

No. 771,538.

PATENTED OCT. 4, 1904.

E. N. DOWNS.

WHEEL RIM FOR HOLLOW TIRES.

APPLICATION FILED JAN. 11, 1904.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.

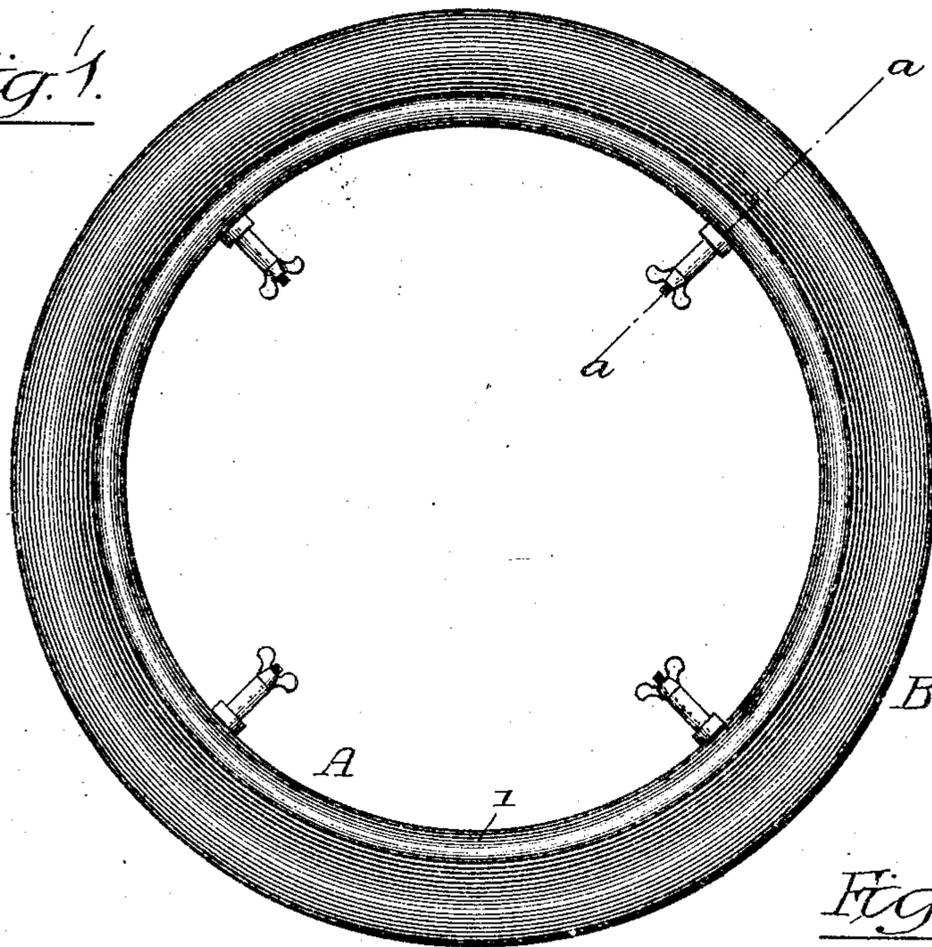


Fig. 3.

