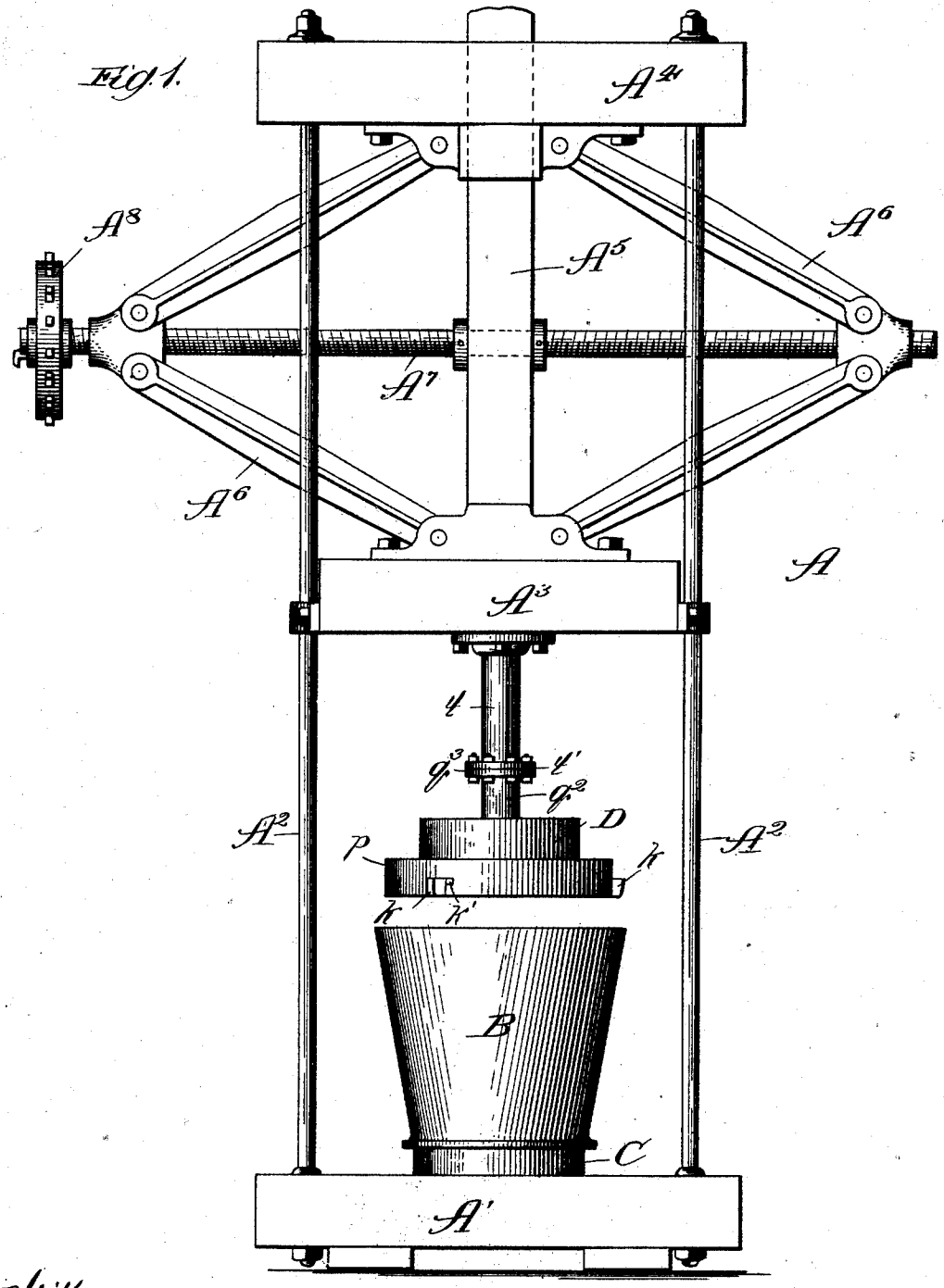
(No Model.) 4 Sheets—Sheet 1.

L. M. TODD.

METHOD OF AND APPARATUS FOR FORMING COMPRESS WHEEL RIMS

No. 503,360. Patented Aug. 15, 1893.

