

No. 627,230.

Patented June 20, 1899.

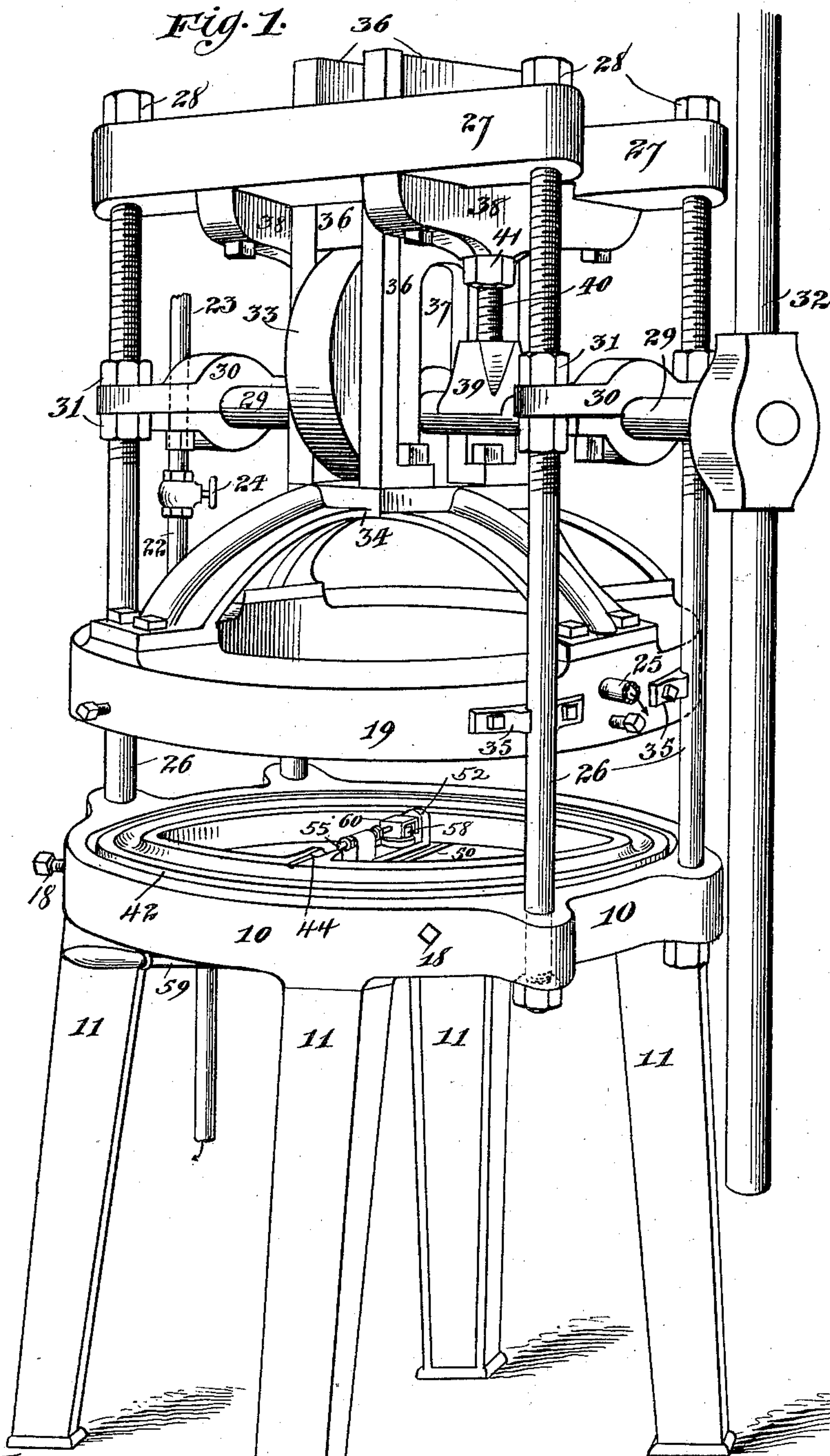
W. B. HARDY.

