Aug. 10, 1948. J. M. W. GRANT 2,446,823

EQUALIZER FOR PLATEN PRESSES OR THE LIKE

Filed Oct. 18, 1945 3 Sheets-Sheet 1

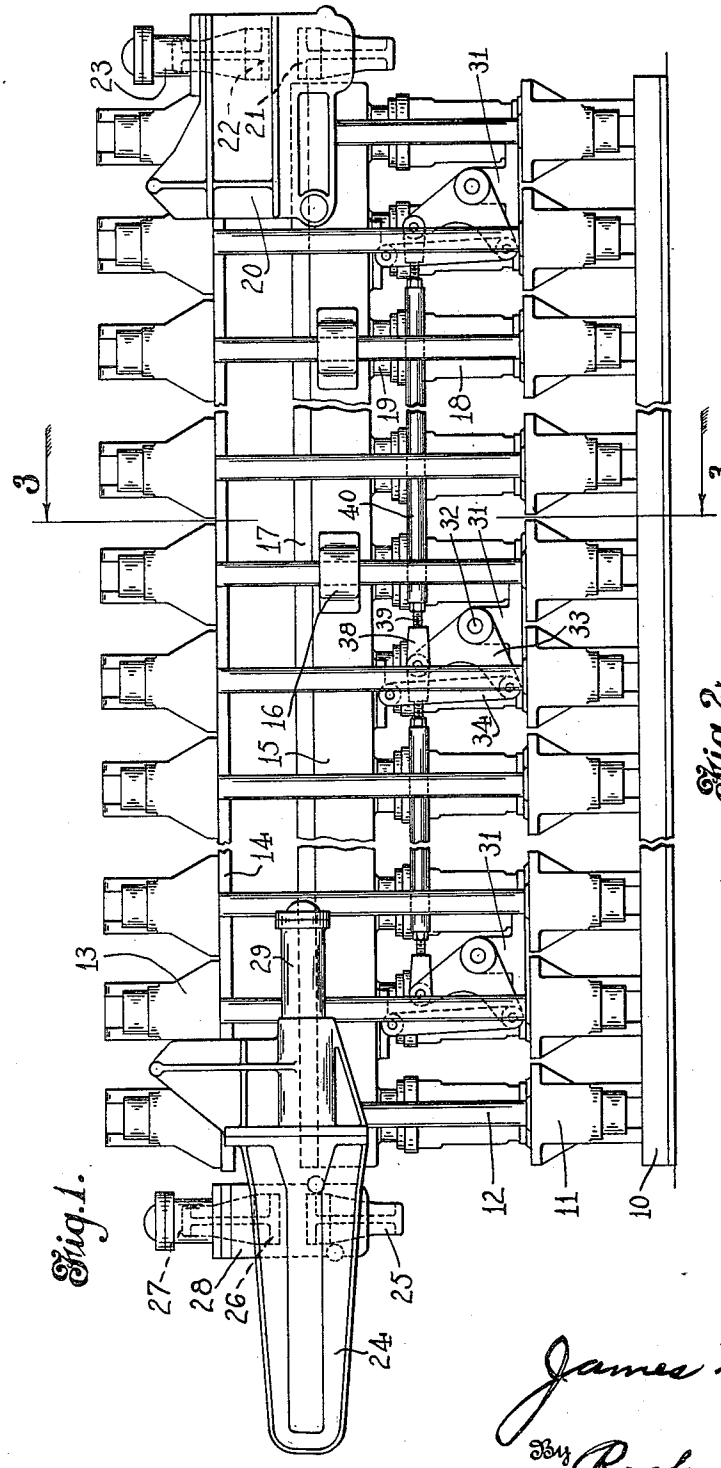


Fig. 1.

