

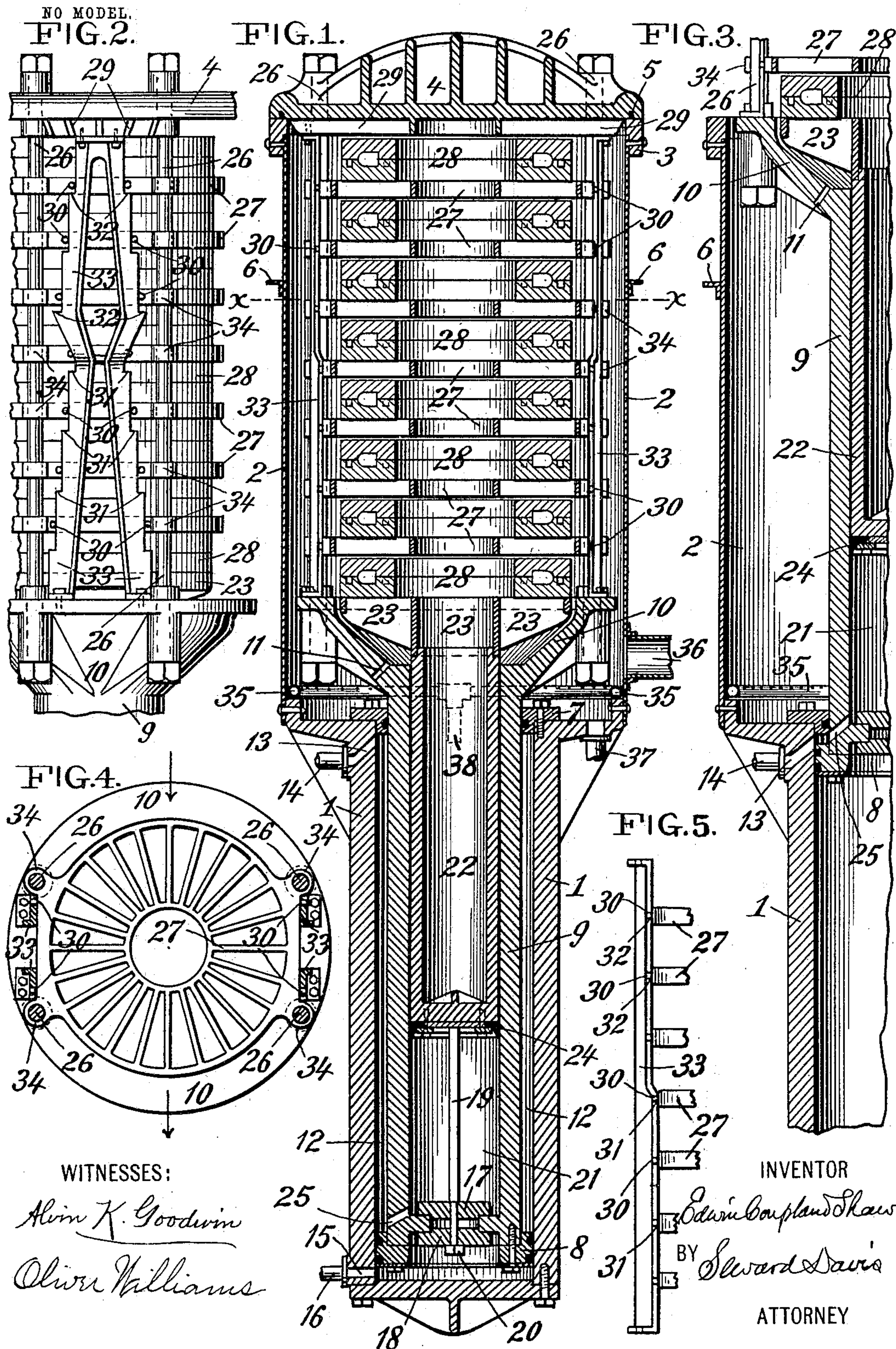
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E. C. SHAW.

