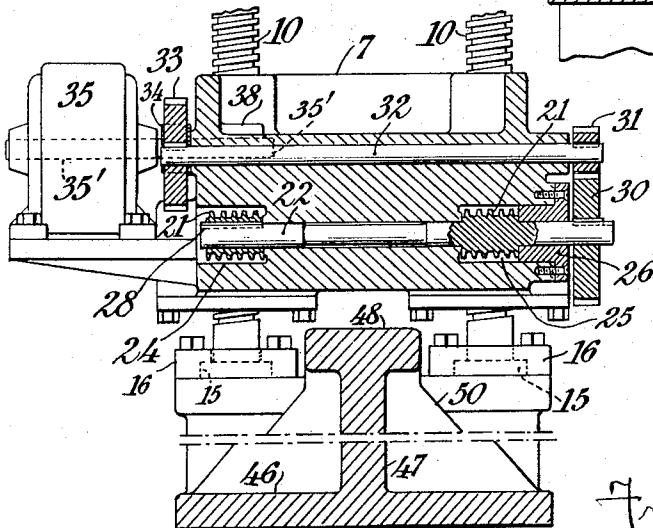


Fig. 5.



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UNITED STATES PATENT OFFICE

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ADJUSTABLE-PLATEN POWER PRESS

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This invention relates to power presses wherein the reciprocating head or platen is afforded a wide range of adjustment relative to the bed of the press whereby to vary the die space of the press.

One object of the invention is to provide an adjustable platen press in which a wide range of adjustment may be obtained without increasing the overall height of the press to the extent that has hitherto been necessary in the construction of presses having die space adjustment of equivalent range.

A further object of the invention is to provide a press having an adjustable die space of extensive range in which the operating parts are disposed above the level of the press bed in such manner as to eliminate the necessity of providing a pit for such parts beneath the bed.

The invention further aims to provide an adjustable platen in which the operating stresses are more uniformly distributed, and more accurate guiding and driving action is afforded, there being provided between the guided platen and the crank-shaft an independently guided cross-head the latter applying thrust to the platen through a plurality of adjusting screws symmetrically distributed on opposite sides of the crank-shaft.

A further object of the invention resides in interposing between the pitman rods and the platen a guided slide or cross-head reciprocated by such pitman rods and adjustably connected to the platen by means of a plurality of threaded rods or screws, the movements of which are synchronized and preferably effected at a rapid rate by means of an electric motor or other prime mover.

In an overhead crank-shaft press where an extended range of platen adjustment is required the adjusting screws according to the present invention are disposed on opposite sides of the crank-shaft and in such position as to permit their elevation above the level of such shaft without interference therewith.

Further objects of the invention will be apparent from the following detailed description wherein reference is had to the accompanying drawings in which—

Fig. 1 is a front elevation of a power press

according to the present invention. In this view a portion of the cross-head and platen have been broken away along the section line I—I of Fig. 2.

Fig. 2 is a horizontal cross-section of the press taken along the line II—II of Fig. 1 and showing the construction of the cross-head, certain portions of which have been broken away to show the internal arrangement of parts.

Fig. 3 is a horizontal cross-section of the press taken along the line III—III of Fig. 1 and shows the adjustable platen in plan view.

Fig. 4 is a vertical cross-section of the upper part of the press taken along the line IV—IV of Figs. 1 and 2.

Fig. 5 is a vertical cross-section taken along the line V—V of Figs. 1 and 2.

Let 2 designate the frame of the press, constructed with a bed 3, and with bearings for a crank-shaft 4 which is suitably driven and which has two cranks 5, 5 connected by pitmen 6, 6 to a reciprocating cross-head 7, which slides on guides or slide-ways 8, 8 carried by the uprights of the frame. If the cross-head 7 constituted the platen of the press this construction would be generally similar to the usual construction of a double crank power press.

According to the present invention however, the cross-head 7 serves only as a carrier for the actual platen 9, which platen is connected with the cross-head through four elongated, symmetrically disposed adjusting screws 10, two on each side of the crank-shaft 4. These screws in order to provide a maximum range of platen adjustment extend in their upward position as shown in Fig. 1, above the crank-shaft.

The adjustable platen 9 is guided independently of the cross-head 7, having projections 11 which run in the guide-ways 8 and being thus guided in a manner similar to cross-head 7. The guide-ways may be of usual construction having one fixed surface 12 and an adjustable gib 13 between which the sliding parts accurately fit.

The adjusting screws 10 are rigidly secured at their lower ends to the frame of the platen, the ends of the screws being headed as shown

at 15, such headed portion being retained and secured to the platen by caps 16 bolted to the platen frame. The adjusting screws extend upwardly through free openings in the frame of the cross-head and the reciprocating movement of the latter is communicated to the screws by means of elongated nuts 17 which engage the screw threads and which are retained within vertical bores 18 by means of flanged sleeves 19 bolted to the lower surface of the cross-head. These sleeves are preferably formed of bronze or other suitable anti-friction metal and provide both an end thrust bearing for the nuts 17 and a bearing in which the nuts are accurately guided in their rotation. Each of the nuts is formed exteriorly as a smooth cylinder, the upper end of which is guided and rotates freely within one of the bores 18 in the cross-head, and the lower end having its bearing in one of the flanged sleeves 19.