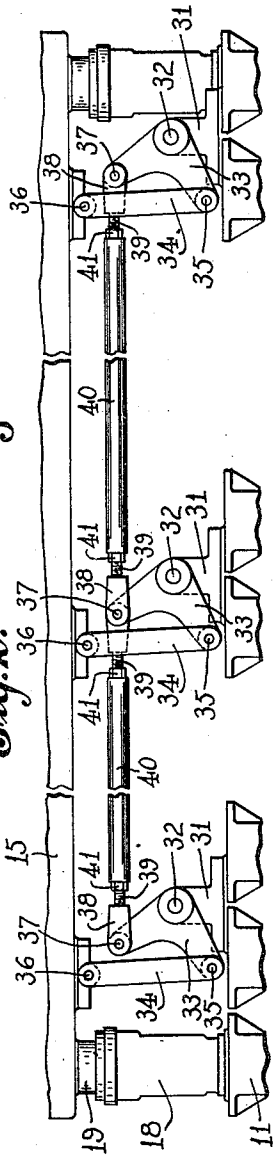


Fig. 2.

Inventor
James M. W. Grant
By Rockwell & Bartholow
Attorneys

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EQUALIZER FOR PLATEN PRESSES OR THE LIKE

Filed Oct. 18, 1945 3 Sheets-Sheet 2

Fig. 7.

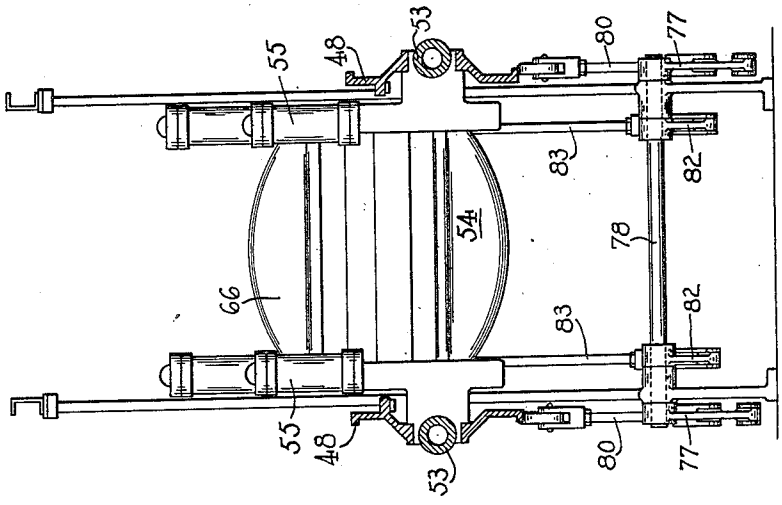
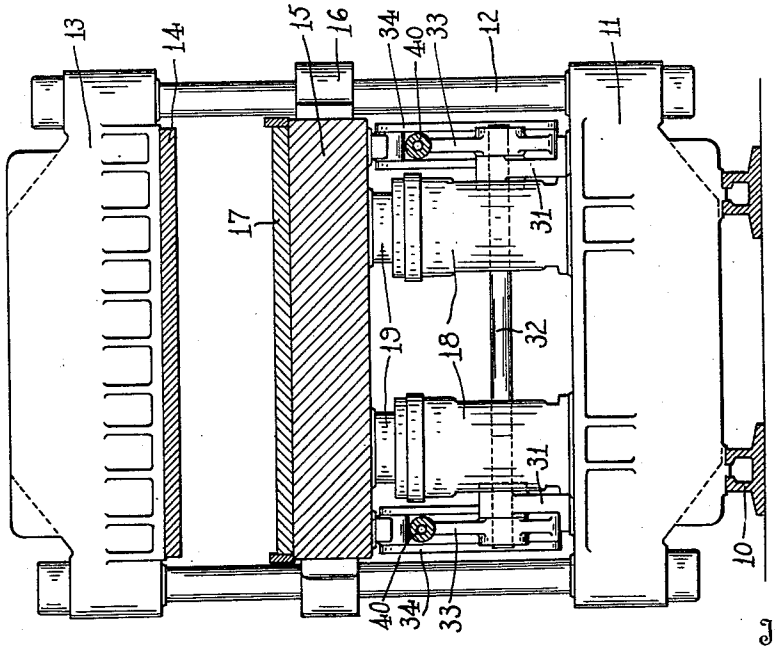


Fig. 3.



