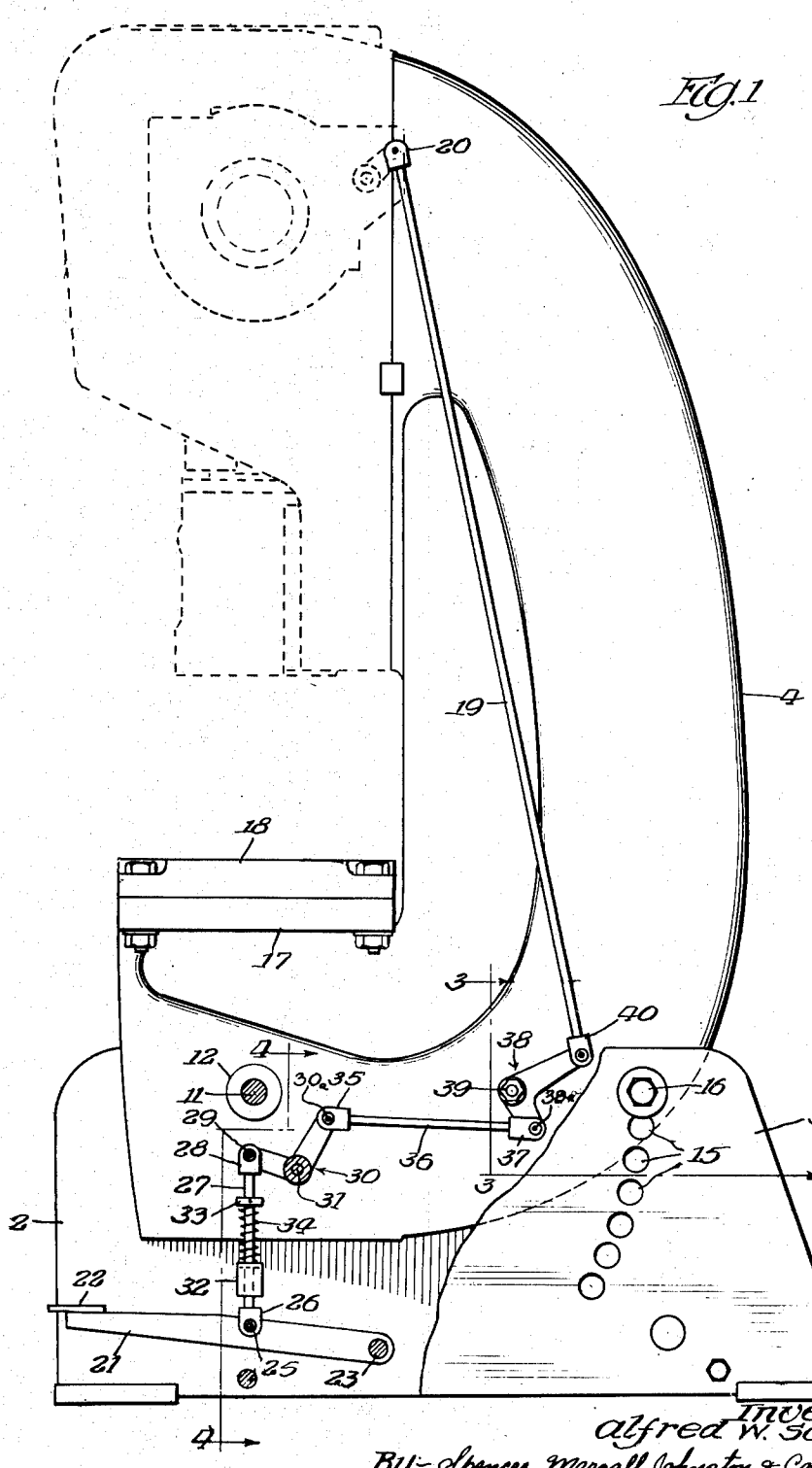
Feb. 24, 1953 A. W. SCHULTZ 2,629,318

INCLINABLE PRESS

Filed Oct. 5, 1946 4 Sheets-Sheet 1

