Feb. 3, 1942. W. KLOCKE 2,271,771

ADJUSTABLE STROKE PRESS

Filed May 21, 1941

Fig. 1.

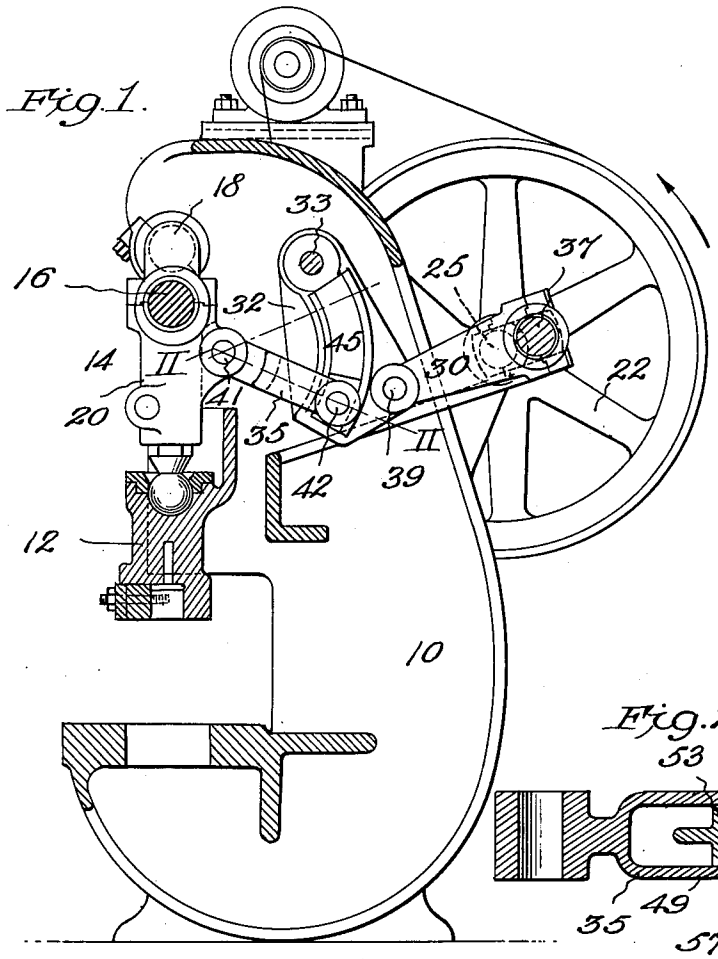
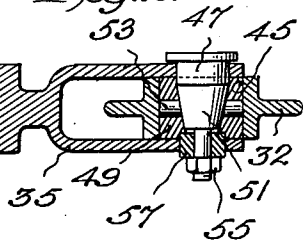


Fig. 2.



INVENTOR.
WILLIAM KLOCKE
BY G. R. Thompson
ATTORNEY

Patented Feb. 3, 1942 2,271,771

UNITED STATES PATENT OFFICE

2,271,771

ADJUSTABLE STROKE PRESS

William Klocke, Woodhaven, N. Y., assignor to E. W. Bliss Company, Brooklyn, N. Y., a corporation of Delaware

Application May 21, 1941, Serial No. 394,439

9 Claims. (Cl. 74—38)

This invention relates to adjustable stroke mechanical presses, and provides improvements therein.

Mechanical presses having an adjustable stroke are desirable for a number of purposes. I have previously provided novel presses having adjustable strokes by the construction shown in my Patents 1,998,242, April 16, 1935 and 2,013,468, Sept. 3, 1935.

By the present invention I provide a mechanical adjustable stroke press capable of infinite adjustments of the length of the stroke, within a maximum length of stroke provided by the design of the press. The present invention further provides adjustable stroke press capable of infinite adjustments as described above, with a constant bottom-of-the-stroke position of the tool-carrying slide, and with a constant position of the slide operating parts in the cycle of operation.

The invention further provides an adjustable stroke press of the character described in which the parts are simple and rugged, comprising mainly links and levers, and provides an arrangement by which the working force is applied through said parts at easy and advantageous working angles. Moreover, in one embodiment of the invention, the moment at which the driving crank on the main shaft works is retained throughout the adjustments by which the stroke of the press is varied.

Presses according to the present invention have a special utility for users of so-called "sub-dies." There is variation in the height of the plungers of sub-dies, and the present invention enables the press user to adjust the stroke of the press slide very closely to the stroke of the sub-die plunger.

The present invention is also of great utility for die makers. It is customary for the die maker to try out the die before sending it to the press user, and as these dies are of a great variety the die maker with a press according to the present invention can test the dies in his own shop, and not have to seek the press on which the dies are to be used, or some other press having a stroke conforming to that on which it is to be used. With one press according to the present invention and by suitable adjustments of the stroke, the die maker can fit and test a great variety of dies.

