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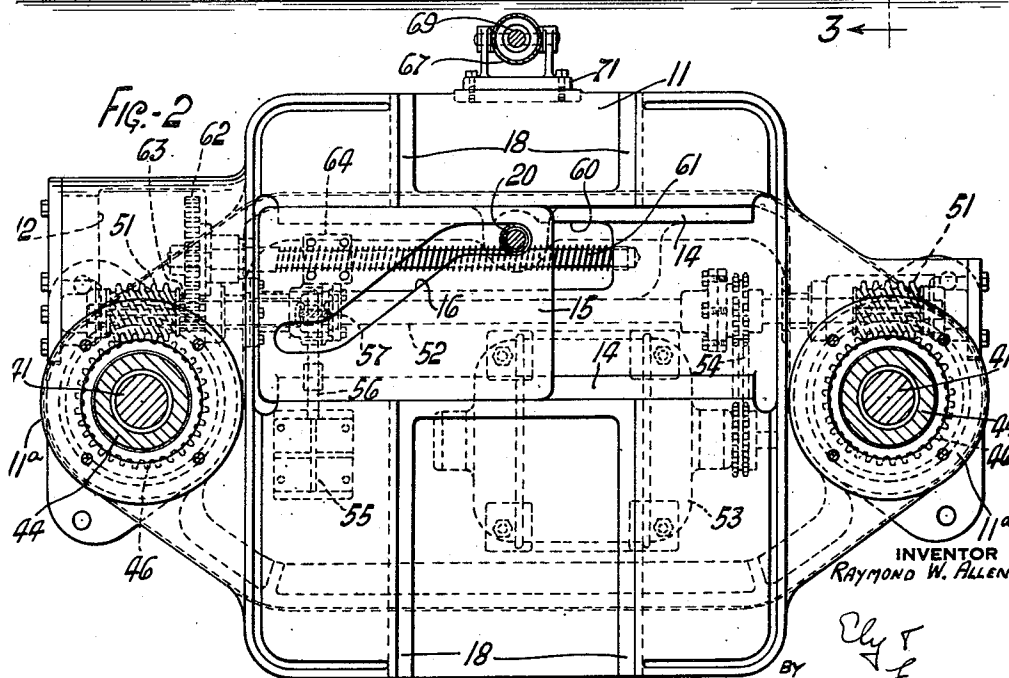
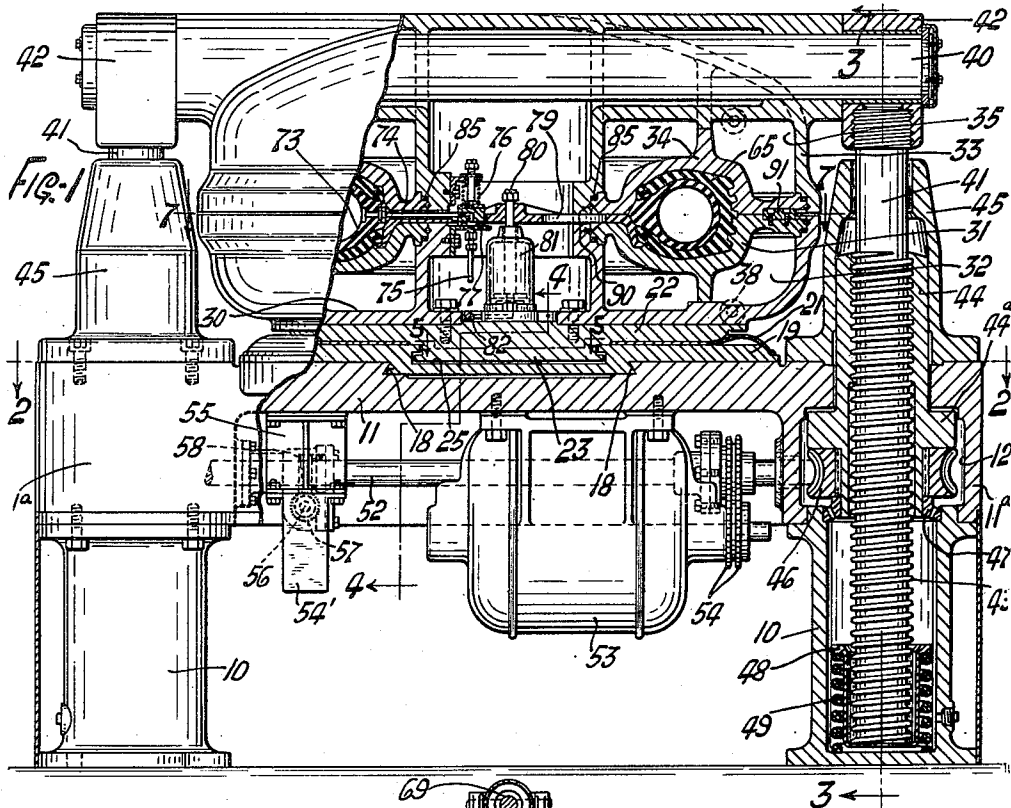
R. W. ALLEN

