

J. L. BUTLER.  
METHOD AND APPARATUS FOR ROLLING TIRE BEAD CORES.  
APPLICATION FILED JAN. 28, 1919.

1,318,643.

Patented Oct. 14, 1919.

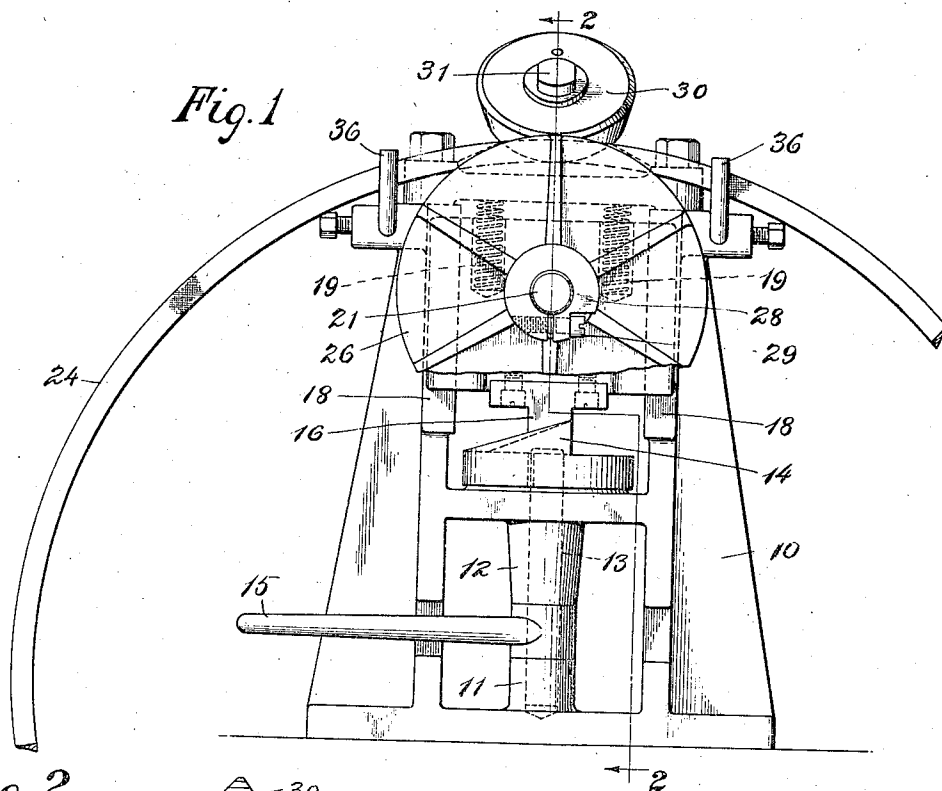


*Fig. 2*

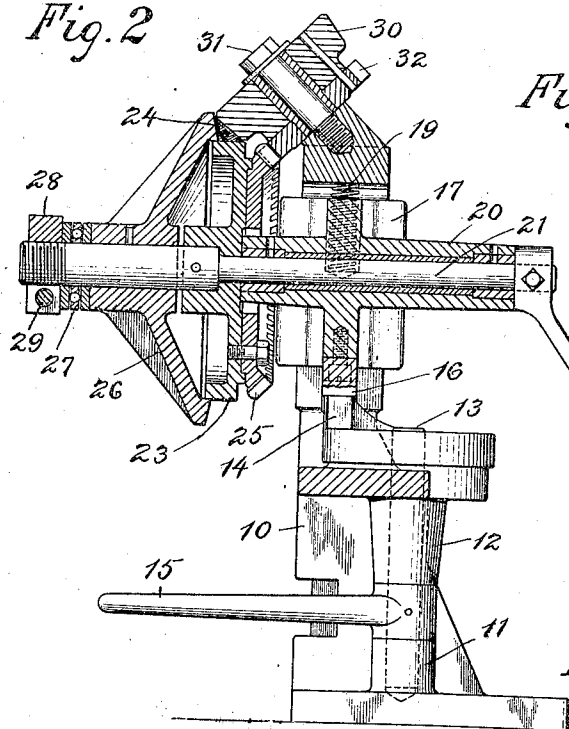


*Fig. 3*

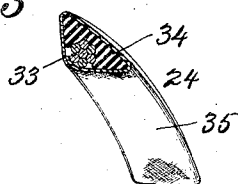
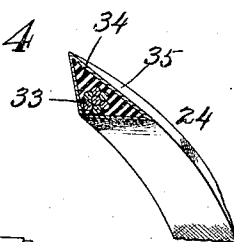


*Fig. 4*



Inventor.  
James L. Butler  
By Robert M. Pearson  
Atty.

