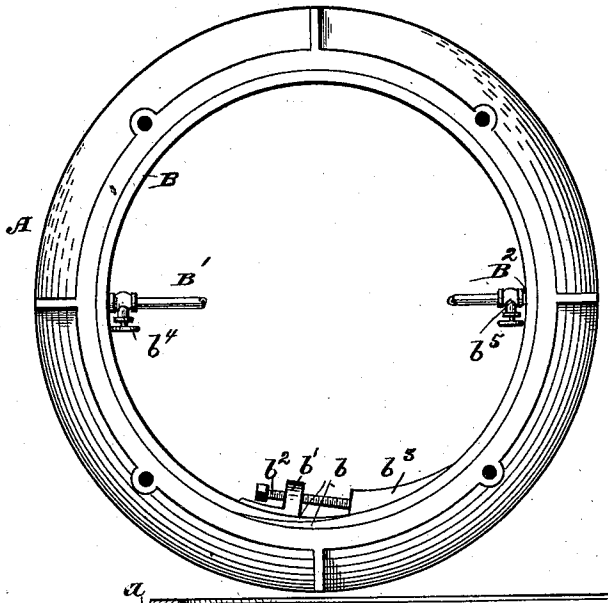
(No Model.) 2 Sheets—Sheet 1.

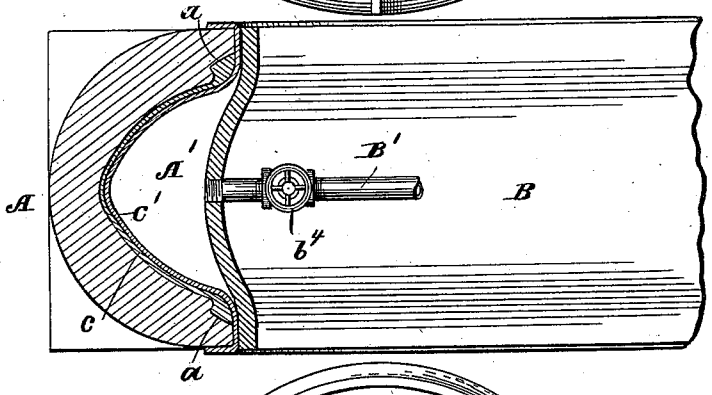
J. F. IVES.

MOLD FOR MAKING PNEUMATIC TIRES AND COVERS FOR SAME.

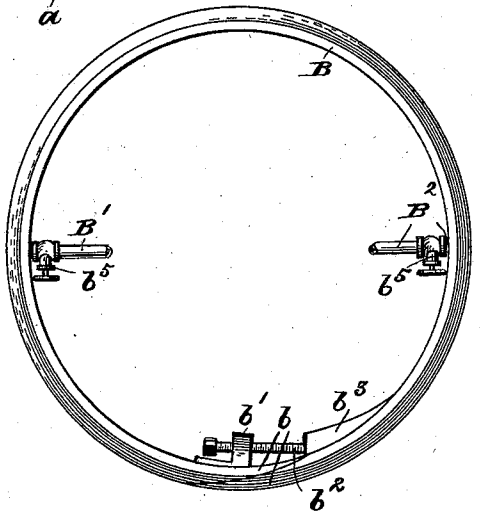
No. 557,128. Patented Mar. 31, 1896.



-FIG. I-



-FIG. II-



-FIG. III-

WITNESSES,
J. C. Turner
Wm. Secker

INVENTOR,
J. F. Ives
By Hall & Fay
Attys.

(No Model.) 2 Sheets—Sheet 2.

J. F. IVES.

MOLD FOR MAKING PNEUMATIC TIRES AND COVERS FOR SAME.

No. 557,128. Patented Mar. 31, 1896.

FIG. IV.