2,272,887

VULCANIZING PRESS

Filed Feb. 6, 1939

3 Sheets-Sheet 1



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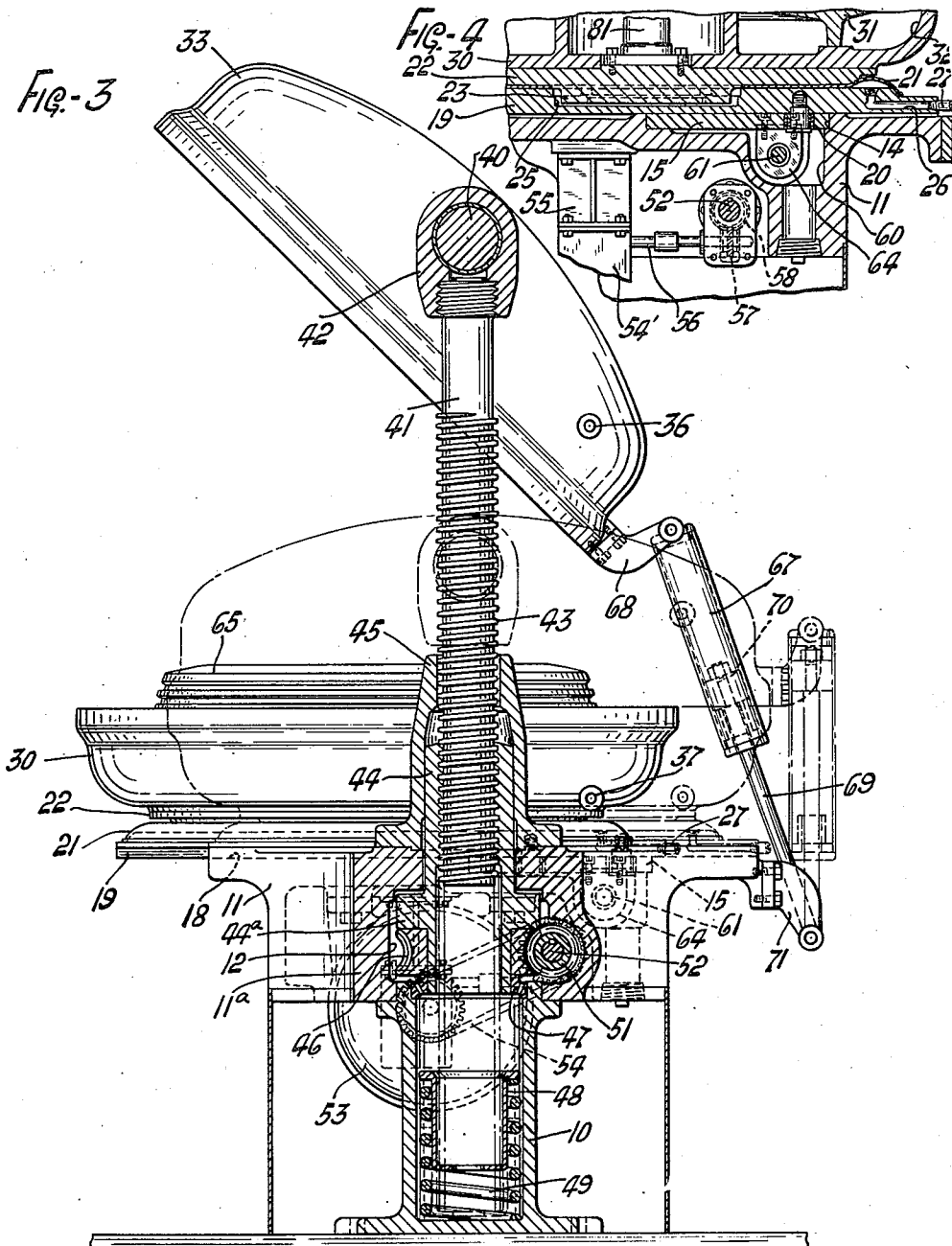
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3 Sheets-Sheet 2