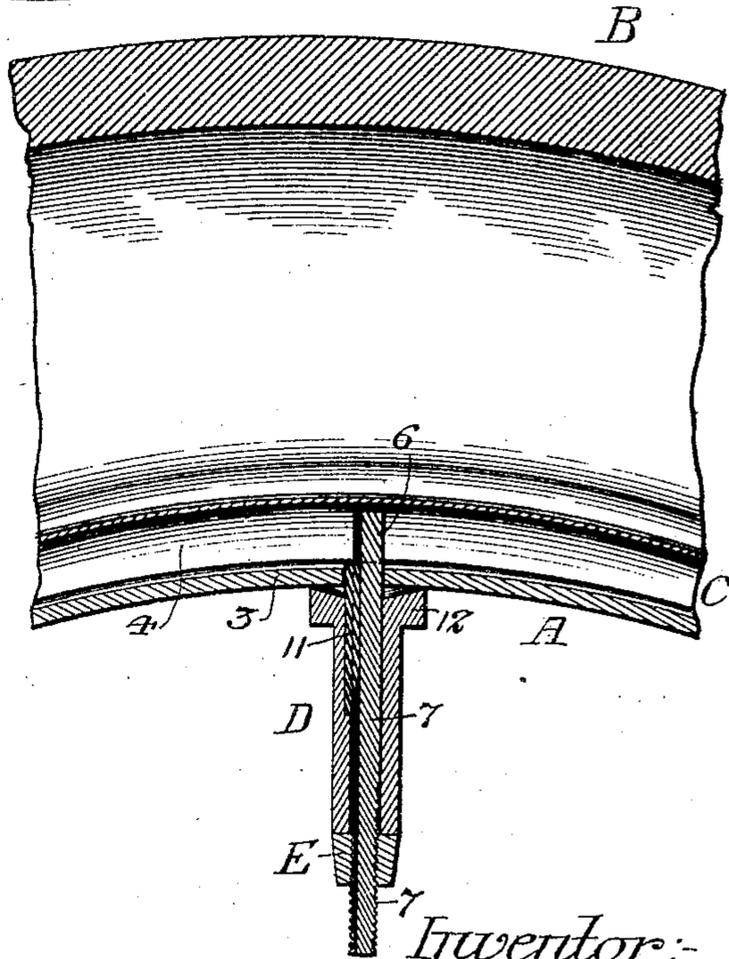
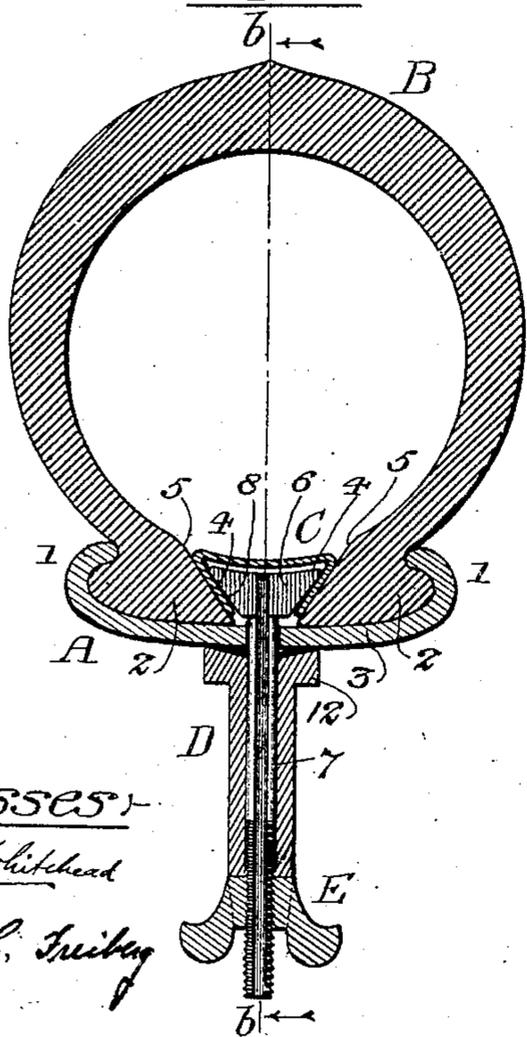


Fig. 2.



Witnesses:

*Louis M. F. Whitehead*

*Ottilio C. Frubing*

Inventor:

*Elmer N. Downs*  
by *Chas. G. Page*  
Atty.

No. 771,538.

PATENTED OCT. 4, 1904.

E. N. DOWNS.  
WHEEL RIM FOR HOLLOW TIRES.

APPLICATION FILED JAN. 11, 1904.

NO MODEL.

2 SHEETS—SHEET 2.

Fig. 6.

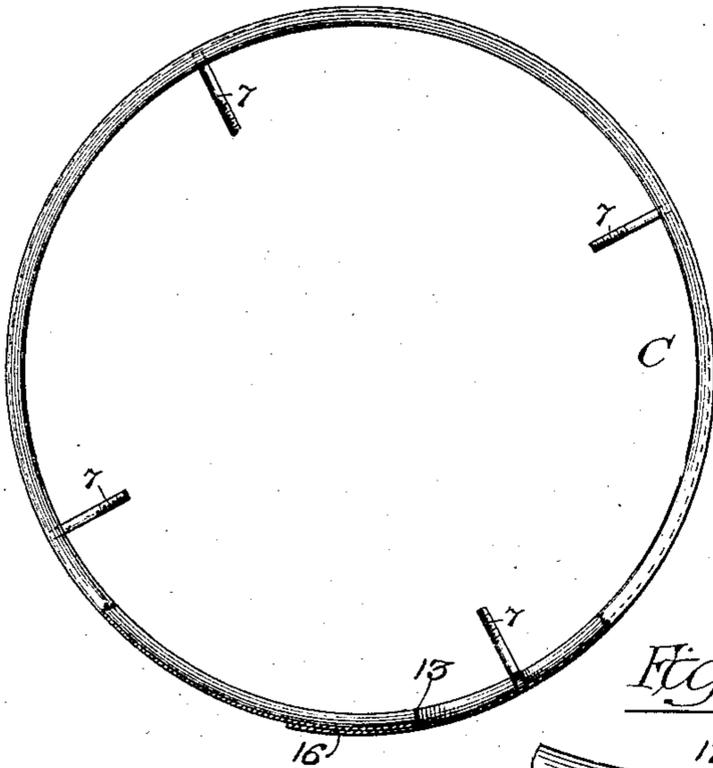


Fig. 7.

