

April 30, 1940.

F. L. JOHNSON

2,199,000

PRESS

Filed Sept. 14, 1937

3 Sheets-Sheet 2

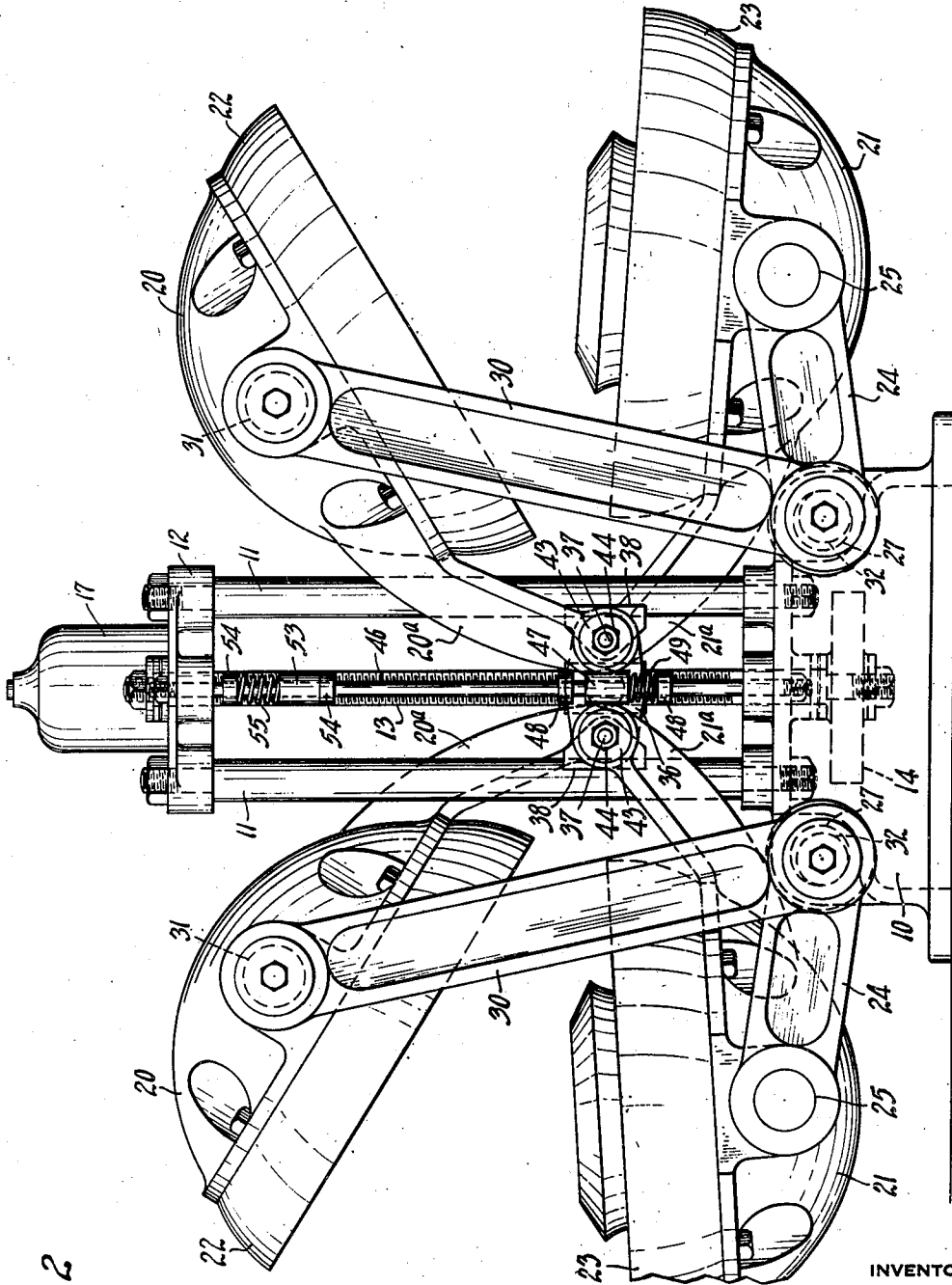


Fig. 2

INVENTOR

FRANK L. JOHNSON

BY

Albert L. Ely

ATTORNEY

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3 Sheets-Sheet 3

Fig.-3

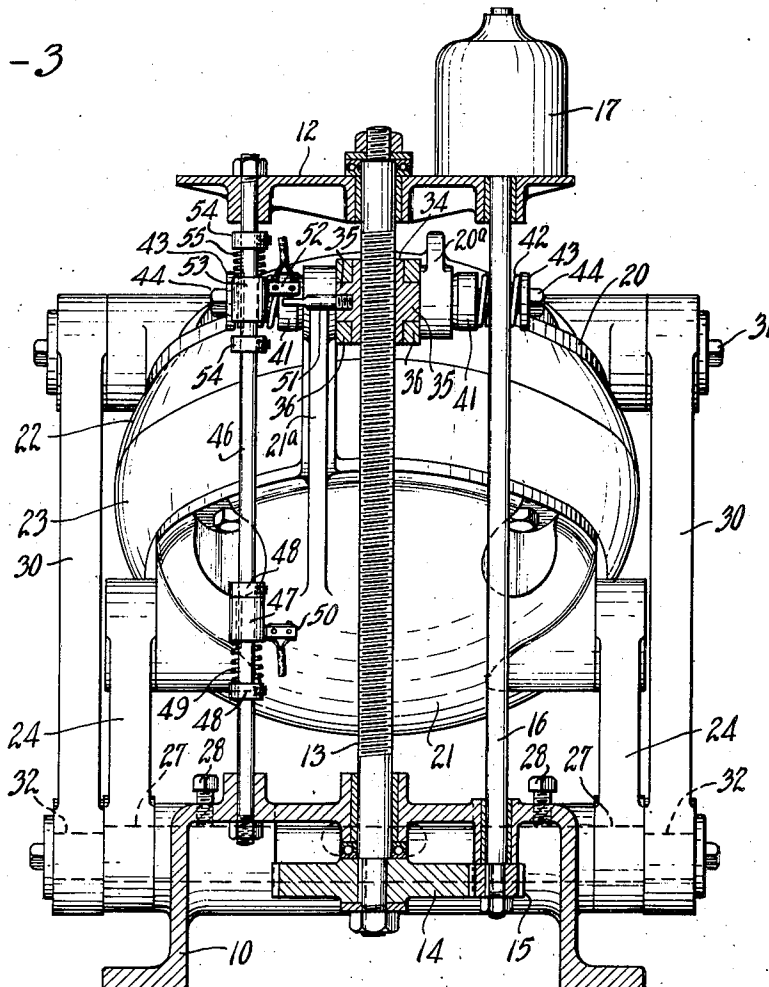
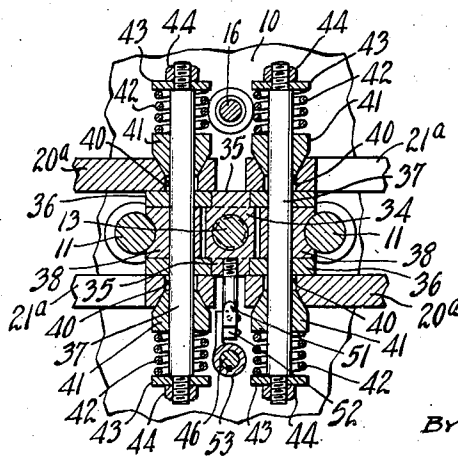


Fig.-4



INVENTOR
FRANK L. JOHNSON

By Albert L. Ely

ATTORNEY

UNITED STATES PATENT OFFICE

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PRESS

Frank L. Johnson, Akron, Ohio

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15 Claims. (Cl. 18—17)

This invention relates to presses, and more especially it relates to presses of the general type commonly used in the rubber industry for the molding and vulcanizing of inner tubes and pneumatic tire casings.

The chief objects of the invention are to provide a press of simple construction and economical operation; to provide for the safety of the operator; to provide rapidity of operation; to provide a press requiring relatively small floor space; to provide a press that is readily accessible for cleaning and for mounting work therein and removing it therefrom; and to provide a press design that is especially adapted for dual or tandem construction wherein two press units are arranged for concurrent operation by a power unit common to both of them. Other objects will be manifest as the specification proceeds.

Of the accompanying drawings:

Figure 1 is a side elevation of the press, in its preferred form, in closed or operative position; Figure 2 is a similar view of the press, in its open or inoperative position;

Figure 3 is a section on the line 3—3 of Fig. 1; and

Figure 4 is a section on the line 4—4 of Fig. 1.