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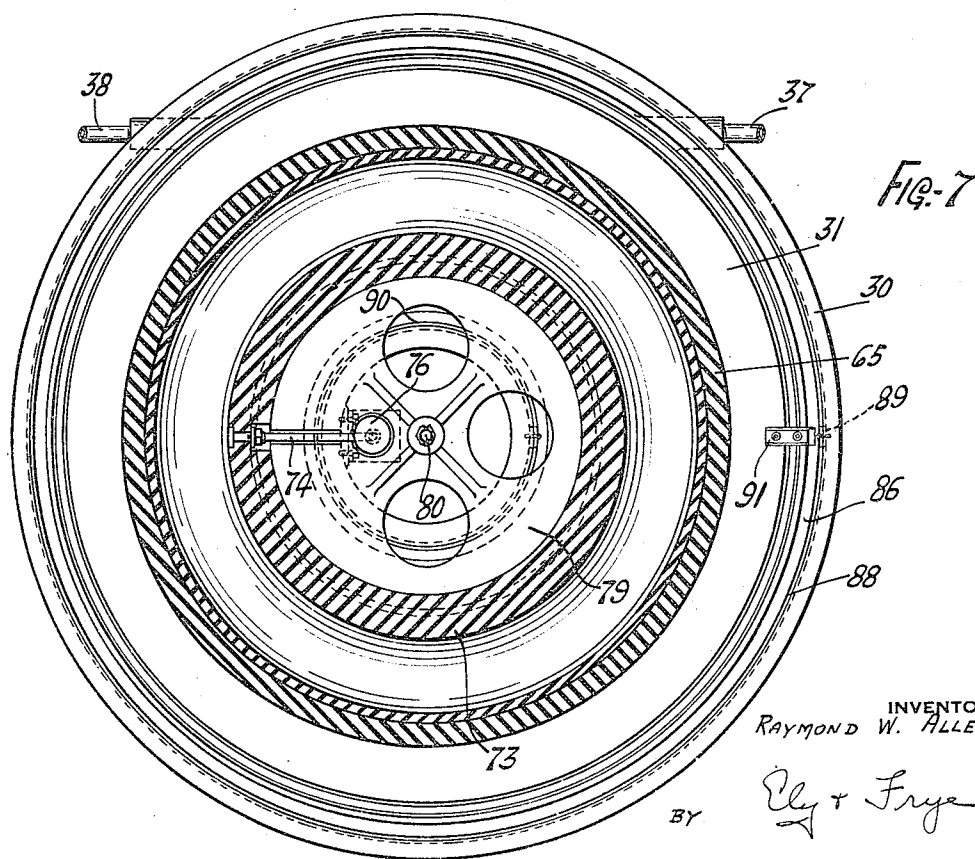
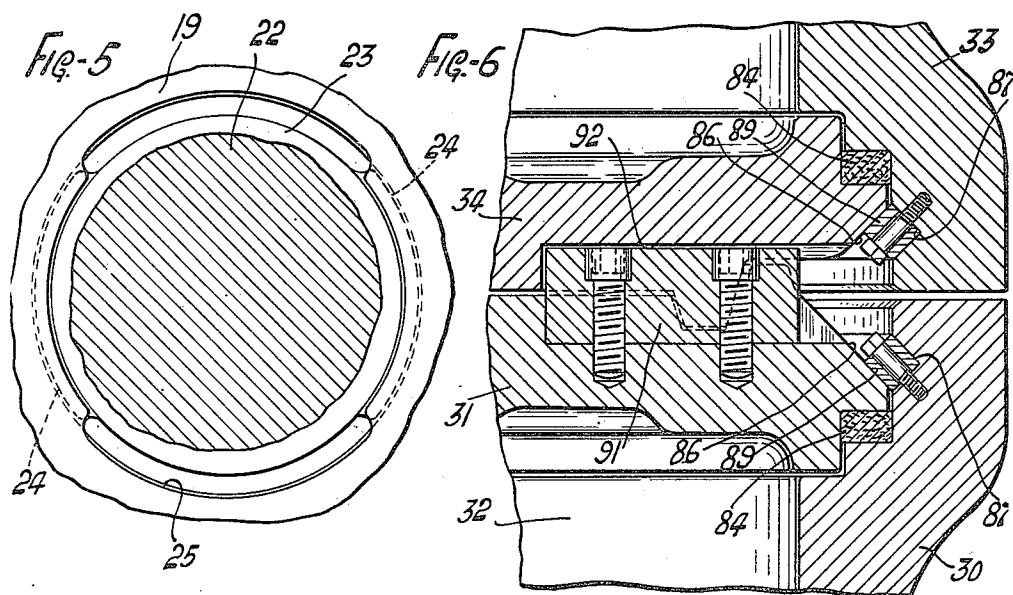
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,272,887