The nuts may be conveniently rotated and their movements synchronized by a gear train as best seen in Figs. 1, 3 and 4. Each nut is provided with a toothed annulus 20 surrounding the cylindrical body portion thereof and preferably formed integrally therewith. Intermediate the ends of the nut, the bore 18 is enlarged to a diameter equal to that of sleeve 19 thus affording a space within the cross-head sufficient to accommodate the said annulus. The toothed annulus 20 of each nut constitutes a worm wheel and these are engaged by worms 21 carried upon two parallel shafts 22 which are journaled in the material of the cross-head, each shaft carrying two worm gears and driving respectively the right and left hand pair of nuts. As will be apparent in Fig. 2, a space is afforded for the worms by the provision of enlarged bores 24, 25 at opposite sides of the cross-head. Each of the shafts 22 having attached one of the worms 21, may be slipped into place through bore 25; the gear and shaft being then held against axial displacement by means of a flanged collar 26 which is secured in the end of bore 25, and bears against the end of the worm, the opposite end of the worm being engaged by a shoulder 27 formed at the inner end of bore 25. After each of the shafts 22 has been thus positioned, the second worm gear may be inserted in each of bores 24 and secured to the shafts 22 by means of keys 28 or in any other suitable manner.

At the end of each of shafts 22 a gear 30 is rigidly secured, these gears meshing with pinions 31 which are secured to the projecting ends of shafts 32. These shafts are journaled in the frame of the cross-head and extend therethrough, the opposite ends of the said shafts 32 carrying gears 33 which commonly engage a central driving pinion 34. The driving pinion may be mounted directly upon the shaft 35' of an electric reversible

adjusting motor 35 or be driven by any other suitable means. The electric motor may be conveniently mounted on a bracket 37 formed integrally with the cross-head. If desired an additional bearing may be provided for the power shaft 35', this being formed in the cross-head frame and a boss 38 formed integrally therewith.

It will be apparent that the cross-head need not be made of solid metal throughout, but may be cored out at various points where the material is not required to accord bearings for the various moving parts and mechanical reinforcement. As will be seen on the right in Fig. 2 the cross-head is made solid at the end portions in order to afford ample strength at the points where the pitman-rod pins 40 transmit the force of the pitman to the cross-head. On the left in Fig. 2 it will be seen that the cross-head is cored out above the pitman pin in order to afford the free space 41 necessary for the lateral oscillation of the pitman, this arrangement perhaps being better seen in Fig. 4.

In order to obtain a more rigid and accurate guiding of the cross-head 7, the end surfaces of which slide in guide-ways 8, such surfaces are extended downwardly as indicated at 45 (Fig. 1). This affords a guiding surface which is considerably in excess of the depth of the cross-head at points intermediate its ends.

The adjustable platen 9 hereinbefore referred to is preferably formed as a rigid casting having a solid lower platen face 46, a central vertical web 47, an upper truss plate 48, transverse end webs 49 upon which are formed the projections 11 lying within guide-ways 8, and intermediate transverse webs 50 and 51 which unite the platen face 46 with central web 47 and truss plate 48. As will be seen in Figs. 4 and 5 the platen slide constitutes in effect a reinforced I-bar. The upper truss plate 48 is extended transversely at points adjacent to the ends of platen adjusting screws 10 in order to provide the necessary footing 53 for such screws and it will be noted that transverse webs 50 are disposed in alignment with said screws and extend transversely the full width of the platen in order to distribute the force applied through the screws uniformly over the entire platen. It will be seen that, for the mechanical strength obtained, a considerable economy of space has been effected inasmuch as the central reinforcing web 47 and truss plate 48 extend upwardly between the ends of the adjusting screws so as to afford in effect a deep truss member without materially increasing the clearance required for the platen.

It will be understood that the press as hereinbefore described may be constructed to provide practically any desired range of adjustment. Should a greater range of platen movement be required than that afforded by

the particular construction herein described it is only necessary to increase the height of the frame 2 and guide-ways 8 and to correspondingly increase the length of platen adjusting screws 10. Because of the uniform distribution of the pressure applied to the platen by the four adjusting screws and the fact that the cross-head carrying said screws is provided with long bearing surfaces in the guide-ways, the platen alignment is at all times accurately and rigidly maintained. In vertically adjusting the platen its parallel relationship with the press bed is insured by the gear drive hereinbefore described which positively effects a uniform movement of each of the platen adjusting nuts.

The operation of the press according to the present invention, once the platen has been adjusted to the required position for a given die setting, differs in no material respect from that of the usual press. The actual working stroke is determined solely by the fixed throw of the pitman actuating cranks. The press may be driven by any suitable means and clutch and braking means may be provided to control the starting and stopping of the press in the usual manner.