# UNITED STATES PATENT OFFICE.

JAMES L. BUTLER, OF AKRON, OHIO, ASSIGNOR TO THE B. F. GOODRICH COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

## METHOD AND APPARATUS FOR ROLLING TIRE BEAD-CORES.

1,318,643.

Specification of Letters Patent.

Patented Oct. 14, 1919.

Application filed January 28, 1919. Serial No. 273,621.

*To all whom it may concern:*

Be it known that I, JAMES L. BUTLER, a citizen of the United States, residing at Akron, in the county of Summit and State of Ohio, have invented a certain new and useful Method and Apparatus for Rolling Tire Bead-Cores, of which the following is a specification.

This invention relates to the rolling art, and its object is to provide an improved method and apparatus for compacting and uniformly shaping and smoothing a compressible ring such as the bead core of a pneumatic tire, especially those bead cores which are built up with an inextensible wire ring embedded in soft unvulcanized rubber, outside of which is a fabric covering.

Of the accompanying drawings,

Figure 1 is a rear elevation, partly broken away, showing a preferred form of my improved apparatus with the work in place.

Fig. 2 is a cross-section on the line 2—2 of Fig. 1.

Fig. 3 is a sectional perspective view showing the work before being rolled.

Fig. 4 is a similar view showing the work after being rolled in the machine.

10 is a frame having bearings 11, 12 for a vertical shaft 13 at the upper end of which is secured an endwise-acting horizontally-oscillating cam 14 for raising and lowering certain parts of the machine, the cam being turned by a handle 15 whose hub is pinned to the shaft between the two bearings. The inclined face of the cam acts on a wearing piece 16 on the lower edge of a vertically-movable carriage 17, and is sloped at an angle from the horizontal less than the angle of repose or slip so that the carriage will remain in the position to which it is elevated by turning the handle to the left. The carriage moves on guides 18 on the frame and is urged downwardly by a pair of springs 19, acting at their lower ends against the bottoms of suitable sockets in the carriage and at their upper ends against the top cross-bar of the frame.

The carriage 17 has a bearing 20 for a horizontal shaft 21 adapted to be manually rotated by a crank 22 on one end thereof. On this shaft near its other end is pinned a roller 23 having a cylindrical periphery forming a bottom seat for the bead-core ring 24, and to said roller is bolted a bevel gear-wheel 25. Mounted to turn

loosely on the horizontal shaft is a roller 26 having a nearly-radial, slightly-conical periphery or bearing surface forming a seat for the back of the bead-core ring. Roller 23 is arranged to telescope slightly within the roller 26, which latter may be adjusted longitudinally on the shaft 21 to accommodate rings 24 of different sizes, there being a ball thrust bearing 27 interposed between the hub of roller 26 and a pinch nut or collar 28 screwing on the shaft and held in any desired adjustment by means of a bolt 29.

30 is another roller mounted to turn on a stud 31 fixed on the frame and having a nearly-cylindrical, slightly-conical periphery forming a seat for the third and widest side of the ring 24. To this roller is pinned a gear pinion 32 meshing with gear 25 in the operative position of the parts, the axis of this roller being inclined at an angle between the horizontal and vertical so that it rotates in a plane non-parallel to the planes of rotation of the rollers 23 and 26.

These three rollers in their operative relation include between them a substantially-closed, triangular work-receiving space or pass.

The construction of the bead-core ring 24, as indicated in Figs. 3 and 4, includes an endless inextensible wire cable or foundation ring 33 embedded in soft or semi-hard vulcanized rubber 34, which in turn is surrounded by a sheath or tubular cover of rubberized fabric 35. When the core is built up, the grooved, raw rubber filler strip 34 only partially surrounds the wire cable ring 33, being located on the inclined outer side of the bead and in the two corners or angles between that side and the base and radial sides of the bead, so as to surround about half of the cross-section of the wire ring 33, as shown in Fig. 3. One of the offices of the machine is to squeeze or flow the rubber around the remaining sides of the wire member so as fully to embed the latter, besides giving the desired flatness of sides, sharpness of corners, smoothness of surface, and uniformity of cross-section to the work.

Two guide pins 36 on opposite sides of the rolling point serve to steady the work.

To operate the machine, handle 15 is swung to the right so as to remove the support afforded to the carriage 17 by the high part of the cam 14 and allow the springs 19, aided by

gravity, to lower the carriage, together with the shaft 21 and parts mounted thereon including the rollers 23 and 26 and the gear 25. This unmeshes the gears, opens the triangular work-receiving space included between the rollers and allows a finished core-ring 24 to be removed and a fresh one hung over the roller 23. Handle 15 is then swung to the left so as to elevate the parts into their working position, and the crank 22 is turned so as to propel the work and progressively compress the latter throughout its circumference in an evident manner. In this way a bead-core ring of the character described may be very rapidly brought to the desired final shape and degree of compactness suiting it for incorporation in the edge of a tire casing. The loose mounting of roller 26 on its shaft permits the latter to turn at a different rate of surface speed from that of the rollers 23 and 30, automatically proportioned to the average surface speed of the back of the work, thereby minimizing slippage between said roller 26 and the work.