COMPOUND HYDRAULIC VULCANIZING PRESS.

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UNITED STATES PATENT OFFICE.

EDWIN COUPLAND SHAW, OF AKRON, OHIO, ASSIGNOR TO THE B. F. GOODRICH COMPANY OF OHIO, OF AKRON, OHIO, A CORPORATION OF OHIO.

COMPOUND HYDRAULIC VULCANIZING-PRESS.

SPECIFICATION forming part of Letters Patent No. 758,863, dated May 3, 1904.

Application filed June 17, 1903. Serial No. 161,886. (No model.)

To all whom it may concern:

Be it known that I, EDWIN COUPLAND SHAW, a citizen of the United States of America, residing at the city of Akron, county of Summit, and State of Ohio, have invented certain new and useful Improvements in Compound Hydraulic Vulcanizing-Presses, of which the following is a specification.

This invention relates more particularly to vulcanizers for wheel-tires or other rubber products, and has for one object to provide a special vulcanizing-press in which any number of rubber-containing molds from one up to the full mold capacity of the press may be subjected to vulcanizing heat while the molds are tightly closed and without requiring removal or disarrangement of the mold-carrying trays or other parts of the press.

Another object of the invention is to relieve the press-body walls from strains incident to holding the molds closed in the press during vulcanization, and thus promote lighter construction of the press.

A further object of the invention is to assure charging the molds into the vulcanizer and discharging them therefrom with economy of time and labor.

The invention includes a special arrangement of the compound-press rams and the water-inlet pipes and ports controlling them whereby the two rams are adapted to exert countervailing pressures in opposite directions for holding the press-cover tightly closed by one ram while clamping the rubber-containing molds and their supporting-trays between the other ram and the press-cover and whereby also both rams may be raised or lowered together to facilitate charging and discharging of the molds.

The invention also includes a special arrangement of the mold trays or carriers relatively to their supports, whereby each tray may fall and be sustained at its own normal level, while allowing all the mold-trays to rise freely for facilitating operation of the press upon any number of molds up to its full capacity.

The invention also includes certain constructions of the mold-trays and the inner-ram

head and the press-cover which assure free-steam circulation during vulcanization of rubber products in the molds and afterward provide for free water circulation for quickly cooling the molds in the press.

The invention also includes other special details of construction and combinations of parts of the vulcanizing-press, all as hereinafter described and claimed.

Reference is made to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a central vertical sectional elevation of my improved vulcanizing-press with the two hydraulic rams and the press-cover fully lowered and with a full charge of molds on the inner press-ram and the trays. Fig. 2 is a detail side view with the press side wall removed and shows the molds and trays clamped together and to the press-cover by the raised inner ram. Fig. 3 is another detail side view showing how all the molds may be raised to discharging-level after vulcanization and cooling are effected. Fig. 4 is a plan view showing one of the mold-trays with its supports and guides in horizontal section on the line *x x* in Fig. 1, the press-wall being removed; and Fig. 5 is an edge view of one of the preferred terrace-shouldered supports for the mold trays or carriers with parts of the trays thereon.

The main press-cylinder 1 has a top flange, to which is bolted the lower end of the press-body wall 2, to the top of which is fixed a metal ring 3, on which the press-cover 4 closes tightly. A steam packing-ring 5 is provided at the joint and is preferably disposed in a recess of the cover. To the press-wall 2 are fastened at the shop-floor line a number of brackets 6, adapted to sustain the entire apparatus at convenient mold-charging level on the floor-beams and with its lower portion sunken in a pit. A stuffing-box 7, fixed at the top of the main cylinder 1, and a packed ring 8, fixed to the lower end of the main ram 9, guide this ram, which preferably has a solid and upwardly-flaring or cupped head 10, provided with a water-drainage hole 11.