The operation of the platen adjusting mechanism according to the present invention is extremely simple. Should it be desired to increase the die space of the press whereby to accommodate it to deeper dies or to permit the insertion of special types of work such as sheets which may have already been so formed as to require a large clearance between the platen and the bed, it is only necessary to set the adjusting motor 35 in rotation in the required direction to elevate the platen. This motor should be of the reversible type in the construction hereinbefore described so that when a reverse movement of the platen is required it is only necessary to reverse the motor, this being accomplished by any suitable electric switching mechanism. It will be apparent that since the motor 35 is carried by the reciprocating cross-head, some form of flexible or movable electrical connection should be provided so that current may be supplied to the motor in its various positions.

While it is more convenient to utilize a reversible motor for driving the platen adjusting mechanism, this is not at all essential inasmuch as any suitable mechanical reverse-drive may be employed in conjunction with a unidirectional motor to accomplish the reversal of the platen movement. Motors of any other type may be employed, such as pneumatic or hydraulic motors, or the platen adjusting mechanism may be manually operated where rapidity of adjustment is not an important consideration.

While in the foregoing description only a single modification of the invention has been described, it will be understood that the

invention may be otherwise embodied and modified without departing from the spirit thereof as set forth in the following claims.

What I claim is:

1. A power press including a crankshaft, a guided cross-head beneath said crankshaft, a pitman connecting the crank with said cross-head, a platen beneath said cross-head, and elongated adjusting screws adjustably connecting said platen with the cross-head, said screws extending upwardly at the sides of the crankshaft and having a range of movement such that in their upper positions the ends of said screws project above the crankshaft.

2. A power press including a crankshaft, a guided cross-head beneath said crankshaft, a pitman connecting the crank with said cross-head, an independently guided platen beneath said cross-head, adjusting screws rigidly connected to said platen and extending above said cross-head and at each side of the crankshaft, nuts engaging said screws, said nuts being rotatably mounted on said cross-head and retained against axial displacement with respect thereto, and a common driving means for effecting the simultaneous rotation of said nuts whereby to raise or lower the platen relatively to the cross-head, and parallel thereto.

3. A power press including a crankshaft, a guided cross-head beneath said crankshaft, two pitmen connecting the cranks with said cross-head, a guided platen beneath said cross-head, a pair of screws mounted on each side of the platen and extending upwardly above the cross-head and at each side of the crankshaft, said screws adjustably connecting the cross-head with the platen, and screw threaded means in axially fixed relationship with said cross-head and engaging each of said screws, a power source partaking of the reciprocating motion of said platen and operatively connected so as to produce simultaneous relative rotation between each of the said screws and the screw threaded means in engagement therewith whereby to vertically adjust the platen relative to said cross-head.

4. A power press including a crankshaft, a cross-head, stationary guiding means for said cross-head, pitmen of invariable length connecting the cranks with said cross-head, a platen, stationary guiding means for said platen affording guidance for the platen independent of the cross-head, a plurality of screw means operatively connecting said platen with the cross-head, and a common drive for said screw means adapted to simultaneously rotate the latter whereby to adjust said platen relative to the cross-head and parallel thereto.

5. A power press including a crankshaft, a guided cross-head, pitmen connecting the cranks with said cross-head, a platen, adjusting screws interposed between said cross-head

and the platen and rigidly connected to the latter, adjusting nuts rotatably retained in said cross-head and engaging said screws, each of said nuts having a worm-gear, worms engaging said gears, a drive-shaft, and gearing connecting said drive-shaft with said worms.

6. A power press including a frame, a bed, a double crank crankshaft above said bed, a cross-head guided in said frame, pitmen connecting the cranks with said cross-head, a platen guided in said frame and disposed between the said cross-head and the bed, adjusting screws arranged in pairs on opposite sides of the crankshaft, adjusting nuts rotatably mounted on and retained against axial displacement with respect to said cross-head, said screws being positively connected to said platen and extending upwardly through said nuts and in engagement with the threads thereof, said pairs of screws being spaced apart a sufficient distance to permit their extension above the level of the crankshaft without interference therewith, a motor mounted on said cross-head, and gearing connecting said motor with said rotatable nuts whereby when the motor is operated the platen will be moved vertically relative to said cross-head to alter the die space between the said platen and the bed.

7. A power press including a frame, a bed, a double crank crankshaft above said bed, a cross-head guided in said frame, pitmen connecting the cranks with said cross-head, a platen independently guided in said frame and disposed between the said cross-head and the bed, adjusting screws arranged in pairs on opposite sides of the crankshaft, adjusting nuts rotatably mounted on and retained against axial displacement with respect to said cross-head, said screws being positively connected to said platen and extending upwardly through said nuts and in engagement with the threads thereof, a worm-wheel on each of said nuts, two worm-shafts rotatably mounted on said cross-head and extending transversely with respect to the crankshaft, each worm-shaft carrying worms engaging worm-wheels on opposite sides of the crankshaft, gear-shafts parallel to said worm-shafts, a pinion at one end of each gear-shaft meshing respectively with gears carried at the ends of said worm-shafts, a drive-shaft carried by said cross-head, and gears connecting said drive-shaft with the said gear-shafts.

In witness whereof, I have hereunto signed my name.

ROBERT W. STROUT.