Moreover the present invention favors the present trend or policy of distribution of manufacture among many small shops in small towns or rural communities, as it gives a press which is adaptable to a variety of types of work, thereby obviating the necessity of the shop owner equipping himself with a number of presses for various types of work which can be done in a single press according to the present invention. It also enables the press owner to obtain a rather wide variation in the speed of operation inasmuch as the press can often be run at much greater speed when the stroke is short than when the stroke is long.

An embodiment of the present invention is illustrated in the accompanying drawing. The invention nevertheless may have other embodiments than that herein specifically illustrated and described.

Referring to said drawing:

Fig. 1 is a vertical sectional view of an adjustable stroke mechanical press according to the present invention.

Fig. 2 is a transverse sectional view on the line II—II, Fig. 1.

Referring to said drawing, numeral 10 designates the press frame, the form of that illustrated being that used on inclinable power presses. Numeral 12 designates a reciprocatory tool carrying slide guided in its reciprocatory movements by gibs (not shown) mounted on the press frame. Numeral 14 designates a toggle lever connecting the slide 12 to the frame, and, as here shown, comprising a crank 16 on a crank shaft 18 and a connecting rod 20, both of which may be of a construction commonly used on "Bliss" power presses. One advantage of the present invention is that it can be applied to standard types of power presses with very little alteration thereof, virtually the only change required being the provision of a bracket on the back of the frame for the main shaft, and the shifting of the fly wheel 22 from the crank shaft 18 to a crank shaft 25 at the back of the press.

A reciprocatory motion is imparted by the toggle lever 14 to the slide 20 through a driving link or rod 30, a lever 32 pivoted on the frame, as indicated at 33, and a link 35. A reciprocatory driving force is imparted to the driving rod 30 by any suitable means, as by a crank 35 on the crank shaft 25 journalled on the press frame. The driving rod or link 30 is connected to the pivoted lever 32, as indicated at 39, and the link 35 connects the toggle lever 14 and the pivoted lever 32, as indicated at 41 and 42.

Advantageously the link 35 is connected to the pivoted lever 32 in such manner that its connection thereto may be adjusted toward and from the axis 33 on which the pivoted lever turns. To

provide for such adjustment, the pivoted lever is provided with a guide 45 in or on which the link connection 42 may be moved to an infinite number of positions of adjustment with respect to the axis 33 on which the pivoted lever 32 turns. A very satisfactory and suitable form of the connection 42 is illustrated in Fig. 2, and, as there illustrated, comprises a pin 47 and a block 49 slidable on the guide 45 of the pivoted lever 32. The pin 47 passes through the forked end of link 35, and the block 49 bears closely on the guide 45. To fasten the block in a desired position of adjustment on the guide 45, the pin 47 may be tapered as indicated at 51, and the block 49 may be provided with a binding plug or plugs 53 which bear at one end against the tapered portion 51 of the pin, and at the other end against the guide 45. A nut 55, threaded on pin 47 and bearing against a collar 57, which latter bears at its opposite face against the block 45, serves to draw the tapered portion 51 of the pin 47 forcibly against the plugs 53 and thereby force them into binding contact with the guide 45 and thus secure the connection 42 in the desired position of adjustment on the guide 45.

The guide 45 has a curvature on a radius corresponding to the length of the link connected thereto; as here shown the guide 45 has a curvature corresponding to the length of the link 35. The arc of the curved guide advantageously does not exceed 45° so as to avoid instability of the driving parts under the reflex stresses transmitted thereto by the toggle-lever, which reflex stresses arise from the resistance encountered by the forming tools in doing their work, and which resistance is imparted as counter-stresses to the slide 12. Thereby the toggle-lever 14 is prevented from flexing toward the wrong side of its position of alinement on encountering the reaction of the maximum forces of resistance in the working of the press, and the stability of the slide actuating mechanism is maintained.

There is a further advantage in connecting the link 35 to the pivoted lever 32 through the adjustable connection; the driving rod or link 30 may be, as here shown, connected to the pivoted lever 32 at or near the end of said lever which is remote from the axis 33 on which it turns. By such an arrangement the moment at which the driving rod 30 acts on the pivoted lever 32 is usually longer than the moment at which said pivoted lever acts on the link 35, and in none of the positions of adjustment of the link 35 is the moment at which the driving rod 30 acts considerably exceeded. Moreover by said arrangement the shocks (incident to the working action of the dies) imparted to the crank shaft 25 are materially moderated, and its ability to withstand the repeated shocks materially increased.