Fig. 1



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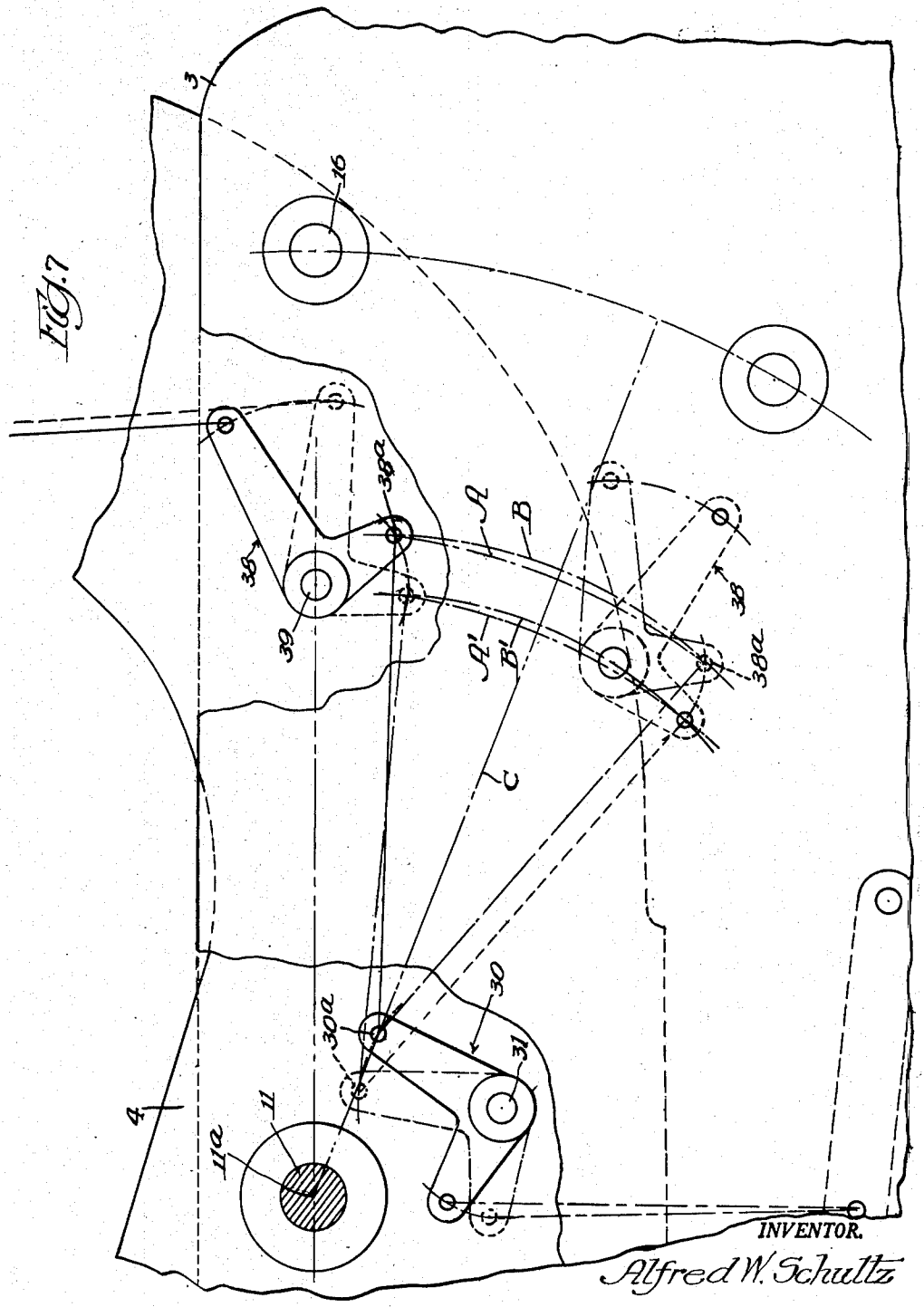