Fig. 1.



Witnesses:
Chas. E. Gaylord.
Clifford Hatch.

Inventor.
Ibanus M. Todd.
By Dyrenforth & Dyrenforth
Attys.

(No Model.) 4 Sheets—Sheet 2.

L. M. TODD.

METHOD OF AND APPARATUS FOR FORMING COMPRESS WHEEL RIMS.

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Fig. 2.

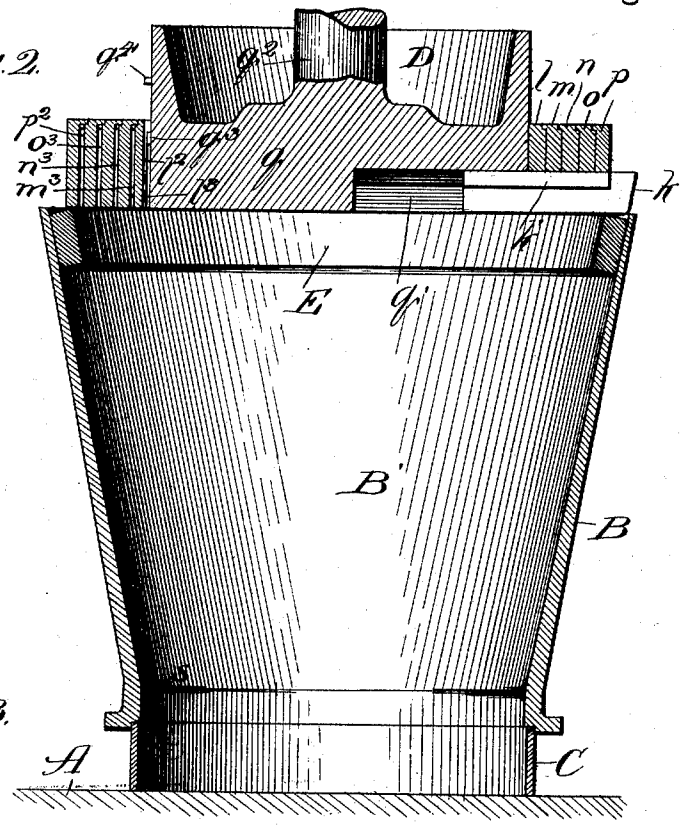
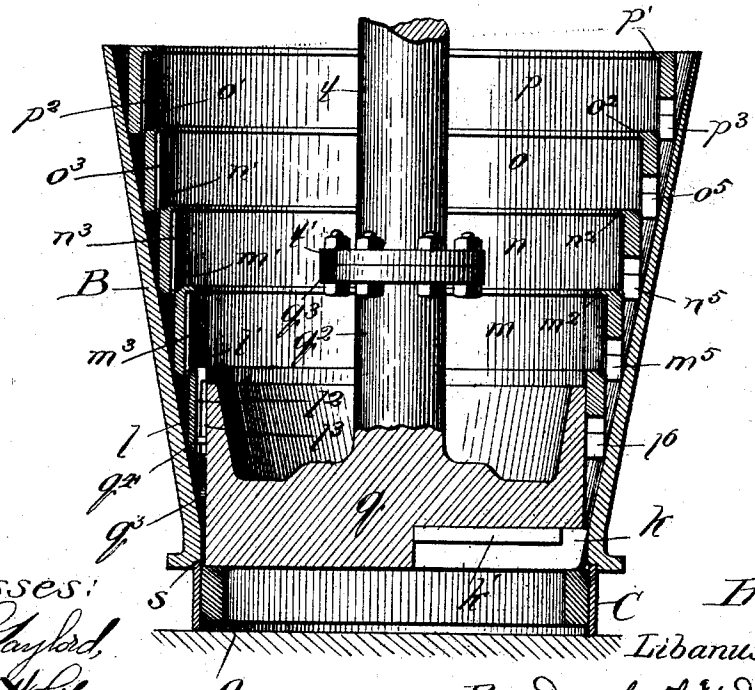


Fig. 3.



Witnesses:
Chas. E. Gaylord,
Clifford N. Wiele.

