April 23, 1940. W. B. FREEMAN 2,198,493

VULCANIZING APPARATUS

Filed Jan. 29, 1937

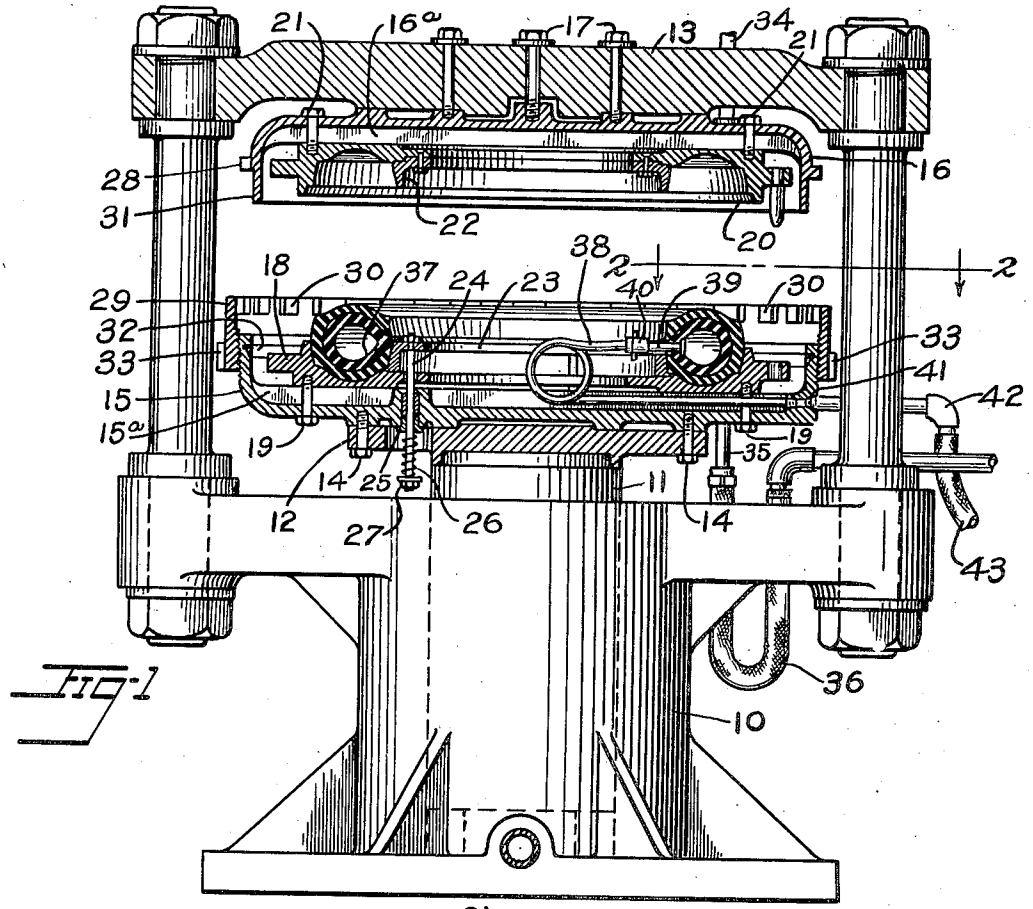


FIG-1

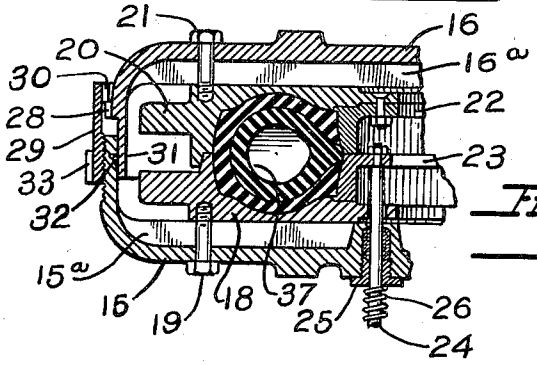


FIG-3

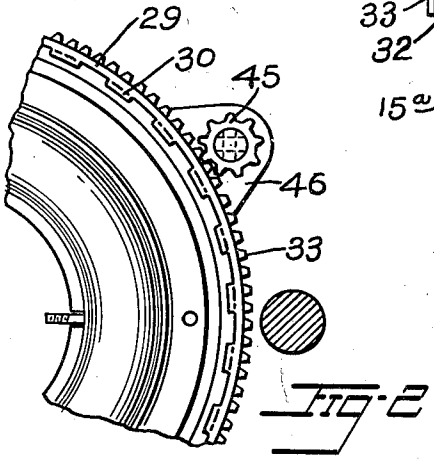


FIG-2

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Patented Apr. 23, 1940 2,198,493