Fig. 7

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Fig. 5

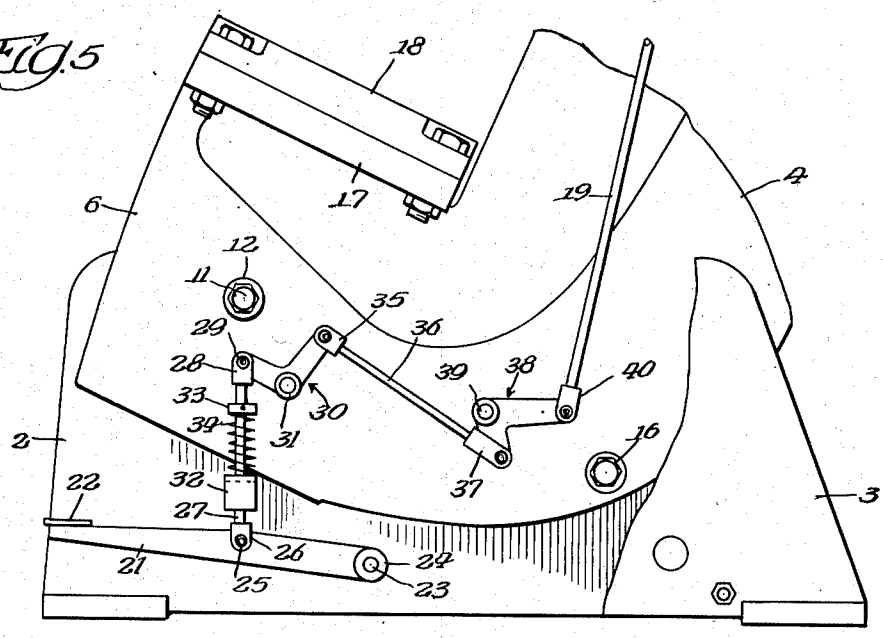
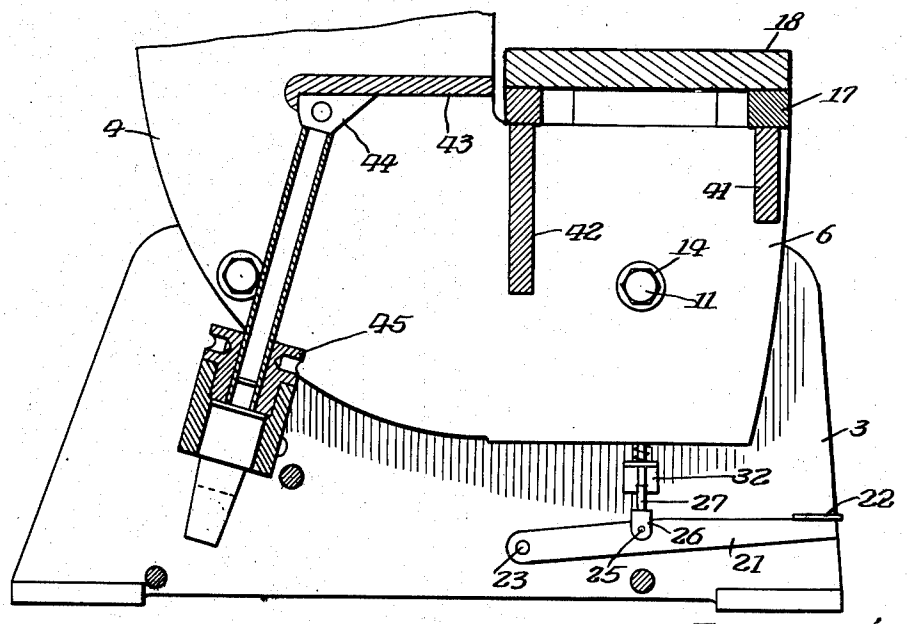