APPARATUS FOR MAKING HOLLOW RUBBER TIRES.

(Application filed June 11, 1898.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses,
F. S. Mann,
Frederick Goodwin

Inventor
Walter B. Hardy,
By Offield, Fowler & Smith,
Attys.

No. 627,230.

Patented June 20, 1899.

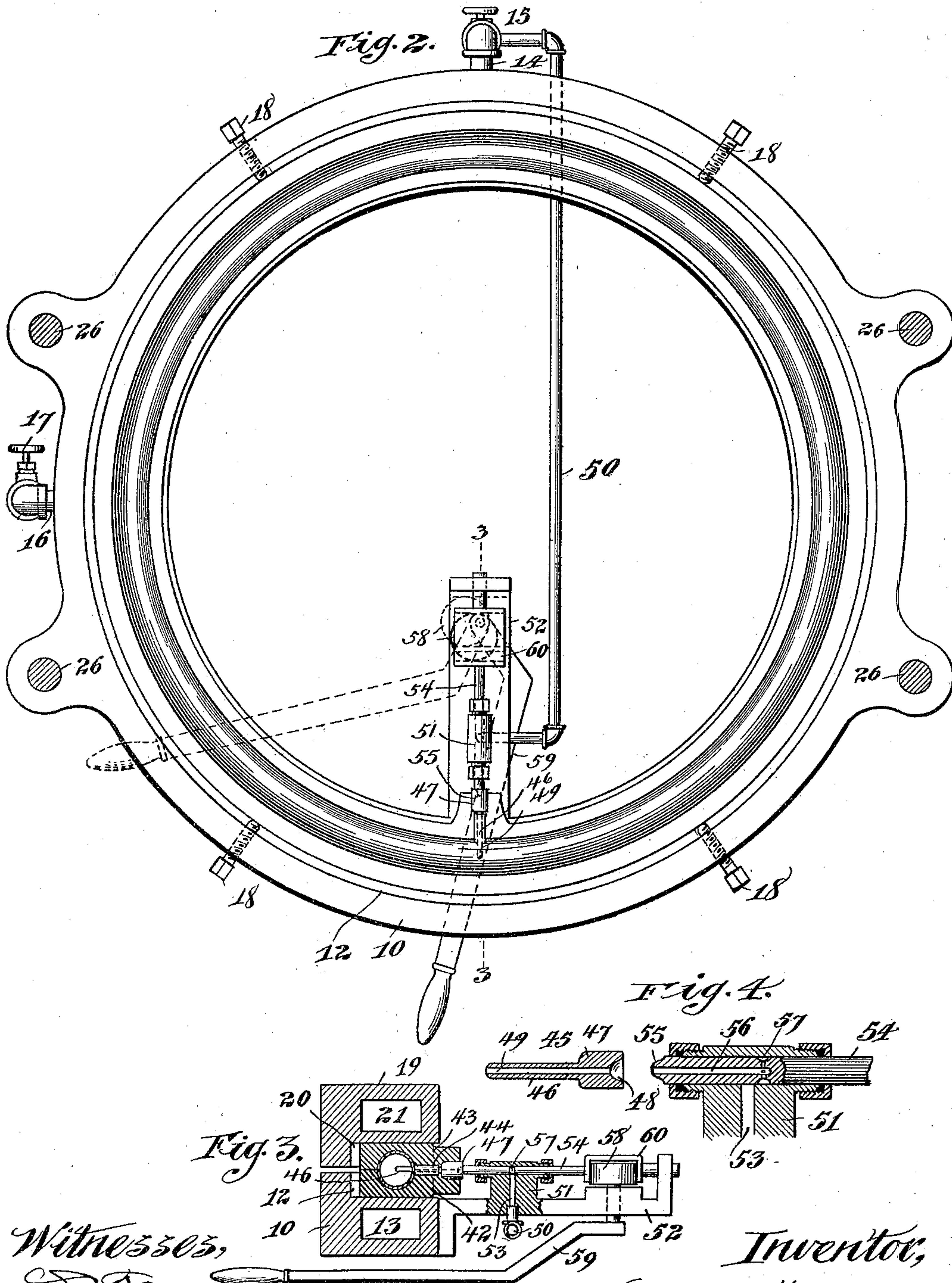
W. B. HARDY.