Inventor:
Libanus M. Todd,
By Dyrenforth & Dyrenforth
Attys

(No Model.) 4 Sheets—Sheet 3.

L. M. TODD.

METHOD OF AND APPARATUS FOR FORMING COMPRESS WHEEL RIMS.

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Fig. 4.

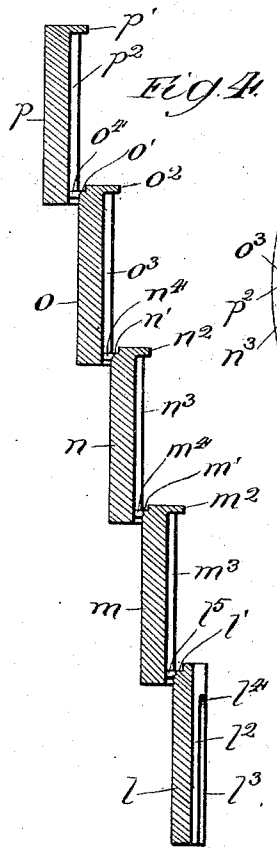


Fig. 5.

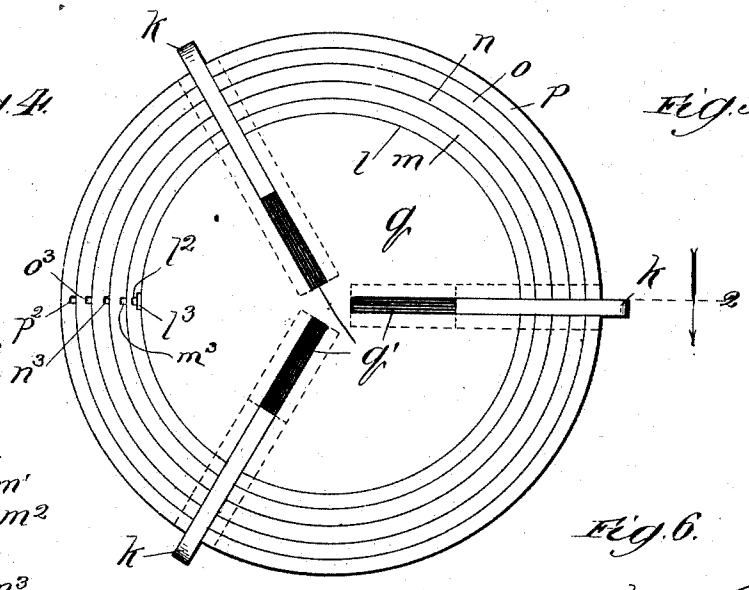


Fig. 6.

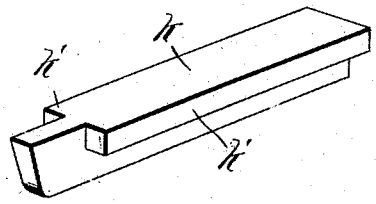


Fig. 7.

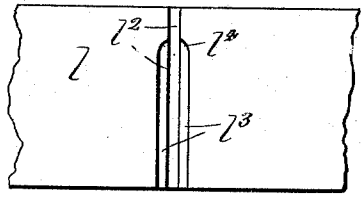


Fig. 8.

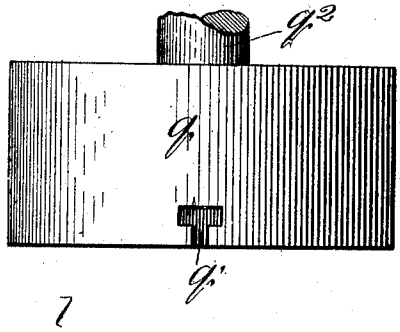
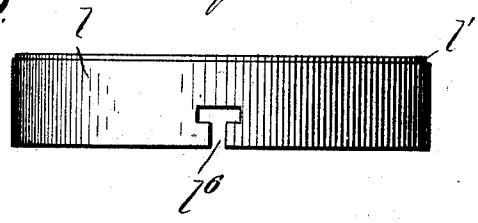


Fig. 9.



Witnesses:
Chas. E. Gaylord,
Clifford N. White.