Various modifications of embodiment are contemplated within the scope of the invention.

I claim:

1. In a machine for rolling compressible pneumatic-tire bead-core rings of triangular section, the combination of a pair of rollers having their axes disposed at an angle, for forming respectively the base or inner side and the inclined outer side of the ring, a third independently-rotatable roller for forming the substantially-radial side of said ring, and means for positively rotating one or more of said rollers.

2. In a machine for rolling compressible bead-core rings of triangular section, the combination of a pair of rollers mounted to rotate in planes at an angle to each other and having peripheries forming two sides of a work-receiving space, and a third roller co-axial with one of the rollers of said pair and adapted to rotate at a different angular speed from the latter, the periphery of the last-said roller forming the third side of said work-receiving space.

3. In a machine for rolling compressible bead-core rings of triangular section, the combination of a pair of rollers geared together and rotating in different planes, their peripheries forming two sides of a triangular work-receiving space, and a third roller whose periphery forms the third side of said space, loosely mounted on the shaft of one of said pair of rollers.

4. In a machine for rolling compressible bead-core rings of triangular section the combination of a substantially cylindrical roller forming the base side of the work-receiving space, a roller co-axial therewith forming a second side of said space and axially adjustable to vary the size of said

space, and a third roller adapted to rotate at an angle to the plane of rotation of each of the first-said rollers and forming the third side of said space.

5. In a machine for rolling compressible bead-score rings of triangular section, the combination of a substantially cylindrical base-side roller, a co-axial roller telescoped therewith for supporting a second side of the work, and a third roller for supporting the third side of the work.

6. In a machine for rolling compressible bead-core rings of triangular section, the combination of a pair of positively-driven rollers placed at an angle for supporting two sides of the work, one of said rollers having a cylindrical working periphery, a third loosely-mounted roller telescoped with said cylindrical roller, and an axially-adjustable thrust member for determining the working position of said third roller.

7. In a ring-rolling machine, the combination of three rollers whose peripheries embrace a work-receiving space, and means for adjusting two of said rollers relatively to the third for opening and closing said space to admit and release the endless ring constituting the work.

8. In a ring-rolling machine, the combination of a stationarily-mounted work-engaging roller forming the upper side of a triangular work-receiving space, a second roller structure forming the remaining two sides of said space, a movable carriage supporting said second roller structure, and means for lowering and raising said carriage to open and close said space.

9. In a ring-rolling machine, the combination of a pair of angularly-related rollers having gears fixed thereto which intermesh in their working position, a carriage supporting one of said rollers and movable to open and close the work-receiving space and mesh and unmesh said gears, and a third loosely-mounted roller supported by said carriage co-axially with the last-said roller.

10. In a ring-rolling machine, the combination of a frame having a bearing stud at its upper end inclined at an angle between the vertical and horizontal, a roller mounted to turn on said stud and having a gear fixed thereto, a vertically-movable carriage having a bearing in which is mounted a horizontal shaft, means for raising and lowering said carriage, a roller mounted to turn with said horizontal shaft and having a gear fixed thereto and adapted to mesh with the first-said gear when the carriage is raised and to unmesh therefrom when the carriage is lowered, the lowering of the carriage serving to open the work-receiving space, and a third work-engaging roller mounted to turn loosely on said horizontal shaft.

11. The method of making triangular bead-core rings for inextensible-bead tires

which comprises providing an endless foundation ring, applying thereto a fabric cover and a raw rubber filler, which latter surrounds about one-half of the cross-section of the foundation ring, and, by pressure applied progressively around the circumference of the structure, flowing the filler about the rest of the cross-section of the foundation ring and shaping the structure in substantially its final form.

12. The method of making triangular bead-core rings for inextensible bead tires which comprises providing an endless wire foundation ring, applying thereto a fabric

covering tube and a grooved, raw rubber filler strip which initially fills the inclined outer side and the two adjacent angles of the space to be filled within the cover of the bead-core ring and, by rolling pressure applied progressively, simultaneously along the three sides of the structure, flowing the filler about the remainder of the foundation ring and shaping the structure in substantially its final form.

In testimony whereof I have hereunto set my hand this 23rd day of January 1919.

JAMES L. BUTLER.