APPARATUS FOR MAKING HOLLOW RUBBER TIRES.

(Application filed June 11, 1898.)

(No Model.)

2 Sheets—Sheet 2.



Witnesses,
J. O. Mann,
Frederick Goodwin

Inventor,
Walter B. Hardy,
By Office, Fowler & Smith, Inc.,
Atty's.

UNITED STATES PATENT OFFICE.

WALTER B. HARDY, OF AKRON, OHIO.

APPARATUS FOR MAKING HOLLOW RUBBER TIRES.

SPECIFICATION forming part of Letters Patent No. 627,230, dated June 20, 1899.

Application filed June 11, 1898. Serial No. 683,212. (No model.)

To all whom it may concern:

Be it known that I, WALTER B. HARDY, of Akron, in the county of Summit and State of Ohio, have invented certain new and useful
5 Improvements in Apparatus for Making Hollow Rubber Tires, of which the following is a specification.

This invention relates to apparatus for making hollow rubber tires, and has for its object
10 to provide an apparatus of this character whereby such tires may be molded and vulcanized in a superior manner and with great rapidity, which apparatus shall be convenient in use, capable of being readily handled,
15 and adapted to be readily changed for the manufacture of tires of different kinds and sizes.

To these ends the invention consists in certain novel features, which I will now describe
20 and will then point out in the claims.

In the accompanying drawings, Figure 1 represents a perspective view of an apparatus embodying my invention. Fig. 2 is a plan
25 section of the same, taken immediately above the bed of the apparatus. Fig. 3 is a longitudinal sectional view, partly in elevation, taken on the line 3 3 of Fig. 2; and Fig. 4 is an enlarged detailed sectional view taken
30 centrally through the valve and nipple, the two parts being shown slightly separated.

In the said drawings, 10 indicates the bed of the apparatus, which is supported in any
35 suitable way, as by means of legs 11, said bed being annular in form and being provided on its upper face with a seat 12 to receive one of the mold-sections. The interior of the bed is hollow, thereby forming a steam-space 13,
40 into which steam is admitted in order to maintain the bed at a proper temperature to heat the mold. In the present instance I have shown a steam-supply pipe 14, provided with a controlling-valve 15 for the purpose
45 of supplying steam to the bed, and an exhaust-pipe 16, provided with a controlling-valve 17 for permitting the steam to pass therefrom. The bed is provided with clamping-screws 18,
50 by means of which the mold-section may be readily secured in position in its seat in the bed and as readily removed.

19 indicates the platen of the apparatus, which is also annular in form and which has
in its under face a seat 20 to receive the up-

per mold-section. This platen is also hollow, being provided with a steam-chamber 21, to which steam is supplied by means of a pipe
22, which has a flexible section 23 to provide 55 for the movement of the platen, said pipe being provided with a controlling-valve 24. The platen is also provided with an exhaust-pipe 25, which will have a suitable controlling-
60 valve. The platen is guided and supported by means of a frame composed of uprights 26, extending upward from the bed 10 and connected at their tops by means of cross-pieces
27. The upper ends of the uprights are 65 threaded where they pass through the cross-pieces, and their upper ends are provided with nuts 28, which bear upon the top of the cross-pieces.