Inventor:
Tibanus M. Todd,
By Dyrenforth & Dyrenforth
Attys.

(No Model.) 4 Sheets—Sheet 4.

L. M. TODD.

METHOD OF AND APPARATUS FOR FORMING COMPRESS WHEEL RIMS.

No. 503,360. Patented Aug. 15, 1893.

Fig. 10.

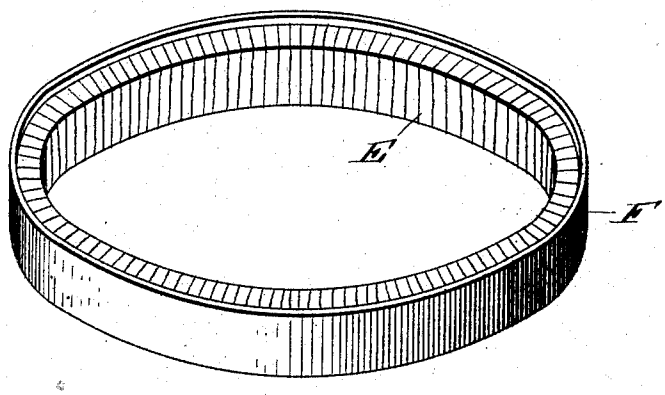


Fig. 11.

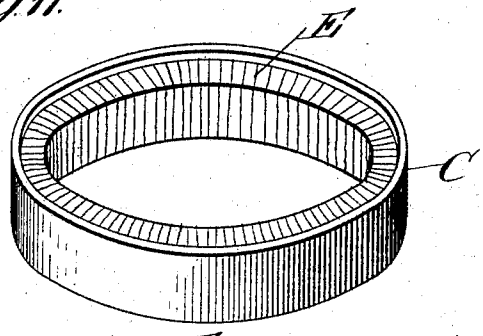
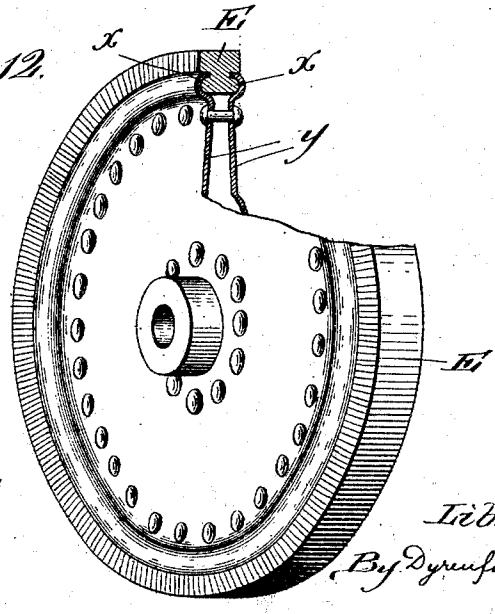


Fig. 12.



Witnesses:
Chas. E. Gaylord.
Clifford N. White.

Inventor:
Tibanus M. Todd,
By Dyrenforth and Dyrenforth
Attys.

UNITED STATES PATENT OFFICE.

LIBANUS M. TODD, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE COMPRESS WHEEL COMPANY, OF SAME PLACE.

METHOD OF AND APPARATUS FOR FORMING COMPRESS-WHEEL RIMS.

SPECIFICATION forming part of Letters Patent No. 503,360, dated August 15, 1893.

Application filed April 7, 1893. Serial No. 469,471. (No model.)

To all whom it may concern:

Be it known that I, LIBANUS M. TODD, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Methods of and Apparatus for Forming Compress-Wheel Rims, of which the following is a specification.

My object is, primarily, to provide an improved method of effecting uniform centripetal compression of annular bodies, and for use more especially in the manufacture of a certain compressed tire or wheel-rim employed in what has become known to the trade as the "compress-wheel." The wheel in question forms the subject of Letters-Patent of the United States No. 455,277, dated June 30, 1891, and though intended, more particularly, for use as a buffing-wheel, the improved rim may be employed in connection with wheels for other uses, wherever practicable. Broadly stated the "compress wheel" consists of a rim or tire-portion formed of flatwise abutting sections extending cross-wise of the circumference of the rim, and held in place by clamping rings or plates which, in the preferred form, engage annular shoulders at opposite sides of the rim and hold the sections in their relative positions, the clamping rings or plates also serving, preferably, as the wheel-center.