Inventor

James M. W. Grant

By Rockwell & Bachtold

Attorneys

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Filed Oct. 18, 1945 3 Sheets-Sheet 3

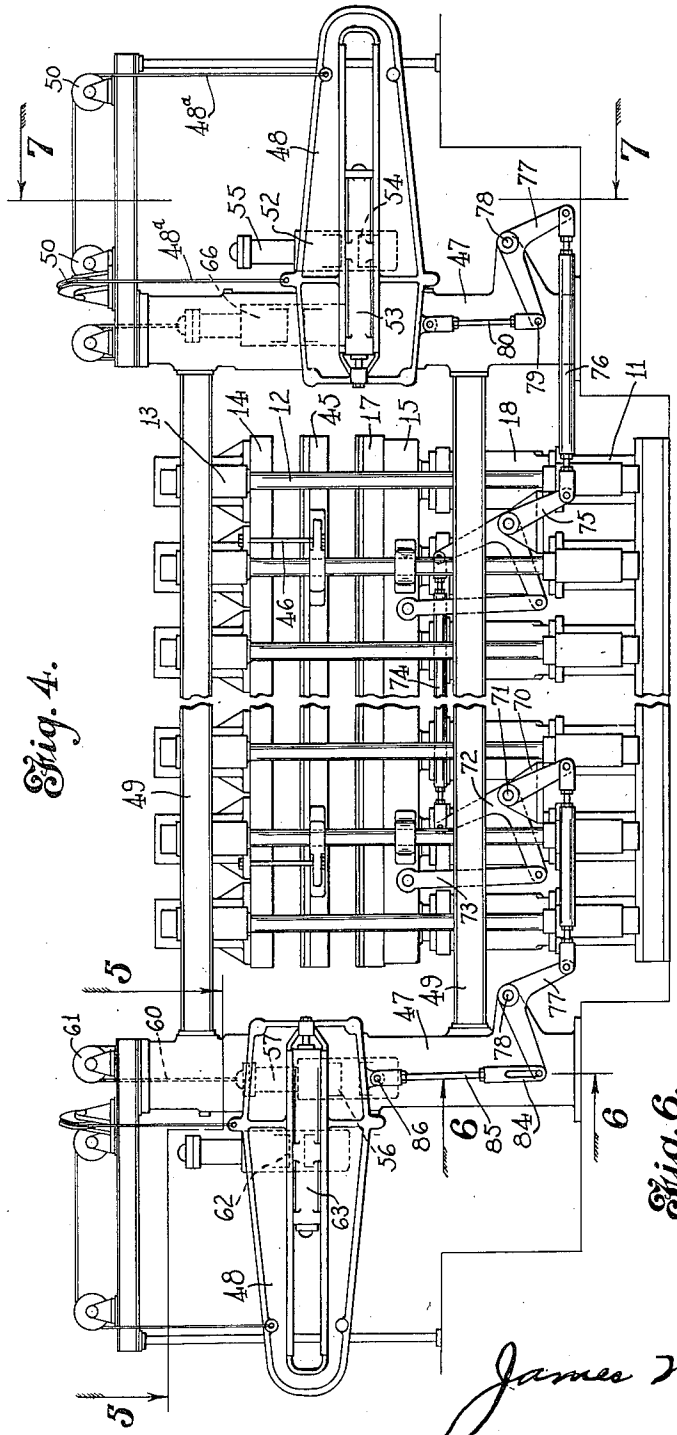


Fig. 4.

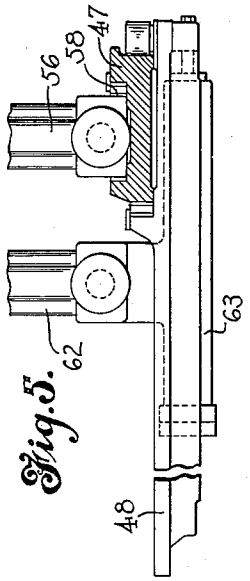


Fig. 5.

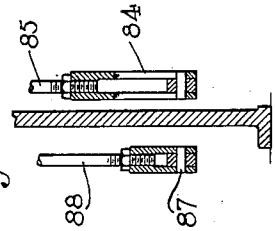


Fig. 6.

Inventor

James M. W. Grant

By Rockwell & Barlow

Attorneys

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UNITED STATES PATENT OFFICE

2,446,823

EQUALIZER FOR PLATEN PRESSES OR THE LIKE

James M. W. Grant, Ansonia, Conn., assignor to Farrel-Birmingham Company, Inc., Ansonia, Conn., a corporation of Connecticut

Application October 18, 1945, Serial No. 623,013

5 Claims. (Cl. 18—17)

1

This invention relates to equalizing means for platen presses, and as illustrated it pertains to a machine in which rubber or rubberized belts may be pressed and vulcanized.