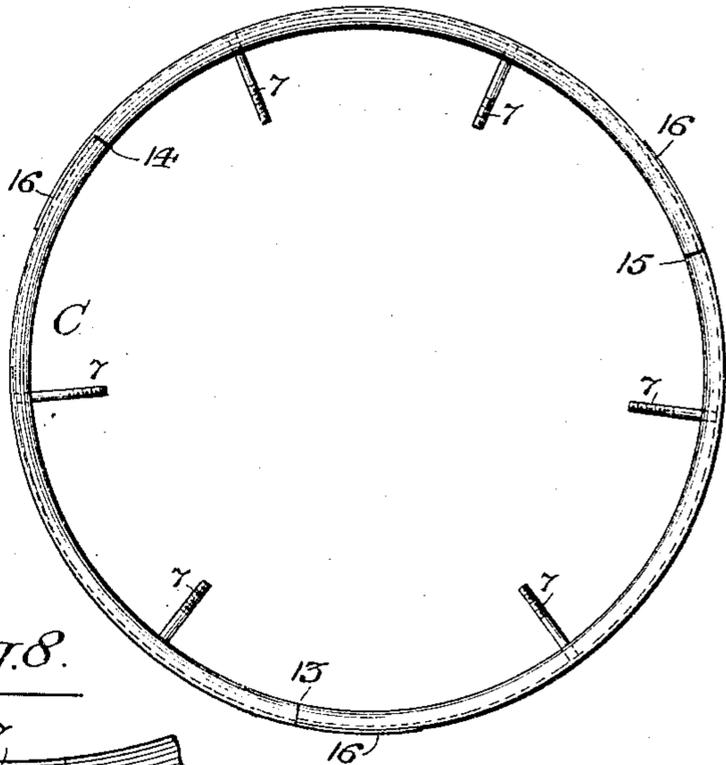


Fig. 8.

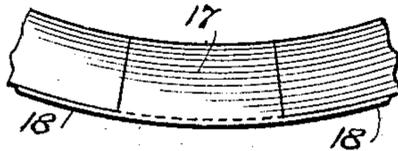


Fig. 4.

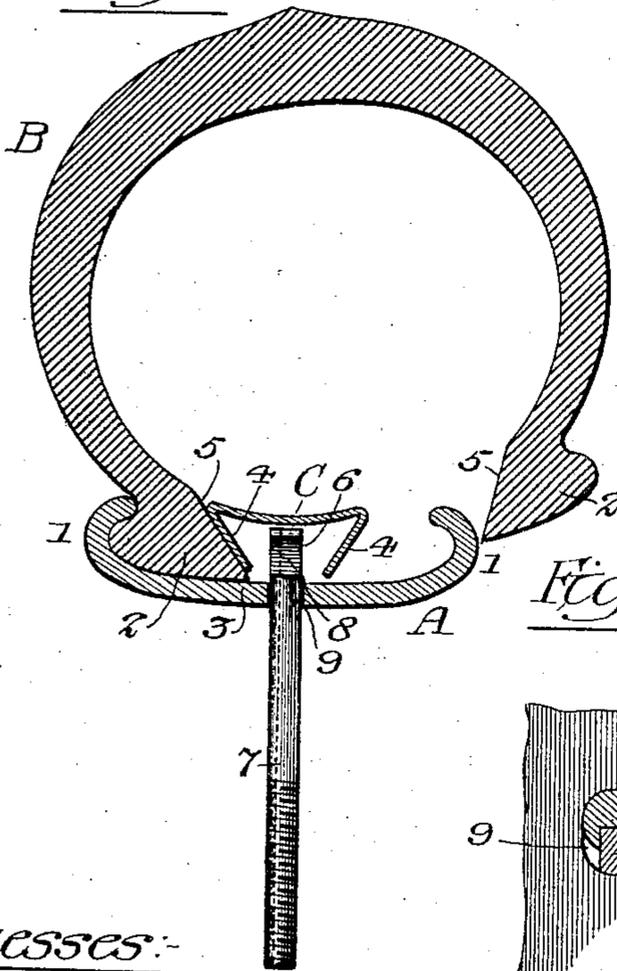


Fig. 5.