When the ram 9 is down, there is a water-

space 12 between it and the cylinder 1, and a port 13 and pipe 14 admit to this space water which presses downward on the packed main-ram ring 8. Below the ring 8 the cylinder 5 has another port 15, admitting water from a pipe 16 below said ring. To opposite sides of an annular flange projecting laterally inward from the ram 9 there are fastened, by steam-tight joints preferably, two metal disks 10 or plates 17 18, which while forming with said flange the closed lower end of the ram 9 also support a metal post 19, the lower end of which is preferably reduced in diameter to pass through the two disks 17 18 and receives below the one 18 a nut 20, which clamps these disks tightly to the intervening ram-flange, while locking the post securely in place and so that it projects upward into a water-chamber 21 within the ram 9. Into this chamber 21 is fitted the inner ram 22, preferably having a spider or grating head 23. A packing-ring 24 is fixed to the closed bottom of the inner ram. Near its bottom the main ram 9 has a port 25, through which 25 water admitted to the space 12 may enter the main-ram chamber 21 for independently forcing upward the inner mold-carrying ram 22 23 and also for assisting simultaneous raising and lowering of both rams during discharging and charging of the molds, as hereinafter 30 more fully explained. The main-ram post 19 serves as a stop limiting the descent of the inner ram when its head stands about level with the main-ram head.

35 To the head 10 of ram 9 are bolted the lower ends of four frame-posts 26, preferably disposed in opposing pairs, as more clearly shown in Figs. 2 and 4 of the drawings. The upper ends of these posts are rigidly secured 40 to the press-cover 4, which thus always moves with the main ram 9 10. These posts also make convenient guides for vertically movable trays or carriers 27, on which the molds 28, holding the rubber tires or products, are placed, excepting the bottom mold, which I 45 prefer to place directly upon the inner-ram head 23. These trays, like the ram-head 23, have open or grating form in order to assure free steam circulation through them during 50 the vulcanizing process and permit free water circulation while cooling the molds. For obtaining similar free steam and water circulation over and around the uppermost mold 28 the press-head 4 has at its under side a series 55 of ribs 29, forming steam and water passages between them. The molds are charged upon and discharged from the ram-head and trays laterally from between the two pairs of press-posts 26, as indicated by the arrows in Fig. 60 4 of the drawings, and from and to a platform which stands about on a level with the top of the press-body.

An important feature of my invention consists in providing means for supporting the 65 mold-carrying trays which will permit each

of the trays to descend only to its normal mold charging and discharging level, while at the same time assuring free upward movement of all the trays to permit clamping of them and the molds thereon between a ram 70 or other pressure device and a relatively fixed opposing head or portion of the press. Any approved means may be employed which will embody the operative principle of mold trays or supports descending each to its own specific 75 limit to permit charging and discharging of the molds and rising freely to allow the molds and trays to be clamped tightly together for holding the molds closed during vulcanization of their contained rubber products. This im- 80 provement may be embodied in vulcanizers not having the compound hydraulic rams 9 10 and 22 23, herein described; but it is specially valuable in combination with these rams. In carrying out this part of my in- 85 vention I now prefer to use mold-carrying trays each provided with opposite pairs of laterally-projecting pins or stops 30, which in normal mold charging and discharging positions of the trays rest upon series of terraced 90 shoulders 31 32, formed, preferably, on skeleton plates or supports 33, bolted at their top and bottom flanges to the main-ram head 10 and press-cover 4, respectively. In view of the lateral charging and discharging of the 95 molds to and from the trays 27, and the consequent disposal of the side pairs of press-posts 26 26 not far apart, and also because of the desirability of locating the two opposite shouldered plates 33 33 in protected posi- 100 tions between the pairs of posts at opposite sides of the press, I have arranged the terraced or stepped support-shoulders in two series—a lower series 31 and an upper series 32. It is desirable that the two pins 30 at each dia- 105 metrically opposite edge of each mold-tray 27 be as far apart as possible within the space allowed between the two posts 26 at the sides of the press in order to give stable support to the molds 28 and relieve their collars 34, 110 which slide on the post 26, from heavy strains during charging and discharging of the molds.