In the manufacture of the wheel-rim described, prior to my present invention, the sections, which for buffing wheels are usually of leather, felt or other comparatively soft material, were first cut by means of suitable dies into the desired ultimate shape and then placed side by side in a form consisting of a divided circular flexible band which was initially open at the ends, and in the operation of forcing the ends together, to produce a closed ring, compressed the sections to afford the rim. It is essential that the circumferential surface of the rim, particularly of a buffing wheel, shall present, as nearly as possible, a perfect circle, that is to say be, in any perpendicular plane, equi-distant at every part from the center of rotation; and it is further essential that the rim be of such equal density throughout as to be balanced to an adequately perfect degree. In the practice of the method above described it was, to say the least, very difficult to exert such an equal centripetal compression against all parts of the circumference as would insure a rim having a uniform periphery and of equal density throughout.

In its broadest sense my improved method consists in first assembling the sections in proper relation, as by placing them in a large circular form to extend in flatwise abutting position around the inner surface thereof, and thence forcing the rim, formed of the sections, laterally through an aperture of gradually diminishing circumference, preferably to a form of the reduced size desired, all as hereinafter set forth.

My object is, further, to provide, as one step of the method, for forming the shoulders, on opposite sides of the sections, after the rim has been compressed into shape, instead, according to the old practice, of providing the sections with shoulders before they are placed in the initial form.

It is my object, still further, to provide improved apparatus for carrying out my method.

In the drawings—Figure 1, is a view in elevation of apparatus for carrying out my method of centripetal compression; Figs. 2 and 3, broken sectional views, taken on line 2 of Fig. 5, of the lower part of the apparatus, illustrating, respectively, the initial and final stages, of the compressing operation upon an annular rim; Fig. 4, an enlarged sectional view showing details of construction of concentric rings forming part of a sectional follower; Fig. 5, a bottom plan view of the sectional follower; Fig. 6, a detail perspective view of one of the radially sliding ring engaging and releasing bars forming part of the follower construction; Fig. 7, a broken view in elevation of a portion of the innermost telescoping ring; Fig. 8, a broken detail view, in side elevation, of the central or disk portion of the follower; Fig. 9, a view in side elevation of one of the follower rings; Fig. 10, a perspective view of an initial form, of the character I prefer to employ, showing rim sections in place ready for compression; Fig. 11, a similar view of the final form, showing the

rim sections compressed therein; and Fig. 12, a broken perspective view of a finished buffing-wheel.

A is a knuckle-joint press having a base, A′, vertical guide-rods, A^2, platen, A^3, movable upon the guide rods, cross-bar, A^4, platen-stem, A^5, movable through a guide in the cross-bar, toggle-levers, A^6, pivoted at opposite ends to the cross-bar and platen, respectively, right and left hand screw, A^7, engaging the toggle joints and passing loosely through an elongate-opening, not shown, in the platen-stem, and a power-wheel A^8; the press, so far as described, being of a well known construction. Extending centrally downward from the platen A^3 is a stem t provided at its lower end with a flange t'.

B is a contracting box affording a gradually diminishing aperture from top to bottom and preferably in the form of the frustum of a cone, as shown in the figures. The inner surface B′ of the contracting box is rendered smooth to present as little friction as possible.

Below the contracting box B is a ring C which affords the final receptacle or form for the rim when the latter is compressed, as hereinafter described. In practice the ring C may rest upon the base A′ of the press and the contracting box may be provided with a socket s in its under side to fit over the ring, as shown in Figs. 2 and 3.

D is a sectional follower comprising a central circular block or disk q surrounded by a series of concentric telescoping rings p, o, n, m, l. The ring l fits closely but loosely around the disk q and the inner surfaces of the other rings are of approximately the diameter of the next adjacent rings which telescope into them.