Such a device usually comprises two or more platens, one of which will be fixed and the remainder movable, so that one or more belts may be suitably stretched between the platens and thereafter pressed by the movement of the movable platen or platens toward the fixed platen. In order to stretch the belt, clamping and stretching devices are usually provided at each end of the press.

Such presses are usually of considerable length in that it is desired to treat a considerable length of a belt at one operation, and the movable platen or platens have been raised or moved toward the fixed platen hydraulically by means of pistons and cylinders. Difficulty has been encountered in the past in that the movable platen or platens do not always move evenly and equally toward the fixed platen. This may be due to deficiencies in water supply or variations in hydraulic pressure in the various cylinders and to other causes such as differences in packing friction or the like which result in failure to secure even and uniform movement of the movable platen.

Also, in some instances, the clamping and stretching devices are provided externally of the press and, as it is desirable that their movement be uniform with that of the movable platen, means should be provided to insure movements of these devices equal to and uniform with that of the movable platen with which they cooperate.

It is contemplated in the present invention to provide hydraulic means for raising the movable platen or platen press and, at the same time, provide mechanical interconnections between spaced points on the platen so that the movement of the platen at one point will insure an equal movement of the platen at a spaced or remote point at which the connection is made. Therefore, the raising effect of the hydraulic cylinders will be equalized so that no point on the platen will lag behind another point, and the hydraulic pressure acting against one point of the platen will also by this interconnecting mechanism be transferred to a spaced or remote point on the platen.

Where the clamping and stretching devices are made rigid with the movable platen, they will, of course, move uniformly with it. However, in machines in which external clamping and stretching devices are provided, it is contemplated to extend the interconnecting mechanism previously referred to, to the clamping and stretching devices

2

so that not only will uniform movement of the platen be insured, but also movements of the clamping and stretching devices will be effected uniformly with the movement of the platen.

One object of the present invention is to provide a novel equalizing mechanism for platen presses or like machines.

A further object of the invention is to provide a platen press or like mechanism which will be provided with hydraulically operated means for lifting a movable platen, and in addition mechanical connections between spaced or remote points on the platen to insure equal and uniform movements thereof.

Still another object of the invention is to provide a platen press or the like having hydraulic mechanism for raising the movable platen thereof, with a plurality of levers pivoted intermediate their ends, the levers each having one end connected to the platen and the other ends interconnected with each other whereby movement of the platen at one point will be accompanied by equal movements of the platen at all points along its length.

A still further object of the invention is to provide an equalizing mechanism of the type previously described which will not only insure equal movements of the platen of a platen press, but will also insure that the movements of the clamping and stretching devices will be uniform with that of the platen.

To these and other ends the invention consists in the novel features and combinations of parts to be hereinafter described and claimed.

In the accompanying drawings:

Fig. 1 is a side elevational view of a platen press embodying my invention;

Fig. 2 is a detail side elevational view of the equalizing mechanism, parts of the press being omitted for the sake of clearness.

Fig. 3 is a sectional view of the press on line 3—3 of Fig. 1;

Fig. 4 is a side elevational view of a multiple platen press having external clamping and stretching devices embodying my invention;

Fig. 5 is a sectional view on line 5—5 of Fig. 4;

Fig. 6 is a sectional view on line 6—6 of Fig. 4; and

Fig. 7 is a sectional view on line 7—7 of Fig. 4.

To illustrate one embodiment of my invention, I have shown in Fig. 1 of the drawings a platen press comprising a frame consisting of base members 10 having mounted thereon a plurality of lower cross beams 11 connected by tie rods 12 to upper cross beams 13, these upper beams carrying

on their lower surfaces the upper platen 14 (Fig. 3).

A bed 15 is slidably mounted on the tie rods 12 by means of brackets 16 secured to the side edges of the bed, and upon the upper surface of this bed rests the movable platen 17.

Upon the beams 11 are mounted hydraulic cylinders 18 having plungers or pistons 19 movable therein, upon which plungers is carried the bed 15 so that this bed and the movable platen 17 may be raised hydraulically toward the fixed platen. As shown in the drawing, two rows or banks of cylinders 18 are provided, the cylinders of each row being spaced relatively close together so as to provide a sufficient number thereof to exert heavy pressure on the belt or other device which it is designed to compress between the platens.