Fig. 6



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INCLINABLE PRESS

Filed Oct. 5, 1946 4 Sheets-Sheet 4

Fig. 2

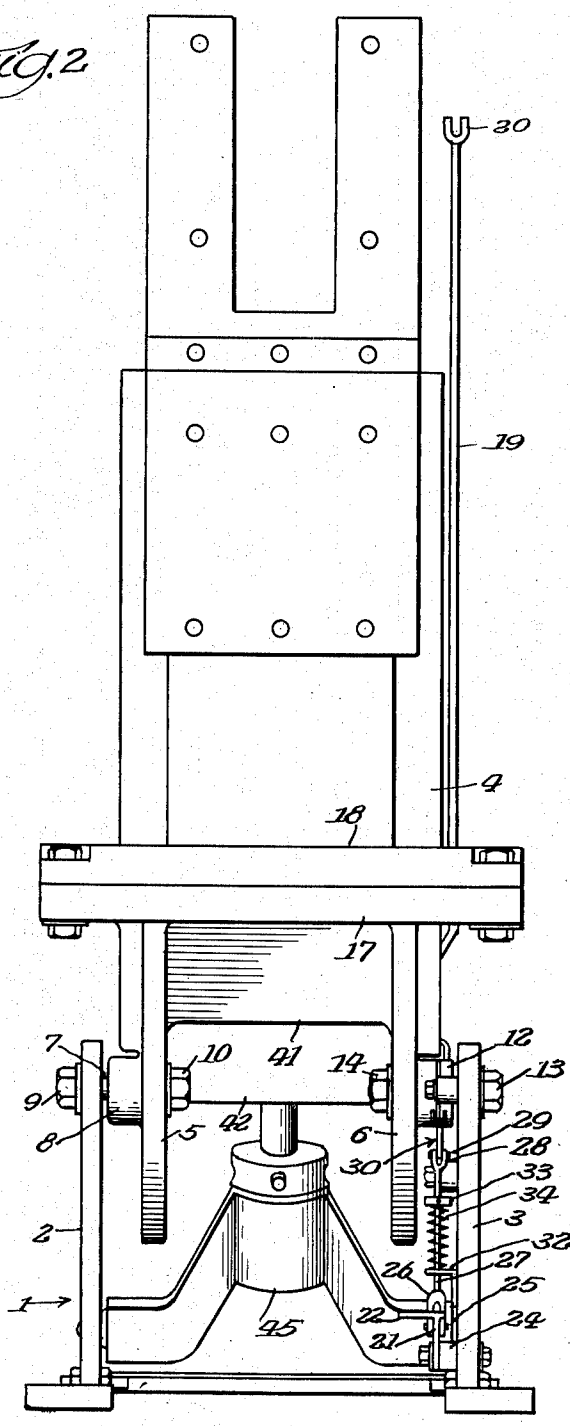


Fig. 3

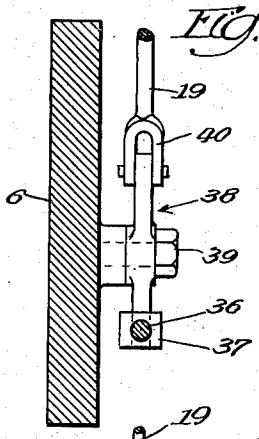
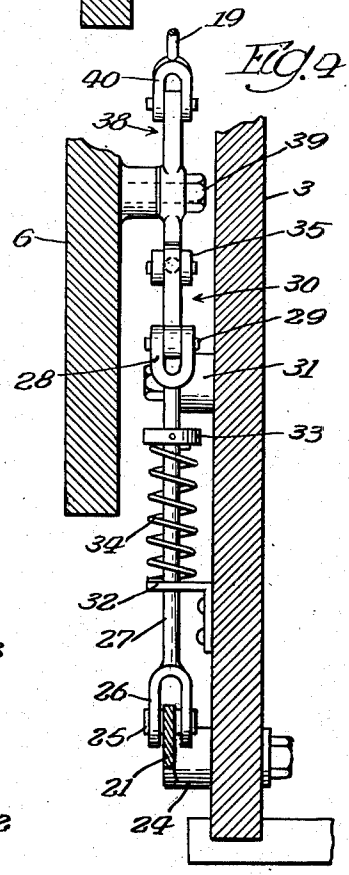