29 indicates a shaft mounted in suitable 70 bearings in cross-bars 30, adjustably supported on the uprights 26, one pair of the uprights passing through the opposite ends of each cross-bar and each upright being provided with adjusting-nuts 31, located, respec- 75
tively, above and below the cross-piece, so that by adjusting said nuts upon the cross-pieces the shaft 29 may be adjusted vertically toward and from the bed of the apparatus. The shaft 29 is provided at its outer 80
end with a cross-bar or lever 32, by means of which it may be rotated, and its central portion within the frame is provided with a cam or eccentric 33, which bears upon the top of a saddle 34, which carries the platen 19. The 85
platen is provided with guides 35, which partly embrace the uprights 26, and the platen is connected with and supported from the cam 33 by means of a yoke 36, which extends
90 upward from the saddle 34 on each side of the cam 33, being slotted, as shown at 37, for the passage of the shaft 29. Cross-bars 38 are located on each side of the yoke 36, being secured to the under side of the cross-
95 pieces 27 of the frame, the yoke 36 passing between said cross-bars and cross-pieces and being laterally supported and guided thereby. In order to prevent bending of the shaft 29
under pressure, there are provided saddles 100 39, which bear on the top of said shaft on each side of the cam or eccentric and which are each provided with an upwardly-extending threaded shank 40, which extends into a recess in the cross-bar 38 above it and which

is provided with an adjusting-nut 41, which bears against the cross-bar 38 and distributes thereon the strain transmitted to the saddle 39 and stem 40 from the shaft 29.

5 The mold is composed of a lower section 42 and an upper section 43, having a suitable cavity, annular in form, to receive the tire to be molded. Between the two mold-sections there is formed at some suitable point a duct
10 or passage 44 to receive the inlet-tube of the tire and the nipple, through which the steam is supplied to the interior of the tire. The nipple 45 is provided with a reduced portion 46, which is adapted to pass through the in-
15 let-tube of the tire, and an enlarged head 47, having a seat 48 to receive the end of the valve. A passage 49 extends through the nipple from this seat to the other end of the nipple. Steam is supplied to the interior of
20 the tire by means of a pipe 50, which may be connected to the supply-pipe 14 or any other suitable source and which opens into a valve-box 51, which latter is supported on or forms part of an arm 52, secured to the bed 10. The
25 valve-box is provided with a port 53, which connects with the supply-pipe 50.

54 indicates the valve, which is provided at its outer end with a nozzle 55, adapted to fit snugly within the seat 48 of the nipple. From
30 this nozzle there extends inward in the valve a passage 56, which is connected with an annular groove or port 57 around the exterior of the valve by means of a plurality of radial passages, as shown in 54. The valve
35 extends through a suitable housing in the upper part of the valve-box and is movable therein, so that the groove or port 57 of the valve may be caused to register with the port 54 of the valve-box. Movement is im-
40 parted to the valve 54 in either direction by means of a cam 58, mounted on the arm 52 and operated by a lever 59, said cam being embraced by a yoke 60 on the stem of the valve.

45 The operation of the apparatus is as follows: The platen having been raised into the position shown in Fig. 1 and steam having been admitted into the interior of both bed and platen, so as to properly heat the molds
50 which are in position therein, the tire in the form of a tubular annulus is placed within the lower mold-section. Previous, however, to thus placing the tire in the mold a nipple has been inserted in the inlet-tube of the tire,
55 a number of nipples being provided in order to prevent delay in the treatment of the tires. By means of the lever 59 the valve 54 is then moved forward into the position shown in Fig. 3, when its port 57 will register with the
60 passage 53, while the nozzle 55 is seated in the exposed end of the nipple. Steam is thus admitted to the interior of the tire for a brief period sufficient to inflate the same and seat it properly in the mold. By means of the
65 lever 59 the valve 54 is then withdrawn. After this withdrawal the steam escapes to some extent through the nipple, but not suffi-