Referring to the drawings, 10 is a base casting and 11, 11 are two vertical posts rising from the medial region thereof and supporting a plate or platform 12 upon their upper ends. Journaled at its respective ends in the base casting 10 and platform 12 is a vertical feed screw 13 that is disposed between the posts 11 and in the same plane as the latter, the lower end of said feed screw extending below its bearing, within the base 10, and being provided thereat with a gear 14. Meshed with the latter is a pinion 15 that is mounted upon the lower end of a vertical drive shaft 16, which shaft is journaled in the base casting 10 and platform 12, parallel to drive shaft 16, and has driving connection at its upper end with a reversible motor 17 that is mounted upon platform 12. The arrangement is such that motor 17 drives the feed screw 13, but at reduced speed by reason of the speed reduction between pinion 15 and gear 14.

The improved press preferably consists of two identical pressing units, and is so illustrated in the drawings. Each of said pressing units comprises an upper press head 20 and a lower press head 21, which heads are hinged together in a manner presently to be described. Secured to the lower face of the upper press head and to the upper face of the lower press head are respective mold sections 22, 23 that mate with each other in the closed, operative position of the press, as shown in Fig. 1, to define a closed molding cavity 26. The lower press head 21 is carried by a pair of arms or links 24, 24 that have their upper ends pivotally connected at 25 to the sides of the press

head, at diametrically opposite points thereof. At their lower ends the links 24 are journaled upon a large hinge pin 27 adjacent the respective end portions thereof, the latter being journaled in the base casting 10, but normally being restrained against angular movement therein by a pair of set screws 28, 28.

In like manner the upper press head 20 is carried by a pair of arms or links 30, 30 that have their upper ends pivotally connected to the opposite sides of the press head upon a diametric axis 31. At their lower ends the links 30 are journaled upon respective end portions 32 of the hinge pin 27, which end portions are disposed laterally outwardly of the portions on which the arms 24 are journaled, and are eccentric with relation to said last mentioned portions. The arrangement is such that by angularly adjusting the hinge pin 27 the links 30 may be adjusted longitudinally relatively of the links 24 to the end that the mold sections 22, 23 always may be brought into pressing relation to each other notwithstanding variation in the thickness of different mold sections that may be employed in the press. In the closed, operative position of the press shown in Fig. 1, the links 24, 30 of each press unit are substantially parallel to each other, with the pivot points 25, 27, 31 and 32 substantially in alignment so that maximum pressure is exerted to close the mold sections upon the work.

The links 24, 30 are disposed at an angle to each other in the open, inoperative position of the press, and this angular positioning is the result of angular movement of the press heads 20, 21 upon their pivots 31, 25 respectively. The aforesaid angular movement of the press heads is effected by movement of translation of the hinge that connects the upper press head 20 to the lower press head 21, said movement of translation being in a rectilinear course, and effected through the agency of the feed screw 13.

To this end a nut 34 is threaded onto said feed screw, which nut is formed with co-axial laterally projecting trunnions 35, 35 having a transversely disposed axis that is parallel to the hinge connecting said press heads. Pivotally mounted upon said trunnions are respective, parallel, equalizer members 36, 36, and carried by said members, in the opposite ends thereof, are hinge pins 37, 37. Journaled upon each hinge pin 37, between the members 36, is a guide shoe 38 that has a groove in one of its faces for sliding engagement with the adjacent post 11, said guide shoes thus preventing angular movement of the nut 34 and structure carried thereby about the axis of feed screw 13. Each of the upper press heads 20 is formed with a rearwardly extending bracket-arm 20a, and each of the lower press heads is formed with a similar bracket-arm 21a. The arms 20a, 21a of one press unit are pivotally

connected to one of the hinge pins 37, and engage the latter immediately outside the respective equalizer members. In like manner the arms 20a, 21a of the other press unit are connected to the other hinge pin 37.

As is clearly shown in Fig. 4, the pivotal connection between the arms 20a, 21a and the hinge pins 37 has a limited amount of play to compensate for any slight mis-alignment of the press heads arising from unequal distribution of the work in the molds or from other causes. To this end each of the arms 20a, 21a is formed with an aperture or bore 40 that is substantially larger in diameter than a hinge pin 37 and through which the latter extends. The outer end of each aperture 40 is counterbored to receive the frusto-conical head of a member 41 that is slidably mounted upon the hinge pin, and is yieldingly urged toward the press-head arm by a compression spring 42. The latter is mounted upon the hinge pin between said member 41 and a washer 43 that is retained on the end of the hinge pin by a nut 44.

