





# UNITED STATES PATENT OFFICE

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## VULCANIZER

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5 Claims. (Cl. 18—17)

This invention relates to vulcanizers, such as the so-called "watch case" vulcanizers used in the rubber industry for the molding and vulcanizing of pneumatic tire casings and inner tubes, and more especially it relates to improved means for opening and closing the vulcanizer, and improved safety features that are operative upon the failure of said opening and closing means.

The chief objects of the invention are to provide a vulcanizer of compact design; to provide for ample head room above the vulcanizer whereby changing of the cavity molds in the vulcanizer is facilitated; to provide safety mechanism that prevents accidental closing of the vulcanizer due to failure of any of its parts; to provide mechanism engageable with the lid or cover of the vulcanizer to tilt the same to an angle that facilitates the changing of a mold section therein; and to provide a superior arrangement of fluid pressure operated cylinders for opening and closing the vulcanizer whereby stresses set up by the cylinders are confined to the base casting of the vulcanizer. Other objects will be manifest as the specification proceeds.

Of the accompanying drawings:

Figure 1 is a side elevation of a vulcanizer embodying the invention, the lid or cover thereof being shown in elevated or open position; and

Figure 2 is a front elevation of the vulcanizer shown in the closed or operative condition.

Referring to the drawings, there is shown a vulcanizer comprising a stationary concavo-convex section 10 and a similarly shaped movable section or cover 11, said sections being arranged to part on a horizontal plane, the cover section being uppermost. The stationary section 10 is positioned relatively close to the floor, being mounted upon a pair of laterally disposed channel-shaped supports 12, 12 at each side thereof, and a reinforced post 13 rising from the floor beneath the front portion thereof. The marginal portion of section 10, which is at the top thereof, is circumscribed by an annular locking ring 14 that rests upon brackets 15, 15 carried by the vulcanizer section. The locking ring is formed with the usual inwardly extending bayonet lugs (not shown) that co-operate with the bayonet lugs 16, 16 on the lower margin of the cover 11 for locking the vulcanizer in the closed condition thereof shown in Figure 2. For moving the locking ring angularly, the usual rack 17 is mounted upon base section 18, which rack is meshed with a gear segment 18 pivotally carried by the locking ring, said segment being provided with an

operating lever 19 for manual operation thereof. Removably mounted within the vulcanizer sections 10, 11 are the respective mating section of a two part cavity mold (not shown) within which work is vulcanized. Means also is provided for conducting vulcanizing fluid, such as steam, to the vulcanizer, but since these features constitute no part of the invention, the illustration and description thereof are believed not to be necessary.

At the rear of the vulcanizer, at opposite sides thereof, are upstanding frame members or standards 21, 21, in the upper part of which are located respective bearing structures 22, the latter supporting a heavy pivot pin 23 that is journaled therein adjacent its respective ends. Said pivot pin projects beyond the said bearing, and keyed to its projecting end portions are respective lever arms 24, 24 that extend forwardly and have their free ends pivotally connected at 25, 25 to vulcanizer cover 11, said pivots 25 being disposed at diametrically opposite points of said cover. Spanning the space between standards 21 and supported at its ends atop the latter, is a cross member 26 made up of angle irons disposed back to back, the purpose of which presently will be explained. The lever arms 24 are swingable so as to move the cover 11 between the closed position shown in Figure 2 of the drawings and the open position shown in Figure 1 thereof, the pivot pin 23 being so positioned that its axis is slightly above the axis of the pivots 25 when the cover 11 is in closed position, as indicated in broken lines in Figure 1. Since the cover 11 is pivotally mounted in the ends of lever arms 24, it will be apparent that the cover will be in parallelism with the stationary section 10 during its initial movement of separation therefrom, and during the final phase of its closing movement therewith. Furthermore, because of the angular position of the lever arms 24, the cover will vary but slightly from axial alignment with the vulcanizer section 10 during said initial opening movement and final closing movement. The arrangement is such as to avoid the pinching or displacement of work in the vulcanizer during the closing thereof.