VULCANIZING PRESS

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Application February 6, 1939, Serial No. 254,837

4 Claims. (Cl. 18—17)

This invention relates to vulcanizing presses, and more especially it relates to vulcanizing presses of the watchcase type comprising separable sections that have a horizontally disposed meeting plane.

Vulcanizing presses of the character mentioned usually have a stationary lower head or section, and a movable upper head or cover that is movable relatively of the lower head to achieve the opening and closing of the press. It has been proposed to raise and lower the cover by means of a pair of axially movable vertical rods or screws, the cover being pivotally connected on a diametric axis to the upper ends of said rods or screws. The arrangement makes it possible for the cover to separate from the lower head while in parallelism therewith, and also to move into engagement with the lower head while in the same position, means being provided for tilting the cover on its diametric axis, when in its fully elevated position, to facilitate the cleaning and lubricating of the mold section in said cover. With the cover in this position, however, the lower mold section and work therein is not as accessible as desired.

The chief object of the invention is to provide a vulcanizing press of the character mentioned, wherein the lower mold section will have greater accessibility in the open position of the press. More specifically, the invention aims to provide for the movement of the lower press head to a position of greater accessibility during the opening of the press. Another object of the invention is to provide in an improved manner for the attaching of the mold sections of the press to the respective heads thereof. Other objects will be manifest as the description proceeds.

Of the accompanying drawings:

Figure 1 is a vertical transverse section of a vulcanizing press embodying the invention, in closed position, a part thereof being shown in front elevation;

Figure 2 is a section on the line 2—2 of Figure 1;

Figure 3 is a section of the press on the line 3—3 of Figure 1, the press being in open position;

Figure 4 is a section on the line 4—4 of Figure 1;

Figure 5 is a section, on a larger scale, on the line 5—5 of Figure 1;

Figure 6 is a detail sectional view, on a larger scale, showing how the mating mold sections of the press are secured to the separable beads thereof; and

Figure 7 is a section, on a larger scale, on the line 7—7 of Figure 1.

Referring to the drawings, there is shown an apparatus comprising a pair of hollow, laterally spaced, pedestal supporting structures 10, 10 upon the top of which is mounted a heavy bed plate

11. The medial portion of the bed plate is substantially square in plan, as shown in Figure 2, and is provided with laterally extending journal portions 11a, 11a that rest upon the supporting structures 10, and are cored out to provide vertical passages 12 therethrough, which passages are co-axial with relation to the respective pedestal supports 10. The top face of the bed plate 11 is formed on a portion of its area with a transverse slideway 14 in which is slidably mounted a cam plate 15, said cam plate having a cam slot 16 formed therein. Said cam slot 16 is of angular profile, having offset parallel end portions connected by an oblique intermediate portion, said end portions being parallel to the slideway 14.