The reversible motor 17 is provided with the usual switch means (not shown) for setting it in motion to open or close the press. It is desirable, however, that the motor cease rotating automatically when the press attains fully open or fully closed position, and to this end suitable limit switches are provided. For supporting the limit switches a vertical rod 46 having its end portions secured in the base plate 10 and platform 12 respectively is positioned at one side of feed screw 13 and parallel thereto. Upon the lower portion of rod 46 is a slidably mounted switch support 47 that may be keyed thereon to prevent angular movement. The switch support is positioned between two collars 48, 48 that are adjustably secured to the rod 46, and a compression spring 49 between the lower collar 48 and the switch support normally urges the latter upward against the upper collar. A limit switch 50 is secured to switch support 47 and projects into the path of a stud 51 that projects axially from the adjacent trunnion 35 of nut 34. In like manner the rod 46 carries an upper limit switch 52 that is mounted upon a switch support 53 that is slidably mounted upon rod 46, near the upper end thereof, between collars 54, 54, there being a compression spring 55 between the switch support and the upper collar. The limit switches 50, 52 are arranged in the electrical circuit of the motor 17 in such a manner as to open the circuit and stop the motor when either switch is operated by the stud 51 as the latter reaches its lower or upper limit of travel. The presence of the springs 49, 55 permits the motor 17 to coast slightly after its circuit is opened, without imposing undue strain upon stud 51 or either switch mechanism.

As shown in Fig. 1, the molding cavity 26 in the mold is annular in form, as is the case with inner tube molds, and the mold sections 22, 23 are shown as comprising internal recesses or passages 58, 58 through which steam may circulate to heat and/or vulcanize the article in the molding cavity, as is the practice in vulcanizing presses. If the mold sections are to be heated, suitable flexible piping (not shown) is provided for conducting steam to the molds, as is well understood in the art.

The operation of the press is extremely simple. In the inoperative, open position of the press shown in Fig. 2, the mold sections 22, 23 are extremely accessible for cleaning, and for the

mounting of work in the lower mold sections. Observe the low elevation of the latter, and the absence of obstructions in front of them, where the operator is required to work. As soon as articles to be pressed are mounted in the lower mold sections, the motor 17 is set in motion to drive the screw 13, whereby the nut 34 is caused to rise and thereby to carry the pivot pins 37 upwardly, with the result that the mold sections are brought into mating relation and the links 24, 30 moved substantially into parallelism, as shown in Fig. 1, to produce a relatively high pressure upon the mold sections, yet requiring but a relatively small amount of power to do so. Furthermore, the same pressure will be exerted on the molds of both press units by reason of the equalizer members 36, which will tilt angularly upon the trunnions 35, if, through inequalities in the two units, one becomes completely closed before the other. As previously explained, the small amount of play in the hinge connections between the press heads also compensates for inequalities in the apparatus which otherwise might impose severe strains upon the same. The upper limit switch 52 is so positioned as to stop the operation of the motor 17 as soon as the mold sections are fully closed. The operations just described are reversed to effect subsequent opening of the press. This completes a cycle of operation which is repeated as rapidly as the operators can remove the finished work from the molds and recharge them with work to be pressed.

Although it is stated that the press heads 20, 21 are hinged together by the respective hinge pins 37, this is not true in the sense that the press heads are supported by the hinges, since they are supported by the links 24, 30 and hinge about points 25, 31 as axes. The pivot pins 37 are merely means, common to the two heads of each press unit, for the application of power to swing the said links angularly and thereby to effect opening and closing of the press.

The fact that the power-driven nut 34 moves in a rectilinear course makes it a simple matter to position two press units back-to-back and operate them concurrently by means of a single power unit, with resulting economies of power, space, and weight as previously explained. The dual arrangement of the presses enables the weight of either press to counterbalance the weight of the other press so that lateral strain on the feed screw 13 is avoided. The improved press provides safety and convenience for the operator, and achieves the other objects set out in the foregoing statement of objects.

Modification may be resorted to without departing from the spirit of the invention, or the scope thereof as defined by the appended claims.

What is claimed is:

1. In a press, the combination of a base, a pair of opposed press heads, links supporting the respective press heads by means of diametrically disposed pivotal connections therewith, at one end of the links, the other ends of the links having pivotal support on the base, the pivotal supports for the links that support one mold section being substantially co-axial with the pivotal supports of the links that support the other mold section, and means connected to the press heads for moving said links angularly of each other to effect opening and closing of the press.

2. In a press, the combination of a base, a pair of opposed press heads, links supporting the respective press heads by means of diametrically disposed pivotal connections therewith, at one

end of the links, a pivot pin in said base upon which the other ends of said links are pivotally mounted, and power means connected to the press heads for moving the links angularly relatively of each other to effect opening and closing of the press.