For raising and lowering the lever arms 24 to open and close the vulcanizer, a pair of double acting fluid pressure operated cylinders 28, 28 are provided. The cylinders 28 are positioned at each side of the vulcanizer, substantially in vertical position, and each is pivoted at 29, near its upper end, in the stationary vulcanizer section 10 and a bracket-like standard 30 positioned laterally thereof. The respective piston rods 31 of the

cylinders 28 have their outer ends pivotally connected at 32 to the lever arms 24 adjacent the free ends of the latter, said lever arms thus constituting levers of the third class. The length of the cylinders 28 is such that shallow pits 33 are required to receive the lower ends thereof. Flexible inlet and outlet pipes 34, 35 communicate with the upper and lower ends respectively of the cylinders 28, said pipes extending to a four-way operating valve 36 mounted upon one of the supporting plates 12. Said valve has connection with a source of pressure fluid (not shown) through pipe 37, and also includes a suitable exhaust pipe 39. Valve 36 is manually operated by means of a hand lever 38, which, when in the position shown in full lines in Figure 1, causes the valve to admit pressure fluid to the lower end of cylinder 28 and discharge fluid from the upper end of said cylinder, whereby the cover 11 is maintained in the elevated position shown. Conditions are reversed when lever 38 is in the position shown in broken lines in said figure.

The vulcanizer comprises safety mechanism that is engageable with the cover structure 11, when the cover is in elevated position, to prevent descent of the cover in case of failure of the fluid pressure supply or in case of failure of the pivot pin 32, said safety mechanism being moved into and out of operative position automatically in determinate time relation to the operation of the valve 36. Said safety mechanism comprises a pair of upright posts 40, 40 positioned at the rear of the vulcanizer, between the lever arms 24 and in front of the pivot pin 23. At its lower end each post 40 is pivotally mounted at 41 in a pair of suitable journal brackets mounted on the floor. The upper ends of the posts 40 are provided with respective caps 42, and journaled in said caps is a horizontal rod or bar 43. Journaled upon the rod 43, between caps 42, is a sleeve 44 to the opposite ends of which are secured, as by welding, respective U-shaped metal loops or clevises 45, 45. The sleeve 44 is secured to one leg of each clevis, both legs thereof being apertured to admit the rod 43. The legs of the clevises straddle the caps 42, and the outside leg of one of the clevises (the nearest one as viewed in Figure 1) has the hub portion of a lever arm 46 permanently secured thereto as by welding. The lever arm 46 has a rearwardly extending portion 46a, the free end of which is connected to one end of a tension spring 47, the other end of the latter being connected to a stud or anchor 48 projecting from the post 40. The lever arm 46 comprises a forwardly extending portion 46b that is bent laterally, as shown in Figure 2, to a position in front of the adjacent cap 42. A short arm 49 is secured to the top of cap 42 and an adjustable stop-screw 50 is mounted in the outer end of said arm in position to engage the forwardly extending portion 46b of lever arm 46, and thereby to limit the angular movement of the latter under the impetus of tension spring 47. When the member 46b is in contact with stop screw 50, the clevises 45 are in the angular position shown in Figure 1. Each cap 42 has a bracket formation on the rear thereof, and pivotally connected to said bracket, by a removable pivot pin 52, is a prop or rod 53, the other end of said rod being connected by a removable pin 54 to a bracket 55 that is mounted upon the cross member 26, at the top of standard 21. Normally the props 53 hold the posts 40 somewhat in forwardly inclined position, as shown in full lines in Figure 1. Removal of pins 52 or 54 enables props 53 to be dis-

engaged and enables the posts 40 to be tilted rearwardly until they rest against the cross member 26, as shown in broken lines in Figure 1, upon occasion as presently will be explained.

As previously stated, the vulcanizer cover 11 is in parallelism with the stationary section 10 during the initial phase of its rising or opening movement. It is desirable, however, that in fully open position the cover should be tilted so as to be more accessible for the cleaning of the mold section therein. To this end a pair of spaced apart abutment members 56, 58 are mounted upon the under side of cross member 26, and project downwardly and forwardly therefrom into the path of a pair of pintle pins 59, 59 mounted in horizontal position on the rear portion of the cover 11. Engagement of the pintle pins 59 with the abutments 56 prevents further rise of the cover at the rear thereof, and causes the said cover to tilt about the pins 59 as a pivot or hinge so that when the lever arms 24 are fully raised the cover is in the angular position shown in full lines in Figure 1. If greater accessibility to the cover is desired, pins 52 or 54 of the posts 40 may be removed, and the latter manually moved to the position shown in broken lines in Figure 1, in which position the cover 11 will be disposed more nearly in a vertical plane.