It will be understood from Fig. 2 of the drawings that the two pins 30, at opposite sides of the lowermost tray 27, are as far 115 apart as the two press-frame posts 26 will allow and that the three successively higher pairs of pins for the three next higher trays are set at gradually-lessening lateral distances apart. It follows that the pins 30 of the lower 120 tray will pass by the shoulders 31, on which the three higher of these four trays rest. Hence each of the four lower trays will take its proper vertically-spaced position as its pins 30 rest on their corresponding support-shoulders 31 as said trays move downward, and 125 all four trays, without molds between them, can be freely raised or bunched together as they slide on the guide-posts 26 and without obstruction by the pins or stop-shoulders of 130

and for these trays. Should the capacity of the press be limited to five molds, the four lower pairs of pins 30 at each side of the respective trays, with corresponding shoulders 31 for them on the two opposite supports 33, will suffice. When I give advantageous large mold capacity to the press—say when it accommodates eight molds with seven trays between them, as shown in the drawings—it is not desirable to continue the gradually-lessening lateral distances between the successively higher pairs of pins 30 at the sides of each tray from the bottom tray upward, as this would bring the pairs of pins of the upper trays too close together to properly sustain said upper trays. I therefore arrange the above-named upper series of terraced shoulders 32 for the three upper trays in a different vertical plane by laterally offsetting the upper parts of the supports 33, which sustain the three upper trays beyond their lower parts, which sustain the four lower trays, as shown in Figs. 1 and 5 of the drawings. This allows me to space the pins 30 in the lowermost of the three upper trays about as far apart laterally as the pins of the bottom tray. The pairs of pins 30 and corresponding shoulders 32 for the three upper trays have gradually-lessening lateral distances apart, substantially like the pins and stop-shoulders for the four lower trays. The three upper trays 27 thus may be raised or bunched together without interference of their pins 30 or stop-shoulders 32, and the tray-pins and stop-shoulders will permit descent of these trays each to its own proper level and no farther. Should the four lower trays or any of them ever be raised above the normal charging position of the fourth tray, the pins 30 of these lower trays will simply pass along freely within and clear of the offset inner faces of the upper parts of the stop-shoulder supports 33 or within the facial plane of said offset upper parts of the supports. It is obvious that without molds on them all seven trays shown in the drawings may be raised and bunched together at the press-cover as they slide by their collars 34 on the press-posts 26 and that when lifting pressure is removed each tray in its descent will lodge by its four pins 30 on its own four shoulders 31 or 32 of the supports 33, and all the trays thus will be sustained at proper distances apart vertically to permit free lateral charging and discharging of the molds.

A perforated or other suitable pipe-coil 35 at the bottom of the press-body admits steam from a pipe 38 to effect vulcanization of the tires or rubber products in the molds, and a pipe 36 supplies water for flooding the molds to cool them quickly after vulcanization. This pipe 36 also is used for water-drainage, for which purpose there is provided another bottom-connected pipe 37. The press-body will be fitted with the usual steam-gage and ther-

nometer, not necessary to be shown or described.