3. In a press, the combination of a base, an angularly adjustable pivot pin therein, the end portions of said pivot pin being eccentric with relation to the remainder thereof, a pair of links journaled at one end on the eccentric portions of said pivot pin, a press head pivotally supported by the other ends of said links, a pair of links journaled at one end on the concentric portion of said pivot pin, a second press head opposed to the first mentioned press head and carried by the other ends of the last mentioned links, and means connected to said press heads for moving said links angularly relatively of each other to open and close the press.

4. In a press, the combination of a base, a pair of opposed press heads having pivotal connection with each other, links supporting the respective press heads by means of diametrically disposed pivotal connections therewith, at one end of the links, a pivot pin in said base upon which pin the other ends of the links are pivotally mounted, and power means having operative connection with the pivotal connection between the press heads for swinging the links angularly relatively of each other to open and close the press.

5. A pivotal connection between the heads of a press that comprises a pair of opposed press heads, and respective pivotal supports for said heads enabling them to swing angularly in the opening and closing of the press, said pivotal connection between the heads being so constructed and arranged as to provide play thereat, yielding means resisting said play, a power member, and means for applying the power thereof to the said pivotal connection to effect opening and closing of the press.

6. A pivotal connection between the heads of a press that comprises a pair of opposed press heads, and respective pivotal supports for said heads enabling them to swing angularly in the opening and closing of the press, said pivotal connection comprising a hinge pin having appreciable play between it and the heads, yielding means normally resisting said play, and power means connected to said hinge pin for moving the latter in a direction that swings the press heads angularly on their supports.

7. A pivotal connection between the heads of a press that comprises a pair of opposed press heads, and respective pivotal supports for said heads enabling them to swing angularly in the opening and closing of the press, said pivotal connection comprising a hinge pin that extends through apertures of larger diameter formed in projecting portions of the respective press heads, said apertures being countersunk at one end, complementally shaped members mounted upon the hinge pin and seated in the respective countersinks, compression springs backing said members and urging them into said countersinks so as normally to maintain the hinge pin in concentric relation to said apertures, and power means connected to said hinge pin for moving the latter in a direction that swings the press heads to open and close the press.

8. In a press, the combination of a pair of opposed press heads, respective pivotal supports for said heads enabling them to swing angularly in the opening and closing of the press, a pivotal connection between said heads, and means for moving said pivotal connection between the press heads in a rectilinear course to effect opening and closing of the press.

9. In a press, the combination of a pair of opposed press heads, respective links upon the free ends of which said press heads are mounted, a pivot pin common to said links upon which their other ends are pivotally mounted, a pivotal connection between said press heads, and means for moving the last mentioned pivotal connection in a rectilinear course to effect opening and closing of the press.

10. A combination as defined in claim 9 in which the pivot pin common to the links is so positioned with relation to the press heads that the links are substantially in alignment in the closed position of the press.

11. In a press, the combination of a pair of adjacent press units, each of said press units comprising a pair of tiltable press heads having pivotal connection with each other, said pivotal connections being disposed adjacent each other, and a power-driven member movable in a rectilinear course and having operative connection with both of said pivotal connections for effecting concurrent operation of both press units.

12. In a press, the combination of a pair of press units disposed back to back, each of said units comprising a pair of tiltable press heads having pivotal connection with each other, said pivotal connections being disposed adjacent each other, a power driven member moving in a rectilinear course, and equalizer means operatively interposed between said power driven member and both of said pivotal connections, whereby equal power is delivered to each of the latter to effect opening and closing of both press units.

13. In a press, the combination of a pair of press units disposed back to back, each of said units comprising a pair of tiltable press heads having pivotal connection with each other, said pivotal connections being disposed adjacent each other, a power driven member moving in a rectilinear course, and equalizer means comprising a member that is pivotally connected at its middle to said power driven member and connected at its respective ends to the respective pivotal connections between said press heads.

14. In a press, the combination of a pair of press units disposed back to back, each of said units comprising a pair of tiltable press heads having pivotal connection with each other, said pivotal connections being disposed adjacent each other, a feed screw positioned intermediate said pivotal connections, a nut on said feed screw, a pair of parallel equalizer elements swiveled at their medial region on said nut and having their ends connected to respective pivotal connections between the press heads, and means for rotating said feed screw.

15. A combination as defined in claim 14 including guide means for preventing angular movement of the nut about the axis of the feed screw.

FRANK L. JOHNSON.