Fig. 4



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UNITED STATES PATENT OFFICE

2,629,318

INCLINABLE PRESS

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Application October 5, 1946, Serial No. 701,526

6 Claims. (Cl. 100—231)

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This invention relates in general to presses and particularly to inclinable presses, and has among its objects the provision of novel mechanism whereby the treadle which operates the press will remain in its normal position when the main frame of the press is tilted or moved to an inclined position.

Inclinable presses of the C-frame or open gap type customarily have a treadle at the lower end thereof which is connected to an operating head whereby the press may be operated upon pressing the treadle. Difficulties have been encountered in the past in this type of machine when the frame was moved to an inclined position, because in moving the frame, the distance between the point of connection to the operating head and the treadle would be increased or decreased and as a result, would move the treadle out of its normal position. An attempt has been made to overcome this disadvantage by forming the elongated connecting rod of two pieces and splicing them together. This arrangement, however, has proven to be undesirable in actual practice and I have provided a novel linkage mechanism connecting the treadle with the operating head, which mechanism is so arranged that when the main frame is tilted, it will permit the treadle to remain in its normal position.

It is, therefore, an important object of this invention to provide a mechanism in an inclinable press to permit tilting or inclining of the frame without materially changing the position of the operating treadle.

Another object of the invention is to provide in an inclinable press a linkage connection between the operating treadle and the head of the press whereby the treadle will remain in its normal position when the frame is inclined.

A further object of the invention is to provide in an inclinable press a rigid rod connected at one end to the operating head and at its other end to a bell crank, which in turn is so connected to the operating treadle as to permit inclining of the frame without changing the position of the treadle.

Still another and more specific object of the invention is to provide in an inclinable press a bell crank connected to the operating treadle, a second bell crank connected to a rod on the operating head and a link connecting the two bell cranks, where the bell cranks are so located as to permit the frame to be inclined without changing the position of the treadle.

Other objects and advantages of the invention will become apparent upon a reading of the following description taken in connection with the accompanying drawings in which:

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Fig. 1 is a side elevational view of the inclinable press with one side of the supporting base broken away to show more clearly the linkage mechanism;

Fig 2 is a front elevational view;

Fig. 3 is a vertical fragmentary section taken substantially along the plane of line 3—3 of Fig. 1;

Fig. 4 is a vertical section taken substantially along the plane of line 4—4 of Fig. 1;

Fig. 5 is a fragmentary side elevational view of the press showing the position of the linkage mechanism when the main frame is tilted;

Fig. 6 is a vertical section through the press at the lower part thereof, showing the inclining means; and

Fig. 7 is an enlarged diagrammatic illustration indicating the basis for properly positioning the bell cranks to obtain the desired result.

Referring now more particularly to the drawings, the press is provided with a supporting base generally indicated by the numeral 1, having spaced side members 2 and 3. The main frame 4 of the press is located between the side members of the base and is pivotally mounted thereon so that it may be free to rotate about its pivotal point and be moved to an inclined position. The lower part of the open gap frame 4 is provided with spaced sides 5 and 6, the side 5 being provided with a pivot pin 7 journaled in a bearing 8 and passing through the side 2 of the supporting base, whereby it may be secured in place by the nuts 9 and 10. At the opposite side, the member 6 is similarly pivoted to the side 3 of the base by means of the pivot pin 11 having a center 11a journaled in the bearing 12 and secured in place by the nuts 13 and 14. The frame is thus mounted for a tilting or inclining movement about the pivot pins 7 and 11.