ciently to permit the collapse of the tire. The platen 17 is then lowered by rotating the shaft 29 by means of the lever 32, and said
70 platen descends upon the bed, thereby enclosing the tire within or between the two sections of the mold. This downward motion of the platen is very rapid as contradistinguished from the relatively slow movement
75 of a hydraulic or steam press, since as soon as the cam passes the dead-center the platen descends by gravity, and any additional pressure which may be needed is supplied by means of the cam-shaft and its lever. After
80 the press is closed the valve is again advanced to engage the nipple, at the same time opening the steam-supply and injecting steam into the interior of the tire. The tire is thus provided with an elastic core, which serves to
85 keep the same distended, so as to cause it to take and maintain the shape of the mold, while the heat supplied to the rubber both from the interior and exterior thereof, combined with the pressure similarly applied,
90 produces a rapid and perfect vulcanization. After the tire has remained within the mold for a suitable length of time the platen is raised, the valve withdrawn, and the tire taken from the mold along with the nipple,
95 which latter may be removed at leisure.

The tire may be withdrawn without removing the mold from the apparatus, so that the molds are kept constantly at the proper temperature to receive another tire, and thus no
100 time is lost in heating a new set of molds for the next operation. The molds may, however, be readily withdrawn for the purpose of substituting other molds for tires of different sizes or shapes, and the provision made for
105 adjusting the shaft 28 serves to adapt the limit of motion of the platen to the varying heights or thicknesses of the different kinds of molds. It will be seen that the mechanism for supplying steam to the interior of the
110 tire is particularly advantageous in the saving of time, for the reason that the same forward movement of the valve in order to engage it with the nipple and thus make connection with the interior of the tire also opens
115 the steam-supply, while the disengaging motion of the valve simultaneously shuts off the steam-supply. By reason of these various features it will be seen that the apparatus may be operated with great rapidity and with
120 a minimum loss of time, so that the product of the apparatus for a given length of time is greatly increased, while the quality thereof is superior.

I claim—

1. In an apparatus of the character described, the combination, with a fixed bed and a mold-section seated therein, of a platen above the bed carrying a corresponding mold-section, a shaft provided with a cam to operate said platen, said platen being provided with a yoke embracing said cam, whereby said platen is supported from said cam, means for heating the mold and means for introducing

fluid under pressure into the interior of said mold, substantially as described.

2. In a machine of the character described, the combination, with a bed and a removable mold-section therein, of a platen carrying a similar removable mold-section, a supporting-frame, and a shaft mounted in said supporting-frame and having a cam or eccentric to operate the mold, said shaft being adjustable in said supporting-frame to compensate for molds of varying dimensions, substantially as described.

3. In an apparatus of the character described, the combination, with a mold having an inlet-passage, of a separate nipple adapted to extend through said passage and fit within the inlet-tube of the tire, said nipple having a seat in its outer end, a steam-supply box having a port, and a valve movable in said box and adapted to seat within the nipple and having a passage which communicates with the port when the valve is so seated and which is closed when the valve is unseated, substantially as described.

4. In an apparatus of the character described, the combination, with a mold, and an inlet-nipple having a seat at its exposed end, of a valve-box having a port connected with a steam-supply, a valve movable in said box toward and from the nipple, adapted to engage the seat therein and having a passage which registers with the supply-port when in

such engagement and which is closed when disengaged, and a hand-lever operatively connected with said valve, substantially as described. 35

5. In an apparatus of the character described, the combination, with a mold and a steam-supply for the interior thereof, of a valve adapted to be connected with and disconnected from the interior of said mold, and means for automatically and simultaneously connecting and disconnecting said valve with the interior of the mold and with the steam-supply, substantially as described. 40 45

6. In an apparatus of the character described, the combination, with a mold for molding hollow tires having an inlet-passage and a steam-supply, of a nipple adapted to be inserted within the inlet-tube of the tire and to fit the inlet-passage of the mold, said nipple being separated or disconnected from the remaining portions of the mechanism and removable along with the tire, and means adapted to contact with the exposed ends of said nipple to connect it with the steam-supply and separable therefrom by direct movement to disconnect it from the steam-supply, substantially as described. 50 55

WALTER B. HARDY.

Witnesses:

IRVINE MILLER,
EVA B. KIRBY.