Said bed plate 11 also has its top face formed with a fore and aft dovetail slideway 18 that is disposed at a higher level than the slideway 14 and is interrupted by the latter, the bottom of slideway 18 being substantially flush with the top of cam plate 15. Slidably mounted in slideway 18 is a dovetail slide 19 that has a cam roller 20 swivelled to its bottom face, said cam roller being disposed within cam slot 16 of the slidably mounted cam plate 15. The arrangement is such that longitudinal movement of the cam plate 15 will cause a fore and aft movement of the slide 19, the extent of said movement being clearly shown in Figure 3 wherein the extreme forward and rearward positions of the slide are shown in full lines and broken lines respectively. In actual practice the extent of this movement is about six inches.

The top of the slide 19 is formed with a relatively large annular boss or raised portion, and mounted thereon is an annular metal diaphragm 21, the periphery of which is secured to the margin of the boss in an air-tight manner, as by being welded thereto. Mounted upon the diaphragm 21 is a circular piston 22 of somewhat smaller diameter than the diaphragm, the inner circumference of the diaphragm being welded to the bottom face of the piston to prevent the passage of air therebetween. The piston 22 is centrally formed on its under face with a downwardly extending lug 23 formed with two segmental, diametrically opposed, marginal flanges 24, 24, Figure 5, said lug and flanges being receivable in a recess 25 formed in the top face of the slide 19, said recess being undercut at diametrically opposite points to provide a bayonet connection for the lug 23 of the piston. The recess 25 is sufficiently larger than the lug 23 and flanges 24 to enable the piston 22 to move vertically an appreciable distance relatively of the slide 19. At the rear of the press the slide 19 is formed with a duct 26 through which pressure fluid is discharged into the space beneath the diaphragm 21 to lift the latter and the piston 22 thereon, the outer end of duct 26 being connect-

ed by a flexible pipe 27, Figure 4, with a suitable source of pressure fluid (not shown). The movement of the piston is utilized for effecting a close mating of the mold sections of the press in the closed or operative position thereof.

The upper and lower press heads are of the type that comprise mating mold sections, which sections consist solely of the cavity portions of the mold, and said cavity portions are assembled with respective jacket structures in such a manner as to define chambers therebetween, which chambers receive the steam that heats the mold sections. The lower press head comprises an annular jacket portion 30 and an annular mold or cavity portion 31, which portions have sealed engagement with each other at their inner and outer circumferences, and define a steam chamber 32 therebetween. Similarly the upper press head or cover comprises a jacket portion 33 and mold or cavity portion 34 that define an intervening steam chamber 35. The press is provided with the usual piping for circulating steam through the steam chambers 32 and 35, only portions of said piping being shown in the drawings. Thus in Figure 3 the steam outlet from chamber 35 of the upper head is shown at 36 and the steam inlet to the lower head is shown at 37. In Figure 7 is shown the steam inlet 37 and outlet 38 of the lower head.

The jacket portion 30 of the lower press head is removably secured to the piston 22, concentrically thereof, by means of cap screws or the like, whereby the lower press head is subject to the lateral movement of translation of the slide 19 and the axial movement of the piston 22. The jacket portion 33 of the upper press head or cover is pivotally supported upon a diametrically arranged, transverse shaft 40, and said shaft is supported in horizontal position by a pair of axially movable vertical posts 41, 41 that are disposed at opposite sides of the press, the opposite ends of the shaft being pivotally mounted in respective clevises 42 that are mounted upon the upper ends of said posts 41. The major portion of each post 41, upwardly from the lower end thereof, is formed with a screw thread 43, the latter having threaded engagement with an elongated nut 44 through which the post extends. Each nut 44 has a flange portion 44a that is disposed within the vertical passage 12 in a journal portion 11a of the bed plate 11, and a portion extending upwardly from said flange and journaled in a nut housing 45 mounted atop of said bed plate. Immediately below the flange 44a, within said passage 12, each nut 44 has a worm gear 46 mounted thereon, there being a thrust bearing 47 mounted between the lower side of the worm gear and the top of a pedestal support 10. The arrangement is such that concurrent rotation of the worm gears 46 will turn the nuts 44 and thus raise or lower the posts 41 and thereby raise or lower the upper head of the press. Located in the bottom of each pedestal support 10 is a cup 48 in which the lower end of a post 41 is receivable in the lowermost position of the latter, said cup being yieldingly supported upon a circumscribing compression spring 49. The arrangement cushions the closing movement of the cover of the press.