In the upper outer edges of the rings l, m, n and o are annular recesses l', m', n', o', respectively, and at the upper inner edges of the rings m, n, o, p are inward projecting flanges m^2, n^2, o^2, p' adapted to fit into the said sockets, whereby when the follower is in the raised position shown in Fig. 2, the upper edges of the rings are in the same plane, and the under edges of the rings are in the plane of the under surface of the disk q. At one part of the inner surface of the ring l is a vertical guide-groove l^2 extending from the bottom to the top thereof, see Fig. 7, and at the said groove is a shallower and wider groove l^3, which extends nearly but not quite to the top of the ring, the upper end of the slot being contracted to afford a stop l^4 for the purpose hereinafter described. The ring m is provided in its inner face with a vertical groove m^3 extending from the lower side of the ring to the flange m^2, and the rings n, o, p are provided with corresponding grooves n^3, o^3, p^2, respectively. On the outer surface of the ring l, in a plane just below the recess l', is a lug l^5 which registers with and slides in the groove m^3. On the rings m, n, o are similarly placed lugs m^4, n^4, o^4, respectively, which register with and slide in the respective grooves n^3, o^3, p^2.

In the under surface of the disk q are radial T-shaped grooves q', and each ring is provided with similar T-shaped recesses l^6, m^5, n^5, o^5, p^3 which when the rings are telescoped with the disk q register with the grooves q'. The stem portion of the T-groove extends through the base of the disk q and the T-stems of the recesses in the rings extend out through the under edges of the latter. In each groove q' is a radially sliding bar k, T-shaped in cross section, to fit and slide in the T-shaped grooves q' and corresponding T-shaped recesses in the rings. At the outer end portions of the bars k the flanges or shoulders k' are cut away, as indicated in Fig. 6, for a distance exceeding slightly the thickness of one of the rings, and the end of the bar is beveled to an angle corresponding with the pitch of the surface B′ of the contracting box, as indicated in Figs 2 and 3. At the center of the upper side of the disk q is a stem q^2 provided at its upper end with a flange q^3. The flange t' of the stem t and flange q^3 are provided with coincident bolt openings through which bolts may be passed to fasten them together and thus secure the follower in rigid relation with the platen A^3.

On the outer surface of the disk q, and registering with the groove l^2 of the ring l, is a lug q^4 and below the lug q^4 and registering with the groove l^3, in the ring l, is a lug q^5, shorter than the lug q^4 and capable of sliding in the groove l^3 to the stop l^4. When the follower is in its initial position the engagement of the lug q^5 with the stop l^4 and the engagement of the flanges p', o^2, n^2, m^2 with the respective recesses o', n', m', l' causes the rings to be held in their elevated telescoped condition, wherein the T-shaped recesses register with each other and the bars k may be slipped radially outward until the ends of their shoulders k' are in line with the outer circumference of the ring l, as shown in Fig. 2. When in this position the ends of the lower side of the bars k are in the circular plane described by the upper end of the surface B′ of the contracting box B.

In practice the sections of leather, felt, or the like, which, when placed together in proper relation form the rim E, may be placed in an initial form F, being crowded therein until they are locked sufficiently tight to prevent their falling out while the ring or form F is being carried about. The sections of material are cut preferably into rectangular form and of uniform size, as shown. The ring F is of approximately the diameter of the upper end of the contracting box B and when placed thereon the sections may be pressed downward into the upper end of the contracting box to the position shown in Fig. 2. When thus transferred to the contracting box care should be employed to have the outer edge of each section of the rim E in contact with the surface B′, and to have the sections at their upper and lower edges pre-