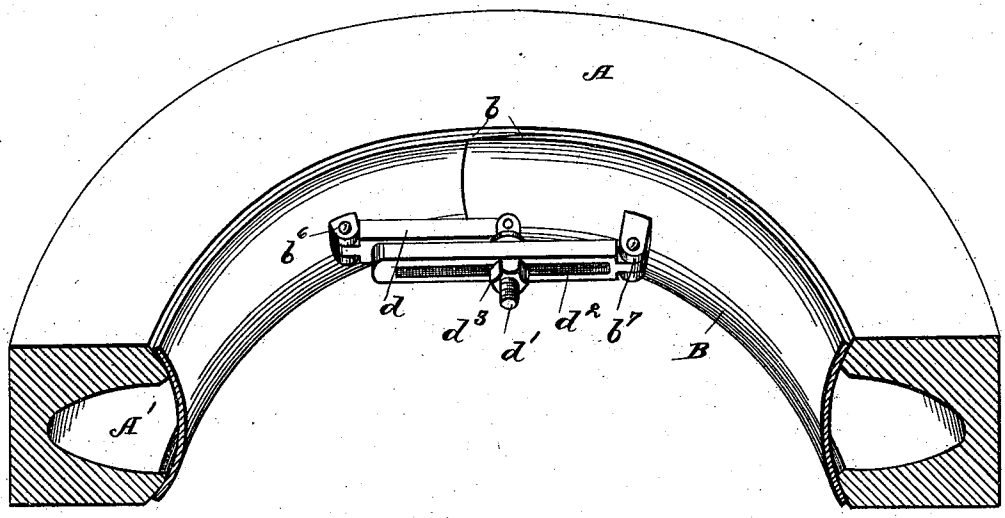
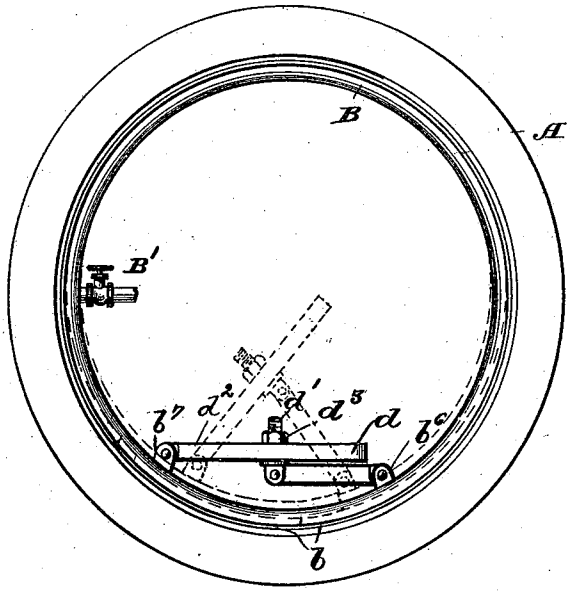


FIG. V.



WITNESSES,

J. C. Turner

Wm Secher

INVENTOR,

J. F. Ives

By Hall & Fay

Atty's.

UNITED STATES PATENT OFFICE.

JOHN F. IVES, OF CLEVELAND, OHIO.

MOLD FOR MAKING PNEUMATIC TIRES AND COVERS FOR SAME.

SPECIFICATION forming part of Letters Patent No. 557,128, dated March 31, 1896.

Application filed August 8, 1895. Serial No. 558,592. (No model.)

To all whom it may concern:

Be it known that I, JOHN FISH IVES, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented certain new and useful Improvements in Molds for Making Pneumatic Tires and Covers for the Same, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

The annexed drawings and the following description set forth in detail one mechanical form embodying the invention, such detail construction being but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings, Figure I represents a top plan view of one form of my improved mold for pneumatic wheel-tires and covers; Fig. II, a transverse section of a portion of the mold, illustrating the making of a tire-cover in the same; Fig. III, a top plan view of the expansible mold-closing ring for the mold; Fig. IV, a perspective view of one-half of the mold, illustrating another form of expanding device for the ring and illustrating the mold used for the manufacture of a tubular tire; and Fig. V, a top plan view of said mold.

The mold essentially consists of an outer mold-ring A, and an inner expansible mold-closing ring B, which covers the mold-cavity in the outer ring. The outer mold-ring has an annular mold-cavity A′, of a shape corresponding to the external shape of the tire or cover, and is formed with annular grooves *a* at the edges of the cavity when the mold is intended for tire-covers having locking-beads at their edges. The inner face of the outer mold-ring is preferably ground smooth, so as to afford a fluid-tight fit for the mold-closing ring. The inner mold-closing ring has its outer face shaped to fit against the inner face of the outer ring and has scarfed ends *b*, which may fit tightly at their lap. Means are provided at the scarfed ends of the inner ring for the purpose of expanding the same, and I have illustrated two forms of such means, respectively in Figs. I, II and III, and in Figs. IV and V. In the first form one end of the inner ring has a lug b' formed with a threaded perforation, in which an expanding-screw b^2 fits. Said screw bears against a lug b^3 upon the other end of the ring, so that the ring may be expanded and contracted by turning the screw. In said latter form of expanding mechanism the action of the screw is slow, and the screw requires adjustment each time the mold is closed.