Rotation of the worm gears 46 is effected by means of respective worms 51 that are meshed therewith, said worms being mounted upon opposite ends of a shaft 52 that is disposed transversely of the press below the bed plate 11, and

journaled at its end in suitable bearings located in the journal portions 11a of said bed plate. The shaft 52 is driven by means of a reversible electric motor 53 that is mounted on the under side of the bed plate 11 and has driving connection with the shaft 52 through the agency of sprocket chains 54. A simple switch (not shown) is provided for closing the electrical circuit that includes the motor 53, for setting said motor in operation. The motor is stopped automatically after making a determinate number of revolutions sufficient to raise the press cover to fully elevated position, or to lower it completely therefrom, and for so stopping the motor, a limit switch (not shown) of known or desired construction is employed. Said limit switch is enclosed within a receptacle 54' carried by a bracket 55 secured to the under side of bed plate 11, and is operated by a driven shaft 56 having a spiral gear 57 on an end thereof, which spiral gear meshes with a similar spiral gear 58 on the shaft 52.

Below the slideway 14 the top of the bed plate 11 is formed with an elongated recess 60 that extends parallel to said slideway, and positioned in said recess is a feed screw 61 that is journaled at its end portions in suitable bearings in said bed plate. At one of its ends (the left end as viewed in Figure 2), the screw 61 extends into the recess 12 of the bed plate portion 11a, and is provided therein with a gear 62 that is meshed with a driving pinion 63, the latter being mounted upon shaft 52 beside worm 51. The feed screw 61 is threaded through a nut 64 that is secured to the under side of cam plate 15, the arrangement being such that said cam plate is moved back and forth as the motor 53 is driven in one direction or another. Movement of the cam plate 15 effects a fore and aft movement of the slide 19 as previously explained. The cam 16 is so shaped that forward movement of the slide does not begin until the rising posts 41 have lifted the upper head or cover of the press sufficiently to be clear of a tire casing 65 that is in the lower mold section 31 of the press.

The tire 65 remains in the lower mold section of the press because the upper mold section 34 is cleaned and soaped or otherwise lubricated after each vulcanization. To facilitate the cleaning and lubricating of the upper mold section, the upper head or cover is tilted on its diametric axis, in the fully open condition of the press, which tilting further elevates the front of the cover, and depresses the rear thereof. For so tilting the cover a lost motion connection is provided, which connection is attached to the rear of the cover and to a fixed point at the rear of the bed plate 11. Said connection comprises a tubular sleeve 67 that is pivotally connected at its upper end to a bracket 68 mounted upon the jacket member 33 at the rear thereof. The lower end of the sleeve is closed except for a restricted axial opening through which slidably extends a rod 69. The end of the rod 69 within the sleeve 67 is provided with a head 70 of larger size than said axial opening, so as not to pass therethrough. The outer end of rod 69 is pivotally connected to a bracket 71 mounted on the rear margin of bed plate 11. The head 70 of rod 69 has an axial movement of about eight inches within sleeve 67, which movement constitutes a lost motion that enables the upper head or cover of the press to move axially of the lower head thereof for a distance of eight inches while in parallelism with said lower head. This occurs during the initial opening movement

and final closing movement of the press, and achieves the desirable function of obviating pinching or dislocating the work in the press. When the cover is at a greater distance from the lower head, the lost motion connection described effects a tilting of the cover such as is illustrated in full lines in Figure 3.

During vulcanization of the tire 65, the latter is subjected to internal expanding pressure and heat that is applied to the tire through the agency of an expansible core 73 that it confined therein. The said core is provided with the usual inflating stem 74 through which steam or other heated fluid is discharged into the interior of the core. Heated fluid for distending the core 73 is conducted thereto through a pipe 75, and the upper jacket member 33 and lower jacket member 30 are provided with respective co-operating connections 76, 77 that automatically couple the stem 74 to the pipe 75 in the closed condition of the press, as shown in Figure 1. Said connections automatically are disengaged from the stem as the press opens. The pipe 75 extends to a suitable source of heated pressure fluid (not shown) and is provided with suitable control means (not shown) that are operable manually by the operator.