UNITED STATES PATENT OFFICE

2,198,493

VULCANIZING APPARATUS

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Application January 29, 1937, Serial No. 122,893

3 Claims. (Cl. 18—17)

This invention relates to vulcanizing apparatus, and is especially useful in the vulcanization of pneumatic tire casings.

The principal objects of the invention are to provide for vulcanizing a single article at a time by the use of standard molds at low cost with a minimum amount of steam, and to provide simplicity, adjustability and convenient manipulation of the apparatus.

These and other objects will appear from the following description and the accompanying drawing.

Of the drawing:

Fig. 1 is an elevation of the apparatus, partly in cross section.

Fig. 2 is a fragmentary view, taken on line 2—2 of Fig. 1 showing in plan a part of the lower half of the vulcanizing apparatus.

Fig. 3 is an enlarged fragmentary view showing the mold and its enclosing steam box in closed relation with a tire casing and pressure bag in place.

Referring to the drawing, the numeral 10 designates the hydraulic cylinder, 11 the ram, 12 the movable platen, and 13 the fixed platen of a hydraulic press. Mounted upon the movable platen 12 by means of bolts 14 is the lower half 15, of a steam box, the upper half 16, of which is attached by bolts 17 to the fixed platen 13. The arrangement is such that lowering of the ram separates the halves of the steam box and raising of the ram forces them together. The halves of the box when brought together define a steam chamber of sufficient size to accommodate a single tire mold and to heat the same without waste of steam. The box is also adapted to hold the mold halves in engagement and is large enough to accommodate molds of different sizes.

In order to permit circulation of the steam around the molds, the lower box member 15 is formed with ribs 15*a* across its bottom upon which the mold half 18 is supported, the mold half being fastened to the box by bolts 19. The box half 16 is similarly formed with ribs 16*a* on its lower face to which the mold half 20 is clamped by bolts 21. The steam may freely circulate around the back of the mold between the ribs.

The mold halves themselves may be of any suitable construction. The bull ring 22 is preferably bolted to the mold half 20, whereas the bull ring 23 is preferably free and has attached thereto a plurality of knock-out rods 24 which extend through the steam box 15 and are adapted to engage the cylinder 10 when the ram is lowered to strip the tire from the mold. To prevent escape of steam around the rods 24, stuffing boxes 25 are provided in the wall of the steam box.

To hold the bull ring 23 in place, coil springs 26 are mounted upon rods 24 between the steam box and nuts 27 fastened to the rods.

In order to prevent the halves of the steam box from blowing apart where high pressure steam is used, and to permit the use of low pressure water for operating the hydraulic ram, the box member 16 is formed with an outwardly turned interrupted flange 28 and the lower box member 15 is provided with a rotatable locking ring 29 having an inwardly turned interrupted flange 30. These flanges are adapted to pass each other and upon turning the ring 29 they prevent return movement, the arrangement being similar to a breech lock on a gun.

For the accommodation of molds of different thicknesses a telescopic construction is provided. The steam box 15 is threaded about its exterior and ring 29 is formed with corresponding threads. Also the box 16 is provided with a long depending skirt 31 adapted to telescopically slide within the rim of the box 15. A lip gasket 32 of rubber is set in an annular groove formed in the inner face of the vertical walls of the box member 15 so as to engage the skirt 31 over a range of adjustments of the box members. By rotation of the ring 29, the steam box may be adjusted to lock the box members at different spacings to accommodate molds of different thicknesses, and the lip gasket 32 will seal the box against escape of steam at any position within the range of adjustment.