The operation of the apparatus may be summarized as follows: Assuming that the two rams 9 and 22 have been fully raised and that the ram 9 has raised with it the press-cover 4 and that the molds 28 have been placed on the ram-head 23 and trays 27 and that the rams and the press-cover have been fully lowered, as shown in Fig. 1 of the drawings, water now is admitted through pipe 14 and port 13 and passes under pressure downward through the space 12 and also passes through the port 25 into the chamber 21 below the inner-ram piston 22. The hydraulic pressure on the packed ring 8 and on disk 17 forces the main ram downward, thereby holding the press-cover 4 to the press-body tightly to close its packed joint 5 therewith, and at the same time the water-pressure raises the inner ram 22 off its seat or rest on the main-ram post 19 and lifts all the molds 28 and intervening trays 27 and clamps these molds and trays between it and the ribs 29 of the press-cover, as shown in Fig. 2 of the drawings. Vulcanization of the rubber products in the molds now is effected by the aid of steam admitted through the pipe 35. The water-pressure holding the main ram 9 and the press-cover 4 downward counter-acts the pressure forcing the inner ram 22 and the molds and trays upward. Hence there are no heavy strains on the press-wall 2, which may be made lighter than usual. After vulcanization is effected the steam is shut off and water is admitted through pipe 36 to flood and quickly cool the molds, and when cooling is effected and the water used for this purpose has been drained off through the pipes 36 37 the water-pressure at the pipe 14 is relieved to permit the inner ram 22 to lower again to the stop-post 19 on the main ram, thereby allowing the molds 28 to settle to normal discharging positions as their intervening trays 27 lodge on their respective shoulders 31 or 32 of the supports 33 to be sustained thereby, while clearance-spaces are provided above all the molds. Hydraulic pressure at pipe 14 now is restored, and water-pressure also is established through or at the lower cylinder-pipe 16 and under the packed ring 8. The combined valve-controlled pressures now underneath both rams 9 22 lift them and the press-cover 4 in step-by-step movements or with occasional brief stops, permitting lateral discharge of each mold as it reaches the level of the loading and unloading platform. When all the molds are thus discharged, another series of molds will be laterally charged into the press, beginning at the lowermost mold, and as the rams are together lowered by a step-by-step movement to bring successive trays 27 to the level of the loading-platform the mold-charged press comes to rest at the initial position shown in Fig. 1 of the drawings and all is again ready for vulcaniz-

ing the rubber products in this second series of molds, and thereafter a repetition of the cooling and discharging processes, substantially as above described.

5 This press is always ready for operation on any number of molds 28 from one mold placed upon the inner-ram head 23 or on any one of the trays 27 up to its full capacity, and the above-described construction of the terrace-shouldered supports 33 relatively to the tray
10 pins or stops 30 permits one or more molds and all the trays to be clamped together between the inner-ram head 23 and the ribs 29 of the press-cover 4 to hold the mold or molds
15 closed during vulcanization.

It is obvious that it is not necessary to charge this vulcanizing-press with molds up to its full capacity before vulcanization can be effected and as is required for prior apparatus of this character.
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When the press is operated with a full charge of molds, the vertical edges of the skeleton plate-supports 33 between their successive shoulders 31 or 32 form guides for the vertically-moving trays and make unnecessary independent tray-guides, such as the press-posts 26; but to provide for pressing a lesser number of molds to the best advantage and to positively prevent accidental displacement of the
25 trays during charging and discharging of molds into and from the press it is preferable to use independent guides, such as the press-posts 26, for the vertically-moving mold trays or carriers.
30

Certain features of my invention expressed in the appended claims may with advantage be adopted for presses not used for vulcanizing rubber goods, as will be readily understood.
35

40 The compound vertically-disposed vulcanizing-press herein described embodies certain important generic novel features of a horizontal vulcanizing-press shown in a companion patent application filed by me of even date herewith and adapted more especially to compress a stack of long heavy molds each containing a number of straight lengths of rubber-tirestock. This vertical compound press, like the above-named horizontal press, clamps
45 vulcanizing-molds between a ram and an opposing resistance-plate with a pressure which compensates change in mass of the rubber stock while the tires or other rubber products are being cured in the heating-chamber and
50 also assures constant proper closure of the molds in the press without requiring time-consuming and expensive bolting together of their halves or parts and also clamps the molds for practically their whole area, thereby preventing buckling or bursting of the
55 molds during vulcanization of their rubber contents. This compound vertically-disposed press also embodies certain operative features of a single-acting vertically-disposed press
60 shown in another companion patent applica-