Where quick action in the expanding device is required, and where one adjustment of the expanding device is desired, which may remain undisturbed during the locking and unlocking of the ring in the successive manufacture of a number of tires or covers in the same mold, the device illustrated in Figs. IV and V is desirable. Said device consists of an arm *d*, pivoted between ears b^6 upon one end of the ring, and having a shouldered screw-bolt d', pivoted to its free end, and a longitudinally-slotted arm d^2, pivoted between ears b^7 upon the opposite end of the ring. The screw-bolt is inserted through the slot in the arm and is secured in its adjusted position by a nut d^3. The adjustment of the screw-bolt is such that the ring will be expanded to the proper extent when the two arms are straightened into the position illustrated in full lines in the drawings, on the principle of two toggle-arms. When the ring is to be removed, the arms are flexed into the position illustrated in dotted lines in the drawings, when the ring is contracted sufficiently to be removed from the outer ring. A steam-inlet B′, preferably provided with a valve b^4, is provided at one portion of the ring, and a steam-exhaust B^2, likewise provided with a valve b^5, is provided at an opposite portion of the ring. When the mold is employed to make tubular tires, the inflating-tube of the tire is connected to the inlet and the exhaust is dispensed with.

In practice the material from which the cover or tire is made is placed in the mold-cavity, which is then closed by the inner ring. The mold is placed in a vulcanizing-chamber, and steam is admitted through the inlet, and, in the case of a cover-mold, the condensed water is drawn off by the exhaust, while the mold and contents are exposed to the vulcanizing temperature. The steam will expand the material forming the cover or tire

to make it conform to the shape of the mold, and the heat from the steam will exert its vulcanizing action upon said material. Air, gas, water, or any other fluid, either previously heated or becoming heated during the process of vulcanization, may be employed equally as well as steam for the purpose of inflating and supporting the cover or tire.

In the form illustrated in Figs. I, II, and III of the drawings a cover for a pneumatic tire is made. Said cover is composed of an outer layer *c* of rubber and an inner textile layer *c'*. The edges of the rubber layer are pressed into the grooves *a* of the mold to form beads, and the edges of the textile layer are drawn over the inner face of the outer ring and over the outer sides of the mold-ring to form a packing between the parts of the mold. The cover will be vulcanized into the exact shape desired for it, which will be a great advantage over the methods usually employed, in which the rubber layer is first placed upon the face of a pulley or mandrel, then the textile layer is placed over the rubber, whereupon vulcanization takes place. By such method the rubber layer, which in the tire or cover is to be the outer layer, is molded as the inner layer, and must be stretched out of its vulcanized shape to attain the shape in which the cover or tire is to be applied. By my method the layers are vulcanized into their proper shape and will need no reshaping.

When making a tubular tire, the tube is suitably formed, placed in the mold, and confined by the ring, and the usual inflating-tube of the tire is connected to the inlet so that the inflating medium may be introduced into the tire to maintain the same in the desired shape during vulcanization.

Other modes of applying the principle of my invention may be employed for the mode herein explained. Change may therefore be made as regards the mechanism thus disclosed, provided the principles of construction set forth respectively in the following claims are employed.

I therefore particularly point out and distinctly claim as my invention—

1. A mold for pneumatic tires and covers for the same, consisting of a mold-ring, a mold-closing ring constructed to complete the mold-cavity and having means for circumferentially adjusting it to fit against and tightly cover the mold-ring, and an inlet for the inflating medium opening into the mold-cavity, substantially as set forth.

2. A mold for pneumatic tires and covers for the same, consisting of two annular parts, one of said parts fitting within the other, and one of said parts having means for peripherally adjusting it to fit the other, substantially as set forth.

3. A mold for pneumatic tires and covers for the same, consisting of a mold-ring, an expansible mold-ring, and an inlet into the mold-cavity inclosed by said rings for introducing an inflating medium, substantially as set forth.

4. A mold for pneumatic tires and covers for the same, consisting of an outer mold-ring having a mold-cavity in its inner face, an inner mold-closing ring having scarfed ends and means for expanding it, and a valved inlet into the inner mold-closing ring, substantially as set forth.

In testimony that I claim the foregoing to be my invention I have hereunto set my hand this 1st day of August, A. D. 1895.

J. F. IVES.

Witnesses:
J. B. FAY,
DAVID T. DAVIES.