To provide for rapid adjustment and locking of the ring 29, a pinion 45 is mounted on a stub shaft rotatably mounted in a lug 46 fixed to box member 15, and is adapted to engage gear teeth 33 formed on ring 29. The pinion may be rotated by a crank (not shown) to turn the ring.

To provide steam circulation through the steam box, an inlet pipe 34 is connected to the upper box member, and an outlet pipe 35 is connected to the lower box member and provided with flexible means such as the hose 36 to permit raising and lowering of the ram.

Where it is desired to use an expansible bag 37 to expand the tire in the mold, a pressure connection therefor is provided through the lower box member. For this purpose a flexible pipe 38 is connected to the stem 39 of the bag by a coupling 40. The other end of the pipe 38 is connected through a tapped opening 41 to a pipe 42,

which by means of a flexible hose 43 is connected to a source of pressure.

By the use of this device a manufacturer having a stock of molds of various sizes may utilize these molds to cure a single tire at a time without excessive waste of steam. The device may also be used in repairing or retreading tires by the use of molds of standard design, as the small amount of steam required may be obtained by use of a very small boiler and the locking mechanism permits use of low pressure water supply to the ram.

In the operation of the device, a tire is placed in the lower mold half with its pressure bag in place. The pipe 38 is connected to the stem of the pressure bag. The ram is raised to close the mold. The ring 29 is adjusted to lock the steam box. Steam is then admitted to the steam box through the pipe 34 and the pressure bag is inflated. After vulcanization the pressure bag is deflated, the steam supply to the box is shut off and the steam in the box blown off through the pipe 35. The ring 29 is then turned to unlock the steam box and the ram is lowered. In lowering the ram, the rods 24 contact with the cylinder 10 and loosen the tire from the lower mold half. The connection 40 is removed and the tire is then removed from its mold.

I claim:

1. Apparatus for individually employing a two-part mold, said apparatus comprising heater box sections, at least one of said sections being movable to open and close the box and said sections in their closed relation being adapted to enclose the mold and to provide circulation of heating fluid about the mold within the box, means for securing the mold parts to respective box sections with each mold part substantially stationary with respect to its box section and in a manner such that closing of the sections causes mating of the mold parts, the box sections being telescopically assembled in their closed position in a manner not to hinder the application of high molding pressure to the mold parts, means for applying molding pressure directly to the box sections and through them to the mold parts, means comprising a movable wall portion of a box section for adjusting and locking the section to lock molds of varying thickness in the box against failure of molding pressure, and means for sealing the joint between the box sections while permitting adjustabilty of the sections in their telescoped relationship.

2. Apparatus for individually employing a two-part mold, said apparatus comprising heater box sections, at least one of said sections being movable to open and close the box and said sections in their closed relation being adapted to enclose the mold and to provide circulation of heating fluid about the mold within the box, means for securing the mold parts to respective box sections with each mold part substantially stationary with respect to the box section and in a manner such that closing of the sections causes mating of the mold parts, the box sections being telescopically assembled in their closed position in a manner not to hinder the application of high molding pressure to the mold parts, means entirely outside the box for applying molding pressure directly to the box sections and through them to the mold parts, means comprising a movable wall portion of a box section for adjusting and locking the section to lock molds of varying thickness in the box against failure of molding pressure, the movable portion being threadedly mounted on its box section and having locking means engageable with the other box section, and means for sealing the joint between the box sections while permitting adjustabilty of the sections in their telescoped relationship.

3. Mold apparatus comprising heater box sections, at least one of said sections being movable to open and close the box and said sections in their closed relation being adapted to enclose a replaceable mold and to provide circulation of heating fluid about the mold within the box, the box sections being assembled in their closed position in a manner not to hinder the application of high molding pressure to the mold, means for applying molding pressure directly to the box sections and through them to the mold, and means for locking the sections in their closed relation to maintain closure of the mold irrespective of the molding pressure, said locking means being adjustable to accommodate molds of varying thicknesses in the box, and means for sealing the joint between the box sections while permitting adjustabilty of said locking means.

WALTER B. FREEMAN.