The supporting base has a plurality of holes 15 at the rear thereof, and these holes are located in an arcuate path about the pivot pins 7 and 11 as a center so that a locking pin 16 may be inserted to hold the main frame in any one of a plurality of tilted or adjusted positions.

The lower part of the main frame is provided with the usual bed plate 17 and the removable bolster 18. While the invention may be applied to any type of machine or press where it is desirable to move or tilt a portion thereof without changing the normal position of the operating treadle, the type of press disclosed herein is provided with an operating head adapted to drive

a plunger. The operating treadle may be moved to engage or disengage a clutch mechanism in order to actuate the operating head. This part of the press, however, forms no part of the present invention, and therefore no detailed explanation of these parts need be made.

A rigid rod 19 has a bifurcated upper end 20 which may be suitably connected to the operating head in the usual manner. The operating head is actuated by longitudinal reciprocation of the rod 19 through a suitable connection with an operating treadle 21 which is preferably located at the bottom of the press. The treadle 21 has a foot portion 22 at the forward end thereof, and this foot portion is pivotally mounted at its rear end on a pivot pin 23 received within a bearing 24 mounted on the side 3 of the supporting base.

A pivot pin 25 passes through the treadle 21 at some suitable point between the ends thereof (see Fig. 1). The pin 25 engages the lower bifurcated end 26 of a link construction 27. The upper end 28 of the link construction is pivotally secured by means of the pin 29 to one arm of a bell crank 30. This bell crank 30 is pivoted at 31 to the side 3 of the supporting base. The rod 27 extends upwardly through a bracket 32 also mounted on the base. The rod 27 also is provided with a collar 33 spaced upwardly from the bracket 32, and a coiled compression spring 34 surrounds the link and bears at its ends against the bracket 32 and the collar 33, so that when the treadle is depressed to actuate the operating head, the treadle will be moved downwardly against the tension of the spring 34 which urges the treadle back to its normal inoperative position when pressure thereon is released.

The other arm of the bell crank 30 has a pivotal point 30*a* which is pivotally secured to one end 35 of a rearwardly extending link 36 which has a rear bifurcated end 37 pivotally secured to one arm of a second bell crank 38 at the pivotal point 38*a*. This latter bell crank 38 is pivoted at 39 to the side 6 of the main frame, the other arm of the bell crank 38 being secured to the lower end 40 of the rod 19 by means of a pivot pin.

In the normal upright position of the main frame as shown in Fig. 1, the treadle may be depressed to actuate the operating head. This movement of the treadle will rotate the bell crank 30 in a counter-clockwise direction, and the bell crank 38 in a clockwise direction, thus causing a downward longitudinal movement of the rod 19.

When the main frame 4 is tilted it may assume any one of a number of positions, depending upon which of the holes 15 receives the locking pin 16. The frame is shown in one of its inclined positions in Fig. 5, and indicates clearly the manner of operation of the linkage mechanism between the treadle 21 and the rod 19 whereby the treadle is permitted to retain its normal position even though the frame has been inclined and the head has been moved away from the treadle. It may be observed that the bell crank 30 is mounted on the supporting base adjacent the pivotal point of the main frame. The bell crank 38 is mounted on the main frame at a much greater distance than the pivotal point thereof so that the pivotal point 39 of the bell crank 38 will be moved a considerable distance in an arcuate path whenever the frame is inclined. The pivotal point 31 of the bell crank will not move since it is mounted on the supporting base. When the frame is moved to its inclined position as shown in Fig. 5, the bell crank

30 will be retained in substantially its original position, the greater movement taking place in the bell crank 38 which not only moves bodily but also rotates slightly in a clockwise direction. It will thus be seen that the linkage mechanism between the treadle and the operating head, which includes the two bell cranks 30 and 38, is so constructed and arranged as to permit the treadle to remain substantially in its normal position when the frame of the press is inclined. This will be true in whatever position the frame may be placed between the two permissible extremes. Any suitable adjusting means can be provided for the treadle if sufficient movement thereof has taken place when the inclined position of the frame is between the extreme inclined and upright positions, however the error is so slight in this arrangement as to make such adjustment unnecessary for the most part. This will become evident upon viewing Fig. 7 to which reference will now be made.