For lifting the finished tire 65, with core 73 therein, from the molding cavity of the lower mold section 31, the usual bead-engaging ring 79 is provided, which ring seats in a suitable recess in said mold section 31 underlying the bead of the tire therein. Said ring 79 is in the form of a disc, as is best shown in Figure 7, and at its axis is connected to the upper end of a piston rod 80 of a fluid pressure operated cylinder 81, the latter being mounted upon the piston 22. The cylinder 81 is provided with an inlet and outlet pipe 82 connecting with a suitable source of pressure fluid (not shown), the admission of fluid to the cylinder being under the control of the operator.

The press also includes improved and simplified means by which the mold sections 31, 34 are secured and retained in the jacket members 30, 33, said means being best shown in Figure 6. As shown therein, each mold section and its companion jacket member are formed with suitable circumferential shoulders, at the periphery of said mold sections, which shoulders define intervening annular recesses in which suitable packing material 84 is mounted. Similar packing 85 is positioned between the mold sections and the jacket members at the inner circumference thereof, as shown in Figure 1, with the result that the steam chambers in the respective press heads are fluid-tight. The confronting faces of the mold sections 31, 34 are beveled at 86, at the periphery of said sections, and the inner face of each jacket member 30 and 33 is formed with a circumferential groove or recess 87, contiguous with the bevel 86 of the companion mold section, said groove consisting of two faces that meet at right angles. Mounted in each groove 87 is a split ring 88 that is square in section, one face thereof overlying the bevel 86 of the mold section in the jacket member for retaining the mold section therein. Being split, the rings 88 readily are partly collapsed and sprung into place in their grooves 87. For retaining the rings in said grooves, respective keys or inserts 89 are mounted between the ends of each ring, said keys being secured to the jacket members by suitable cap screws. Similar retaining rings 90, 90 are interposed between the

mold sections 31, 34 and the respective jacket members 30, 33 at the inner circumference thereof.

For facilitating the accurate angular positioning of the mold sections 31, 34 relatively of each other so that they meet properly in the closed operative position of the press, a key or metal block 91 is secured to the top face of lower mold section 31, and the lower face of upper mold section 34 is formed with a slot or recess 92 in which said key 91 is receivable. The lateral faces of key 91 may be somewhat sloped, as shown in Figure 7, to facilitate entrance of the key into the recess 92.

The invention provides in a simple manner for the securing of the mold sections in the press, whereby said mold sections readily may be removed and replaced as alterations or change of size or design may require. The press heads and mold sections are conveniently presented in the open position of the press, both for the removal and mounting of work therein, and for the cleaning and lubricating of the upper mold section. The use of the screw-posts for elevating and lowering the upper press head makes for safety, since said head cannot accidentally fall and injure the operator. The use of spring-supported cups beneath the screw-posts assures that the press will close without jars or jolts.

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 of the character described, the combination of a pair of horizontally disposed upper and lower press heads of which the latter is movable in a horizontal plane, a pair of axially movable posts at opposite sides of the press pivotally supporting the upper press head on a diametric axis, cam means in operative engagement with the lower press head and adapted to move the same laterally in its own plane, and a single power instrumentality for axially moving said posts and for operating said cam.

2. A combination as defined in claim 1 in which the cam means is a horizontally slidable plate having a cam-slot formed therein.

3. A press of the character described, comprising a bed plate formed with a transverse slideway, and with a fore and aft slideway at a higher elevation than said transverse slideway and interrupted by the latter, a cam-plate in said transverse slideway formed with a cam-slot, a slide in said fore and aft slideway, a cam roller carried by said slide and engaged in said cam slot, and means for moving said cam-plate longitudinally of the transverse slideway to effect a fore and aft movement of the slide.

4. A press of the character described comprising a bed plate formed with a transverse slideway and with a fore and aft slideway at a higher elevation than said transverse slideway, a cam-plate in said transverse slideway formed with a cam slot, a slide in said fore and aft slideway, a cam roller carried by said slide and engaged in said cam slot, a pair of opposed press heads of which the lower press head is carried by said slide, a pair of longitudinally movable posts that carry the upper press head, and a single power unit operatively connected to said post and said cam plate adapted to effect longitudinal movement of said posts and longitudinal movement of said cam-plate in its slideway.

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