tion filed by me of even date herewith. This single-acting press has but one ram, which clamps molds between it and the closed press-cover with a pressure compensating change in mass of the rubber products undergoing vul-
70 canization. The chief difference between this vertical compound or two-ram press and the above-named one-ram vertical press consists in the double-acting rams operating to allow all the molds to be lifted by them after vul-
75 canization is completed to permit comparatively quick and easy lateral charging and discharging of the molds to and from the raised rams and trays directly from and to a loading-platform and without disturbing or lifting off
80 the press-cover and without independently raising and lowering the individual molds and intervening trays in charging and discharging the molds.

I have described the preferred embodiment 85 of my invention, but do not wish to be understood as limiting the invention to the precise forms shown, since it is obvious that modifications may be made in these structures without departing from the spirit of my invention.
90

I claim as my invention—

1. A hydraulic vulcanizing - press having telescopic rams adapted to move simultaneously, first inward, to charge; second together, to press; and third, outward, to discharge,
95 the press contents, substantially as described.

2. A hydraulic vulcanizing - press having telescopic rams, the ram of the outer cylinder constituting the cylinder of the inner ram, both rams being adapted to move simultane-
100 ously from opposite directions to effect pressing, substantially as described.

3. A hydraulic vulcanizing - press having telescopic rams, the ram of the outer cylinder constituting the cylinder of the inner ram,
105 and means for advancing the inner ram and retracting the outer ram to effect pressing, and means for operating both rams in the same relative directions to effect charging and discharging, respectively, of the press con-
110 tents, substantially as described.

4. A compound press having two rams or plungers working one within the other and adapted to exert countervailing pressures in opposite directions, substantially as described.
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5. A compound press having two rams or plungers working one within the other and adapted to exert countervailing pressures in opposite directions and to move simultaneously in the same direction, substantially as
120 described.

6. A compound press having two rams or plungers adapted to exert countervailing pressures in opposite directions, one ram being connected to the press-cover and holding it
125 closed to the press-body while the other ram presses substances between it and the closed cover, substantially as described.

7. A compound press having two rams or plungers adapted to exert countervailing pres-
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5 sures in opposite directions, one ram being connected to the press-cover and holding it closed to the press-body while the other ram presses substances between it and the closed cover, said rams also being adapted to move simultaneously in the same direction, substantially as described.

10 8. A compound press having two rams or plungers working one within the other and adapted to exert countervailing pressures in opposite directions, one ram being connected to the press-cover and holding it closed to the press-body while the other ram presses substances between it and the closed cover, substantially as described.

15 9. A compound press having two rams or plungers working one within the other and adapted to exert countervailing pressures in opposite directions, one ram being connected to the press-cover and holding it closed to the press-body while the other ram presses substances between it and the closed cover, said rams also being adapted to move simultaneously in the same direction, substantially as described.

20 10. In press apparatus, the combination, with vertically-movable work trays or carriers having pins or stops, of supports to which the tray pins or stops are adapted permitting each tray to fall and be sustained at its normal level by its pins or stops while allowing all the trays to rise freely, substantially as described.

25 11. In press apparatus, the combination, with vertically-movable work trays or carriers having pins or stops, of supports having series of terraced shoulders to which the tray pins or stops are adapted and permitting each tray to fall and be sustained at its normal level by its pins or stops while allowing all the trays to rise freely, substantially as described.

30 12. In press apparatus, the combination, with vertically-movable work trays or carriers having pins or stops, of supports having two series of terraced shoulders arranged in different vertical planes and to which shoulders the tray pins or stops are adapted and permitting each tray to fall and be sustained at its normal level by its pins or stops while allowing all the trays to rise freely, substantially as described.

35 13. In press apparatus, the combination, with vertically-movable work trays or carriers having pins or stops, of guides on which the trays move, and supports independent of said guides and to which supports the tray pins or stops are adapted and permitting each tray to fall and be sustained at its normal level by its pins or stops while allowing all the trays to rise freely on the guides, substantially as described.