At one end of the bed 15 is secured a clamping device comprising the frame 20 having mounted therein clamping jaws 21 and 22, the latter being movable toward the jaw 21 by means of the hydraulic cylinder 23. At the other end of the bed is mounted a clamping and stretching frame 24, this frame having clamping jaws 25 and 26, the latter being movable toward the jaw 25 by means of the hydraulic cylinder 27. In this instance, the jaws 25 and 26 are mounted in a frame 28 movable with respect to the frame 24 and designed to be moved on the latter frame by the hydraulic cylinder 29 so that, after a belt has been clamped between the jaws 21 and 22 at one end, it may be stretched by movement of the frame 28 to properly stretch the belt before the pressing operation. The parts thus far described may be of the conventional or usual construction and, as illustrated, the frames 20 and 24 which carry the clamping device are rigid with the bed 15 so that these devices will move with the platen 17.

As previously stated, it has been found that due to deficiencies in water pressure or lack of uniformity of resistance offered to the movement of the platen at various points along its length, uniform and equal movements of all parts of the platen have not been obtained. The present invention, which will now be described, pertains to mechanism which will insure such uniform and equal movement.

Upon the cross beams 11 are mounted a plurality of brackets 31, these brackets being arranged in pairs, one at each side of the frame of the press, and the pairs being arranged in spaced relation along the length of the press. As many pairs of these brackets may be provided as is found desirable, three of such pairs being shown in Fig. 1 of the drawings, these being arranged one adjacent each end of the platen and one adjacent the central portion thereof. However, more may be provided if necessary.

Rotatably mounted in each pair of brackets 31 are pivot rods or shafts 32, each of the shafts having a bell crank lever 33 secured to each end thereof, so that these bell crank levers will be pivotally mounted on the frame adjacent their intermediate portions. A link 34 is pivoted at one end to one end of each of the bell crank levers as shown at 35, and the other end of each of these links is pivoted at 36 to the lower portion of the bed 15, so that as the bed moves the bell crank levers will be correspondingly moved in the same direction.

Pivoted at 37 to the other end of each of the bell crank levers is a clevis 38, these clevises having threaded rods 39 secured thereto to which

is adjustably secured an internally threaded rod 40. The members 39 may be provided with right- and left-hand threads so that rotation of the rods 40, which are correspondingly threaded, will result in lengthwise adjustment of the connections between the pivot points 37 of two adjacent bell crank levers. When proper adjustment is secured, the rods 40 may be locked in place by means of lock nuts 41.

With the above construction, it will be obvious that each of the bell crank levers has one arm connected to the platen or the bed which supports the platen and that the other arm of each bell crank lever is connected to the corresponding arm of an adjacent bell crank lever so that each of these levers is interconnected, thus insuring equal movements thereof if one is moved. As they are connected to the platen at spaced points along the length thereof as well as on both sides of the machine when the hydraulic lifting mechanism tends to raise one point of the platen, uniform movements of the platen throughout its area will be effected as uniform movements of all of the bell crank levers will result, and they in turn will act upon the various points of the platen to which they are connected, serving as an auxiliary to the hydraulic lifting mechanism at that point if there is any tendency of the latter to lag and thus insure that the movable platen is raised evenly and uniformly toward the fixed platen to exert uniform pressure upon the belt being pressed.

In the form of my device above described, the clamping devices at each end of the bed 15 are carried upon supports rigid with the bed, so that these clamping devices are moved with the bed and the movable platen. In some instances, however, these clamping devices are externally mounted, and, therefore, provision must be made for insuring movements of these devices with the platen with which they cooperate, and also in some presses a plurality of movable platens are provided so that a plurality of belts may be simultaneously pressed. In Figs. 4 to 7 of the drawings, I have shown my invention as applied to a platen press having clamping and stretching devices mounted externally of the movable platens.

As shown in Fig. 4, the press is, in general, constructed in a manner similar to the press shown in Figs. 1 to 3, in that it is provided with the cross beams 11 and 13 connected by the tie rods 12 and with an upper fixed platen 14 and the lower movable platen 17 mounted upon the bed 15 which is slidable upon the tie rods 12 and moved by the hydraulic lifting mechanism 18.