When the posts 40 are in the full line position shown in the drawings, and the clevises 45 are in the angular position shown in Figure 1, said clevises are in position automatically to engage respective hook members 60 mounted on top of vulcanizer cover 11, when said cover is elevated to fully open position by the cylinders 28. The hooks 60 preferably are welded to the cover, and each has a somewhat pointed or tapered upper end to enable it to tilt the clevis 45, against the tension of spring 47, so that the clevis may move into the recess or notch 61 of the hook. In this position of the apparatus, the clevises will prevent descent of the cover 11 due to failure of the pressure in cylinders 28, or due to breakage in the cover-lifting linkage. Normally the notches 61 are clear of the clevises, as shown in Figure 1, so as to enable the clevises readily to be moved out of engagement with the hooks, as is necessary before the cover can be lowered.

The moving of the clevises out of engagement with the hooks 60 is effected concurrently with the operation of valve 36, and to this end a cable 63 is connected to the free end of portion 46b of lever arm 46, said cable extending downwardly therefrom and being trained about a sheave or pulley 64 that is carried by a bracket 65 mounted upon a cross-member 66 connecting standards 21, the other end of said cable being connected to the operating lever 38 of valve 36. The arrangement is such that when the operating lever 38 is moved to the position shown in broken lines in Figure 1, to charge the upper end of cylinder 28 and concurrently to discharge its lower end and thereby to lower the cover 11, the cable 63 is drawn taut and tilts the clevises 45, against the tension of spring 47, thereby withdrawing said clevises from operative engagement with hooks 60 and enabling the cover 11 to descend.

The top of the cover 11, at the front thereof, is provided with an eye 67 by means of which the cover may be engaged by a hook 68 on a cable from an overhead pulley block (not shown), the latter being positioned so as to exert a rearward pull on the cover. The pulley block is utilized when it is desired to change the mold section

within the cover 11. By lowering the arms 24 in the manner previously described, while the front of the cover is drawn rearwardly by the cable 63, the cover is caused to swivel about pivot points 25, and is easily lowered, in inverted position, upon the stationary vulcanizer section 10. The mold section within the cover 11 is readily removed or replaced when the cover is in this position.

10 The vulcanizer is small and compact, it is of relatively simple construction, it is safe to operate, and it achieves the other objects set out in the foregoing statement of objects.

15 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 vulcanizer of the character described, the combination of stationary lower vulcanizer section, a removable cover therefor, a pair of lever arms pivoted at one end to a fixed point and extending along opposite sides of said cover, the free ends of the lever arms being pivotally connected to the cover at diametrically opposite points thereof, and respective fluid pressure cylinders connected to said arms for raising and lowering the same, said fluid pressure cylinders being pivotally mounted below said lever arms and connected thereto intermediate the ends thereof.

2. In a vulcanizer of the character described, the combination of a stationary lower vulcanizer section, a removable cover thereon, a framework at one side of the vulcanizer, a pair of lever arms pivotally mounted thereon and extending to op-

posite sides of the cover, the free ends of said lever arms being pivotally connected to said cover substantially on a diametric axis, which axis is parallel to the axis of oscillation of the lever arms and slightly below the same in the closed position of the vulcanizer, and means connected to said lever arms for moving them angularly to raise and lower said cover with relation to the stationary section.

3. A combination as defined in claim 2 in which the means for angularly moving the lever arms consists of respective fluid pressure cylinders disposed below said arms and pivotally mounted upon the framework of the apparatus.

4. A vulcanizer of the character described, comprising a removable cover, lever arms at opposite sides of the cover in the free ends of which the cover is pivotally mounted upon a horizontal axis, means engaging said lever arms for moving the same angularly to raise and lower the cover, a safety device engageable with said cover in the elevated position thereof for preventing descent of the cover upon failure of the raising and lowering means, and means supporting said safety device, said means comprising upright, spaced apart posts that are pivotally mounted at their lower ends below the bottom plane of the cover when the latter is in closed position.

5. A combination as defined in claim 4, including means for maintaining said posts alternatively in either of two positions of inclination from the vertical.

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