40 14. In press apparatus, the combination, with vertically-movable work trays or carriers having pins or stops, of guides on which the trays move, and supports independent of

said guides and having series of terraced shoulders to which the tray pins or stops are adapted and permitting each tray to fall and be sustained at its normal level by its pins or stops while allowing all the trays to rise freely on the guides, substantially as described.

45 15. In press apparatus, the combination, with vertically-movable work trays or carriers having pins or stops, of guides on which the trays move, and supports independent of said guides and having two series of terraced shoulders arranged in different vertical planes and to which shoulders the tray pins or stops are adapted and permitting each tray to fall and be sustained at its normal level by its pins or stops while allowing all the trays to rise freely on the guides, substantially as described.

50 16. A compound vulcanizing-press having two rams adapted to exert countervailing pressures in opposite directions and to move simultaneously in the same direction, posts connecting one ram to the press-cover and holding said cover closed to the press-body while the other ram presses molds between it and the closed cover, mold trays or carriers having pins or stops and vertically movable in the press-body, and supports to which the tray pins or stops are adapted permitting each tray to fall and be sustained at its normal level by its pins or stops while allowing all the trays to rise freely, substantially as described.

55 17. A compound vulcanizing-press having two rams adapted to exert countervailing pressures in opposite directions and to move simultaneously in the same direction, posts connecting one ram to the press-cover and holding said cover closed to the press-body while the other ram presses molds between it and the closed cover, mold trays or carriers having pins or stops and vertically movable in the press-body, and supports having series of terraced shoulders to which the tray pins or stops are adapted permitting each tray to fall and be sustained at its normal level while allowing all the trays to rise freely, substantially as described.

60 18. A compound vulcanizing-press having two rams adapted to exert countervailing pressures in opposite directions and to move simultaneously in the same direction, posts connecting one ram to the press-cover and holding said cover closed to the press-body while the other ram presses molds between it and the closed cover, mold trays or carriers having pins or stops and vertically movable in the press-body, and supports having two series of terraced shoulders arranged in different vertical planes and to which shoulders the tray pins or stops are adapted and permitting each tray to fall and be sustained at its normal level by its pins or stops while allowing all the trays to rise freely, substantially as described.

65 19. A compound vulcanizing-press having

two rams adapted to exert countervailing pressures in opposite directions and to move simultaneously in the same direction, posts connecting one ram to the press-cover and
 5 holding said cover closed to the press-body while the other ram presses molds between it and the closed cover, mold trays or carriers vertically movable on said posts and having pins or stops, and supports to which the tray
 10 pins or stops are adapted permitting each tray to fall and be sustained at its normal level by its pins or stops while allowing all the trays to rise freely on the posts, substantially as described.

15 20. A compound vulcanizing-press having two rams adapted to exert countervailing pressures in opposite directions and to move simultaneously in the same direction, posts connecting one ram to the press-cover and
 20 holding said cover closed to the press-body while the other ram presses molds between it and the closed cover, mold trays or carriers vertically movable on said posts and having pins or stops, and supports having
 25 series of terraced shoulders to which the tray pins or stops are adapted permitting each tray to fall and be sustained at its normal level by its pins or stops while allowing all the trays to rise freely on the posts, substan-
 30 tially as described.

21. A compound vulcanizing-press having two rams adapted to exert countervailing pressures in opposite directions and to move simultaneously in the same direction, posts
 35 connecting one ram to the press-cover and holding said cover closed to the press-body while the other ram presses molds between it and the closed cover, mold trays or carriers vertically movable on said posts and having
 40 pins or stops, and supports having two series of terraced shoulders arranged in different vertical planes and to which shoulders the tray pins or stops are adapted and permitting each
 45 tray to fall and be sustained at its normal level by its pins or stops while allowing all the trays to rise freely on the posts, substantially as described.