Between the platens 14 and 15 is a third floating platen 45 slidably mounted on the rods 12 and movably connected with the platen 14 by means of limiting rods 46 which limit the downward movement of the platen 45. It will be understood that in this instance one belt will be pressed between the platens 17 and 45 and other between the platens 14 and 45, the lower platen first being raised against the floating platen and thereafter both being raised against the fixed platen 14.

At each end of the frame of the press are a pair of spaced frames or standards 47 upon which is slidably mounted a support 48 for the clamping and stretching devices, the frames 47 at one end being tied together with those at the other end by the beams 49. To each of the supports 48 are secured cables 48a, which cables pass over pulleys 50 and lead to suitable counterweights (not shown), so that little effort will be required to raise these frames.

Mounted in the right-hand support 48 is a frame 52 slidable lengthwise of the support by means of the hydraulic mechanism 53, which frame carries clamping jaws 54 adapted to be closed by the hydraulic cylinders 55, which clamping and stretching device is designed to be employed in connection with the belt to be pressed between the lower platen 17 and the floating platen 45. At the left-hand end of the device, the clamping device 56 is carried by the standard 47 to cooperate in stretching the same belt, this clamping device carrying jaws designed to be closed by the cylinders 57. The clamping device 56, however, is mounted for vertical sliding movement in the standard 47 as shown at 58 in Fig. 5 of the drawings. This clamping device, which cooperates with the lower belt, may move independently of the support 48 at that end of the frame, it being remembered that the support 48 is also slidably mounted on the standards according to the arrangement shown in this figure. Connected to each of the cylinders 57 is a cable 60 passing over a pulley 61 and connected to a suitable counterweight (not shown) so as to balance the weight of the clamping device.

At the right-hand end of the frame, a vertically movable clamping device 66 is slidably mounted in the standard 47 similarly to the clamping device 56 already described to cooperate with the upper belt being pressed between the platens 14 and 45, and in the left-hand support 48, a clamping and stretching device 62, similar to the device 52, is slidably mounted and adapted to be moved to the left by the cylinder 63 to stretch the upper belt. Thus it will be seen that the clamping and stretching devices 52 at one end of the machine cooperate with the clamping devices 56 at the other end of the frame, while the clamping and stretching devices 62 at the left-hand end of the frame cooperate with the clamping devices 66 at the right-hand end of the frame.

Rotatably mounted in spaced brackets 70 secured in pairs to the lower cross beams 11 are pivot shafts or rods 71, and secured to each of the rods 70 are a pair of bell crank levers 72, one at each side of the frame, one end of each of the levers being connected to the bed 15 by the link 73, and the other ends of each of these bell crank levers being interconnected by the adjustable tie rod 74 in a manner similar to that described in connection with the mechanism shown in Figs. 1 to 3 of the drawings in order to secure accurate and uniform movements of the platen 17.

In order to secure movements of the clamping and stretching devices which shall be uniform with those of the platens, an arm 75 is secured to each end of each of the shafts 71, each of these arms being connected by a longitudinally adjustable tie rod 76 to a bell crank lever 77, these levers being arranged in pairs and secured one at each end of rods 78 rotatably mounted in the standards 47.

The other arm of the bell crank lever 77 at the right-hand end of the frame is pivotally connected at 79 to a link 80 pivoted at its upper end to the support 48 so that movement of this bell crank lever 77 will serve to raise and lower the support 48 at that end of the frame, which it will be remembered will also serve to raise and lower the clamping devices 54. Secured to the shaft 78 at the right-hand end of the frame are a pair of crank arms 82 connected by links 83 to the clamping devices 66 to raise these devices. The connections between the arms 82 and the links 83 is a

lost motion connection as will be presently described.

One end of each of the bell cranks 77 at the left-hand end of the frame have a lost motion connection at 84 with a link 85 pivoted at its upper end at 86 to the support 48, so that movement of these bell crank levers will raise the support 48 and the clamping device 62. Also secured to the shaft 78 at this side of the frame are additional crank arms 82 pivoted at 87 (Fig. 6) to links 88, which links are secured to the clamping devices 56 to raise the latter. It will be understood that the lost motion connection between the arm 82 and the rod 83 on the right-hand end of the machine is similar to the lost motion connection 84 at the left-hand end of the machine.