In Fig. 7 the full line position of the bell crank 38 indicates the normal inoperative position thereof when the main frame 4 of the press is in its upright position. The dotted line indicates the position which the same bell crank assumes when the treadle is depressed. When the frame is inclined to its full tilted position, the inoperative position of the bell crank 38 is indicated by the lower dot-dash line and the lower dotted line position thereof is that which is assumed when the treadle is depressed. The arc indicated at A is that through which the point 38*a* travels when the frame 4 is moved from its upright to its fully inclined position.

It will be evident that for a perfect condition to exist where no movement of the treadle takes place upon inclining the press, the point 30*a* of the bell crank 30 should be coincident with the center 11*a* about which the frame pivots. For physical reasons, of course, this ideal situation cannot exist because of the presence of the shaft 11 and the hub surrounding it. It then remains to so position this point 30*a* as to result in as little error as possible in movement of the treadle when the frame is inclined. It should, therefore, be located as close as possible to the point 11*a* so that in the operative position of the treadle, which rotates the bell crank 30 in a counter-clockwise direction, the point 30*a* will not touch the hub.

In the upright position of the frame, the point 30*a* could be located on a line between the center 11*a* and the inoperative position of the point 38*a*. This, however, would result in a fairly large error, or movement of the treadle, when the frame is moved to its fully inclined position. On the other hand, if the point 30*a* were to be located on a line between the center 11*a* and the inoperative fully inclined position of the point 38*a*, the error would be equally as large when the frame is upright. Thus, to minimize this error for all positions of the frame it has been determined that the most satisfactory location of the point 30*a* is on a line which bisects the angle or arc between the upright and fully inclined positions of the point 38*a* from the center 11*a*. This line is indicated by the letter C.

As mentioned above, the arc A is that through which the point 38*a* moves about the point 11*a* as a center when the frame 4 is rotated from its upright to its fully inclined position. The arc B is that through which the point 38*a* would move about the point 30*a* as a center. The arcs A' and B' are similar and corresponding paths of move-

ment of the point 38a when the bell crank is in its operative position.

The distance between the arcs A and B or A' and B' along the bisecting line C represents the maximum error or treadle movement, which will occur when the frame has been tilted half way to its fully inclined position. From these arcs it will be evident that there will be no change of position of the treadle as between the fully upright and fully inclined positions of the frame. By so positioning the point 30a of the bell crank 30 as above described, the small error in the treadle position occurring at the mid-position of the frame can easily be adjusted by suitable means on the treadle if so desired.

The main frame is provided, at the lower part thereof, with two strengthening webs 41 and 42, and with a horizontal web 43 which has a lug 44 extending downwardly therefrom and adapted to support any suitable inclining means 45 so that as the frame is tilted, it will be supported in such movement by the inclining means. This means may be any conventional mechanism customarily used in connection with inclinable presses and therefore need not be described in detail.

From the foregoing description it will be clear that I have provided a novel linkage mechanism for connecting the treadle of an inclinable press with the operating head thereof whereby the treadle is permitted to retain its normal position when the frame of the press is inclined. The linkage mechanism is so arranged that this positioning of the treadle is done automatically, thus overcoming the difficulties generally encountered in the past with devices of this character. It will be evident that changes may be made in the form, construction and arrangement of parts from that disclosed herein without, however, departing from the spirit of the invention or sacrificing any of the attendant advantages thereof.