22. A vulcanizing-press having a cover or door provided at its inner face with ribs form-
 50 ing steam and water circulating passages between the cover and the molds held in the press, substantially as described.

23. A compound vulcanizing-press having two rams adapted to exert countervailing
 55 pressures in opposite directions and to move together in the same direction, posts connecting one ram to the press-cover and adapted to hold said cover closed to the press-body, a series of mold trays or carriers having grating
 60 form and provided with pins or stops and independently movable by the other press-ram within the press-body, and supports to which the tray pins or stops are adapted permit-
 65 ting each tray to fall and be sustained at its normal level by its pins or stops while allowing

all the trays to rise freely, said press-cover having at its inner face ribs forming steam and water circulating passages next the up-
 permost mold clamped in the press, substan-
 70 tially as described.

24. A compound vulcanizing-press having two rams adapted to exert countervailing pressures in opposite directions and to move together in the same direction, posts connect-
 75 ing one ram to the press-cover and adapted to hold said cover closed to the press-body, the other ram having a spider or grating head; a series of mold-trays having grating form and provided with pins or stops and vertically
 80 movable within the press-body by said spider-head ram, and supports to which the tray pins or stops are adapted permitting each tray to fall and be sustained at its normal level by its
 85 pins or stops while allowing all the trays to rise freely, said press-cover having at its inner face ribs forming steam and water circulating passages next the uppermost mold clamped in the press, substantially as described.

25. In a compound vulcanizing-press, the combination, with a main cylinder, of two
 90 rams 9, 22, located in said cylinder and working one within the other; said cylinder having water-supply ports 14, 15, and the outer ram 9 having a port 25, substantially as de-
 95 scribed.

26. In a compound vulcanizing-press, the combination, with a main cylinder, of two
 100 rams 9, 22, located in said cylinder and working one within the other; said cylinder having water-supply ports 14, 15, and the outer ram 9 having a port 25 and also having a post 19 limiting descent of the inner ram 22, substan-
 105 tially as described.

27. In a compound vulcanizing-press, the combination, with the main cylinder and the
 110 press-body, of two rams 9, 22, located in said cylinder and working one within the other, and posts 26 connecting the main ram 9 with the press-body cover which moves with said
 115 ram; said cylinder having water-supply ports 14, 15, and the main ram 9 having a port 25, substantially as described.

28. In a compound vulcanizing-press, the combination, with the main cylinder and the
 120 press-body, of two rams 9, 22, located in said cylinder and working one within the other, and posts 26 connecting the main ram 9 with the press-body cover which moves with said
 125 ram; said cylinder having water-supply ports 14, 15, and the main ram 9 having a port 25, and also having a post 19 limiting descent of the inner ram 22, substantially as described.

29. In a compound vulcanizing-press, the combination, with the main cylinder and the
 130 press-body, of two rams 9, 22, located in said cylinder and working one within the other, posts 26 connecting the main ram 9 with the press-body cover which moves with this ram, said ram 9 having a flaring cupped head provided with a water-drainage passage 11, and

the inner ram 22 having a spider or grating head, said main cylinder having water-supply ports 14, 15, and the main ram 9 having a port 25, substantially as described.

- 5 30. In a compound vulcanizing-press, the combination, with the main cylinder and the press-body of two rams 9, 22, located in said cylinder and working one within the other, posts 26 connecting the main ram 9 with the
10 press-body cover which moves with this ram, said ram 9 having a flaring cupped head pro-

vided with a water-drainage passage 11, and the inner ram 22 having a spider or grating head, said main cylinder having water-supply ports 14, 15, and the main ram 9 having a port 15 25 and also having a post 19 limiting descent of the ram 22, substantially as described.

EDWIN COUPLAND SHAW.

Witnesses:

ALVIN K. GOODWIN,
OLIVER WILLIAMS.