sent together smooth annular surfaces. When the sections have been placed in the position shown in Fig. 2, the press is operated to plunge the platen A^3 and follower in the downward direction. In the initial movement of the follower the rim E is engaged by the outer ring p of the follower and pressed throughout its circumference equally in the downward direction. While the follower is moving the ends of the bars k slide against the surface B′ until the shoulders k' are forced inward beyond the inner surface of the ring p. At this moment the under edge of the said ring engages the surface B′ and stops, permitting the reduced end portion of the bar k to slide out of the T-shaped recess p^3. The shoulders of the bar k still engage the ring o and carry it down until the lower edge of that ring meets the surface B′ when it is disengaged by the bar and remains stationary. The rings n, m and l are released consecutively in the same way. As the follower descends the rim E is forced downward by the engagement with it of the rings p, o, n, m, l, consecutively, and in its descent through the gradually diminishing aperture, afforded by the contracting box it is gradually compressed centripetally and equally at all parts. As the rim nears the lower end of the contracting box it is engaged by the disk q, which leaves the ring l and forces the rim out of the contracting box into the form C. The engagement of the lugs o^4, n^4, m^4, l^5, q^4, q^5 with the respective grooves in the rings prevents relative displacement of the rings after they have been released by the bars k. When the rim has been discharged into the form C the press is operated to raise the follower D. In its rise the disk q passes upward until the lug q^5 engages the shoulder l^4 of the ring l, causing the said ring to be raised through the said engagement. In the further rise of the follower the inward projecting flanges of the rings are engaged by the recesses l', m', n', o', respectively, whereby the rings are taken up one after the other and raised out of the contracting box, as indicated in Fig. 2. When this is done the bars k may be slipped outward to the initial positions described, when the press will be ready for a second operation. After a rim has been forced into a form C the contracting box is raised by any suitable means and the form C containing the rim may be removed and an empty form placed in position. By rendering the follower detachable from the stem t, the detaching being done by removing the bolts from the flanges t', q^3, followers of any desired size may be used upon the same press to work with larger or smaller contracting boxes. Thus one press may be employed for making wheel rims of any desired diameter. The wheel rim E in its completed form is provided in its opposite sides with grooves, whereby annular shoulders x are produced around which clamping plates y may extend to fasten the sections of the rim in their relative abutting positions. The shoulders x are produced by placing the form C containing the rim E in a lathe and shaping the shoulders x with a suitable cutting tool. By this means shoulders x of perfect annularity may be produced and the rim caused to be of uniform size throughout, as is necessary to effect perfect balancing of the rim. The plates y are placed upon and fastened in position while the rim is still in the form C, so that when removed from the latter the rim will retain its shape.

My improved method may be employed to advantage in the manufacture of compress wheel rims generally, whether the sections are afterward provided with shoulders x or are to be held in position by any other means; and, although I prefer to construct the compressing apparatus as described, the construction may be modified without departing from the spirit of my invention as defined by the claims.

What I claim as new, and desire to secure by Letters Patent, is—

1. The method of forming compress-wheel rims, comprising flatwise abutting sections extending crosswise of the circumference of the rim, which consists in assembling the rim sections in proper annular relation in a form of comparatively large diameter, forcing them therefrom laterally through a gradually diminishing aperture, whereby they are compressed centripetally, into a form of comparatively small diameter, and finally providing annular shoulders on opposite sides of the rim, substantially as described.

2. In an apparatus for reducing the diameters of annular bodies by centripetal compression, the combination of a contracting-box formed with an aperture progressively diminishing toward one end, a follower comprising concentric telescoping sections, means for forcing the follower through the said aperture, and engaging means common to the follower sections operating to disengage sections as the follower is advanced through the contracting box, substantially as and for the purpose set forth.

3. In an apparatus for reducing the diameters of annular bodies by centripetal compression, the combination of a contracting-box, formed with an aperture progressively diminishing toward one end, a follower formed with concentric telescoping annular sections, means for forcing the follower through the said aperture, and radially sliding bars, on the follower, engaging the said sections, and operating, as the follower is advanced through the contracting-box, to release the said sections consecutively, substantially as and for the purpose set forth.

4. In an apparatus for reducing the diameter of annular bodies by centripetal compression, the combination of a contracting-box, formed with an aperture progressively diminishing toward one end, a sectional follower, comprising a central disk and a series of telescoping rings about the disk, means

for forcing the follower through the said aperture, centripetally movable engaging means for the follower sections, operating as the follower advances through the contracting-box to release the sections consecutively, and section take-up means on the follower operating as the follower is withdrawn from the contracting-box to telescope and take-up the sections consecutively, substantially as and for the purpose set forth.

LIBANUS M. TODD.

In presence of—
M. J. FROST,
W. N. WILLIAMS.