Having thus described my invention what I claim as new and desire to secure by Letters Patent of the United States is:

1. In an inclinable press having a supporting base and a main frame pivotally mounted thereon for movement between two extreme positions from an upright position to an inclined position, operating means on the frame for operating the press, a treadle to actuate said operating means and having a normally inoperative position, a rigid rod connected at one end to said operating means, a bell crank lever mounted on said frame and having one arm thereof connected to the other end of said rod, a second bell crank lever mounted on said base and having one arm thereof connected to said treadle, and a link connecting the other arms of said bell crank levers whereby said treadle will be positioned in its normal inoperative position when said frame is moved to its fully inclined position, and means to hold said frame in an inclined position.

2. In an inclinable press having a supporting base and a main frame pivotally mounted thereon for movement between two extreme positions from an upright position to an inclined position, means to hold the frame in an inclined position, operating means on the frame for operating the press, a treadle to actuate said operating means and having a normally inoperative position, a rigid rod connected at one end to said operating means on the frame, a bell crank lever mounted on said frame adjacent said frame holding means and having one arm thereof connected to the other end of said rod, a second bell crank lever mounted on said base adjacent the pivotal point of said frame and having one arm thereof connected to said treadle, and a link connecting the other arms of said bell crank levers whereby said treadle will be positioned in its normal inoperative position when said frame is moved to its fully inclined position.

3. In an inclinable press having a supporting base and a main frame pivotally mounted thereon on a fixed axis for movement from an upright to an inclined position, said upright and inclined positions being the two extreme positions of said frame, operating means for the press, a treadle to actuate said operating means having a normal inoperative position, a bell crank having one arm thereof connected to said operating means, a second bell crank having one arm thereof connected to said treadle, and a link connecting the other arms of each of said bell cranks, the point of connection of said link with said second bell crank being located on a line from the pivotal axis of said frame which bisects the arc produced by the point of connection of said link with the first bell crank in moving between the two extreme positions of the inclinable frame.

4. In an inclinable press having a supporting base and a main frame pivotally mounted thereon on a fixed axis for movement from an upright to an inclined position, said upright and inclined positions being the two extreme positions of said frame, operating means for the press, a treadle to actuate said operating means having a normal inoperative position, a bell crank having one arm thereof connected to said operating means, a second bell crank having one arm thereof connected to said treadle, and a link connecting the other arms of each of said bell cranks, the point of connection of said link with said second bell crank being located at a point within the area bounded by the arc produced by the point of connection of said link with the first bell crank in moving between the two extreme positions of the inclinable frame and the lines extending from the pivotal axis of said frame to the point of connection of said link with the first bell crank in the respective extreme positions of said frame.

5. In an inclinable press having a supporting base and a main frame pivotally mounted thereon on a fixed axis for movement from an upright to an inclined position, said upright and inclined positions being the two extreme positions of said frame, operating means for the press, a treadle to actuate said operating means having a normal inoperative position, a bell crank pivotally mounted on said frame and having one arm thereof connected to said operating means, a second bell crank pivotally mounted on said base and having one arm thereof connected to said treadle, and a link connecting the other arms of each of said bell cranks, the point of connection of said link with said second bell crank being located on a line from the pivotal axis of said frame which bisects the arc produced by the point of connection of said link with the first bell crank in moving between the two extreme positions of the inclinable frame.

6. In an inclinable press having a supporting base and a main frame pivotally mounted thereon on a fixed axis for movement from an upright to an inclined position, said upright and inclined positions being the two extreme positions of said frame, operating means for the press, a treadle to actuate said operating means

having a normal inoperative position, a bell crank pivotally mounted on said frame and having one arm thereof connected to said operating means, a second bell crank pivotally mounted on said base and having one arm thereof connected to said treadle, and a link connecting the other arms of each of said bell cranks, the point of connection of said link with said second bell crank being located at a point within the area bounded by the arc produced by the point of connection of said link with the first bell crank in moving between the two extreme positions of the inclinable frame and the lines extending from the pivotal axis of said frame to the point of connection of said link with the first bell crank in the respective extreme positions of said frame.

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