The arrangement by which the guide 45 has a curvature corresponding to the length of the link connected thereto is such that the action of the slide reciprocating mechanism is to bring the slide 12 to a constant bottom-of-the-stroke position, at a constant point in the cycle of operation of the slide-reciprocating mechanism irrespective of the position of adjustment of the adjustable link. Referring to the drawing, it will be seen that the toggle-lever 14 is in a position of alinement, and that the slide 12 is in its bottom-of-the-stroke position. Movement of the link 35 to any position of adjustment on the guide 45, effects no change in the alined position of the toggle-lever 14 or in the position of pivoted lever 32, driving rod 30, or crank 37. The positions of the parts 32, 30 and 37 remain constant for a constant bottom-of-the-stroke position of slide 12 at all lengths of stroke effected by adjustments of link 35. The so-called "die space" between the slide and the bed remains constant, and, at the same time, according to the present invention, the length of the stroke of the slide 12 may be infinitely varied within the range of adjustments provided by the design of the press.

Operation

In the position of the parts shown in Fig. 1, the parts are in a position of adjustment providing for the maximum length of stroke. To adjust the press for a shorter stroke, the block 49 is released (by loosening the binding or fastening means heretofore described) and the block 49 is slid on the guide 45 to a position closer to the axis 33 on which the pivoted lever 32 turns; and then the binding means are fastened to secure the block 49 in the new position of adjustment. The arc through which the pivoted lever 32 turns at the adjusted position of the block just described, being shorter than the arc through which the lever turns at the position of block 49 illustrated in Fig. 1, the rise or height of movement of the slide 12 imparted by the driving mechanism will be less, and consequently the length of the stroke will be less. At the same time, the position of crank 37 in the cycle of operation remains the same as before adjustment of link 35 in arcuate slot 45; so that for a long or a short stroke the positions of the slide actuating parts 32, 30, 37 do not vary with respect to the bottom-of-the-stroke position of the slide 12. From this explanation it will be seen that by adjustments of the position of the block 49 on the guide 45, an infinite variation may be obtained in the length of the stroke of the slide 12, with the bottom-of-the-stroke position of the slide remaining the same for all of the various lengths of stroke, and with the "timing" of the press-parts in the cycle of operation remaining the same for all adjustments of the length of the stroke of slide 12.

What is claimed is:

1. A mechanical press having a variable stroke, comprising a frame, a reciprocatory tool-carrying slide, and means for reciprocating said slide comprising a toggle-lever connection between the slide and frame, a pivoted lever, a link connecting said pivoted lever and said toggle-lever, a driving-link connected to said pivoted lever, means for reciprocating said driving-link, and means for connecting said toggle connected link to said pivoted lever in various positions of adjustment with respect to the axis on which said pivoted lever turns.

2. A mechanical press having a variable stroke according to claim 1, wherein said connecting means comprises a guide having a curvature on the radius of said toggle connected link, a part to which the link is attached, movable on said guide, and means for fastening said guided part in various positions of adjustment on said guide.

3. A mechanical press having a variable stroke, comprising a frame, a reciprocatory tool carrying slide, and means for reciprocating said slide, comprising a toggle-lever connection between the slide and frame, a pivoted lever, a link connecting said pivoted lever and said toggle-lever, a driving-link connected to said pivoted lever, means for reciprocating said driving-link, and means for connecting said first named link to

said pivoted lever, comprising a guide having a curvature on the radius of said link, a part to which said link is attached movable on said guide, and means for fastening said guided part on said pivoted lever in various positions of adjustment with respect to the axis on which said pivoted lever turns.

4. A mechanical press having a variable stroke according to claim 3, wherein the arc of curvature of said guide does not exceed 45°.

5. A mechanical press having a variable stroke according to claim 3, wherein said means for reciprocating said driving-link comprises a crank.

6. A mechanical press having a variable stroke according to claim 1, wherein said driving-link is connected to said pivoted lever adjacent the end of said guide which is remote from the pivotal axis on which the lever turns.

7. A mechanical press having a variable stroke according to claim 3, wherein said guide is in the form of a slot, and the part to which the link is attached comprises a block slidable in said slot.

8. A mechanical press having a variable stroke according to claim 1, wherein the construction and arrangement of said toggle-lever connection, pivoted lever, links and driving means is such that, in a constant position thereof in the cycle of operation for all adjustments of length of stroke, said toggle-lever connection is in alinement at one extreme of the path of movement of said reciprocating means.

9. A mechanical press having a variable stroke according to claim 3, wherein the construction and arrangement of said toggle-lever connection, pivoted lever, links and driving means is such that, in a constant position thereof in the cycle of operation for all adjustments of length of stroke, said toggle-lever connection is in alinement at one extreme of the path of movement of said reciprocating means.

WILLIAM KLOCKE.