Thus it will be seen that the support 48 at the right-hand end of the machine and the clamping device 56 at the left-hand end of the machine are connected to the shafts 78 by the links 80 and 88, and will thus serve to move together while the device 66 at the right-hand end of the machine and the support 48 of the left-hand end of the machine are connected to the shafts 78 by means of the rods 83 and 85 through lost motion connections shown at 84, so that these devices which cooperate with the upper belt will not be raised until the lower platen has contacted the floating platen and the latter begins its upward movement.

The operation of this device is as follows: When the lower platen 17 begins its upward movement, uniform movement of this platen over its entire area will be insured by means of the bell crank levers 72 in the manner previously described in connection with the invention shown in Figs. 1 to 3 of the drawings. At the same time, the crank arms 75 connected to the tie rods 76 will be moved to the left which will serve to rotate the bell cranks 77 and shaft 78 to which the bell cranks are secured in a clockwise direction. At the beginning of this movement of the bell crank 77, the support 48 at the right-hand end of the machine and the clamping device 56 at the left-hand end of the machine will be moved uniformly with the platen 17 as there is a direct connection between these devices and the shafts 78. This movement will continue until the lower platen 17 is moved upwardly against the floating platen 45. Thereafter the latter will be carried upwardly with the lower platen 17 and, at the same time that the movement of the floating platen begins, the left-hand support 48 and the right-hand clamping devices 66 will be moved by the links 83 and 85, which due to their lost motion connection with the shaft 78 have not been moved heretofore. From this point, all parts of the device will move together evenly and uniformly until the floating platen has been moved against the fixed platen 14 to properly press both belts.

While I have shown and described some preferred embodiments of my invention, it will be understood that it is not to be limited to all of the details shown, but is capable of modification and variation within the spirit of the invention and within the scope of the claims.

What I claim is:

1. A belt press comprising a frame, a pair of platens thereon, one of which is movable relatively to the other, hydraulic means for moving one platen toward the other, a clamping device at each end of the frame, a plurality of bell crank levers pivoted to the frame at spaced points, means interconnecting one arm of each of said

levers, and means connecting the other arms of said levers to the platen and clamping devices respectively to insure uniform movement of the platen and of the platen and the clamping device.

2. A belt press comprising a frame, a fixed platen and a plurality of movable platens supported thereon, a clamping device at each end of the frame to cooperate with each of said movable platens, means movably supporting said clamping devices, interconnected members pivoted to the frame and connected to one of the movable platens at spaced points along its length, to insure substantially equal movements of the platen at such points, and means connecting said members to the clamping devices, certain of said last named means comprising a lost motion connection.

3. A belt press comprising a frame, a fixed platen and a plurality of movable platens supported thereon, a clamping device at each end of the frame to cooperate with each of said movable platens, means movably supporting said clamping devices, interconnected members pivoted to the frame and connected to one of the movable platens at spaced points along its length, and means connecting said members to certain of the clamping devices by a lost motion connection and to the other clamping devices by a direct connection.

4. A belt press comprising a frame, a fixed platen and a plurality of movable platens supported thereon, a clamping device at each end of the frame to cooperate with each of the movable platens, standards at each end of the frame supporting said clamping devices, a plurality of bell crank levers pivoted to the frame, each having one arm connected to one of the movable platens, means interconnecting the other arms of

said bell crank levers, bell crank levers pivoted on said standards and connected to said clamping devices, and means connecting said last-named bell crank levers to the bell crank levers pivoted on the frame.

5. A belt press comprising a frame, a fixed platen and a plurality of movable platens supported thereon, a clamping device at each end of the frame to cooperate with each of the movable platens, standards at each end of the frame supporting said clamping devices, a plurality of bell crank levers pivoted to the frame each having one arm connected to one of the movable platens, a plurality of bell crank levers pivotally supported on said standards, means connecting said last-named bell crank levers to certain of said clamping devices by a direct connection and to others of said clamping devices by a lost motion connection, and means connecting the bell crank levers on the standards to those on the frame to insure equal movement of the clamping devices and platens.

JAMES M. W. GRANT.

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