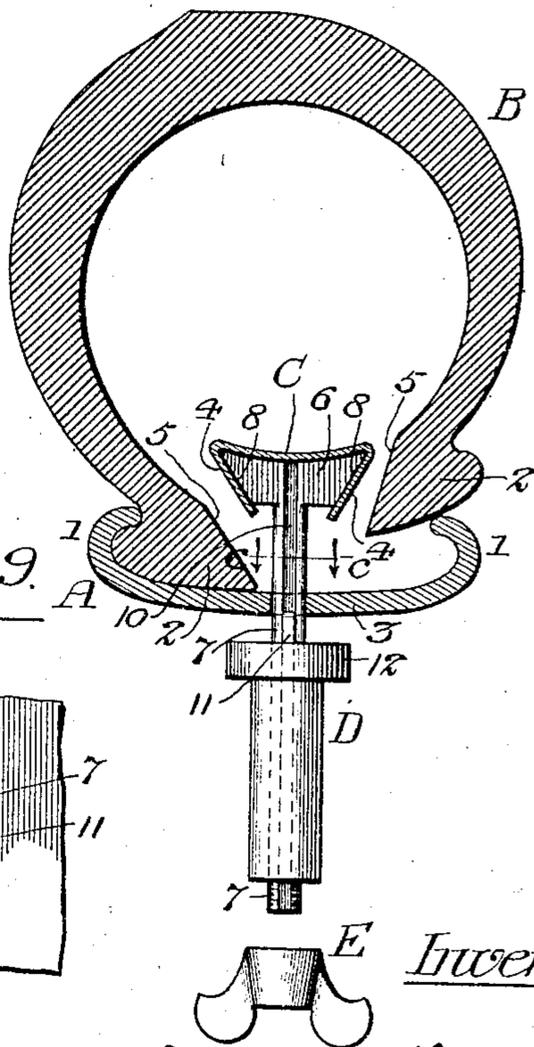
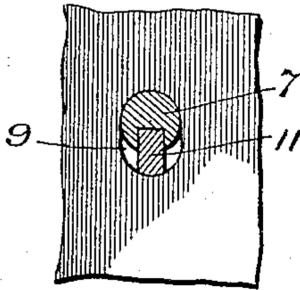


Fig. 9.



Witnesses:

*Louis M. Whiteland.*

*Ottelo C. Freiberg*

Inventor:

*Elmer N. Downs*  
*by Chas. G. Page*  
*attys.*

# UNITED STATES PATENT OFFICE.

ELMER N. DOWNS, OF CHICAGO, ILLINOIS.

## WHEEL-RIM FOR HOLLOW TIRES.

SPECIFICATION forming part of Letters Patent No. 771,538, dated October 4, 1904.

Application filed January 11, 1904. Serial No. 188,627. (No model.)

*To all whom it may concern:*

Be it known that I, ELMER N. DOWNS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Hollow or Pneumatic Tired Wheel-Rims, of which the following is a specification.

My invention relates to means for detachably securing longitudinally-divided, hollow, or pneumatic tire casings upon rim-wheels of the kind or class in which the wheel-rim, hereinafter briefly termed the "rim," is provided with marginal flanges forming abutments with which the two base portions of the longitudinally-divided tire-casing engage, whereby abnormal lateral spread on the part of these base portions of the casing is prevented.

Objects of my invention are to securely hold the casing upon the rim, to clamp the base portions of the casing against the rim-flanges and upon the seating portion of the rim, to provide reliable and efficient binding and locking devices which can be readily and easily manipulated and adjusted, to avoid the presence of cracks into which portions of the inflated inner tube might be forced during inflation, and to provide a hollow or pneumatic tired wheel-rim particularly adapted for use in automobiles.

In the accompanying drawings, Figure 1 is a side view of a hollow or pneumatic tired wheel-rim understood to involve the principles of my invention. Fig. 2 is an enlarged cross-section on line *a a* in Fig. 1. Fig. 3 is a longitudinal section through a portion of the tire-casing and wheel-rim on line *b b* in Fig. 2. Fig. 4 is a section corresponding with Fig. 2 with the sleeve D removed and one of the base portions 2 of the casing detached from the rim, the locking-key being given a quarter-turn from its position shown in Fig. 2, so as to permit the binder C to be removed from or placed upon the key-head 6. Fig. 5 is a similar section with the sleeve D upon the stem of the key, the latter being turned to bring into the position shown in Fig. 2 and raised so as to lift the binder. In this view one of the base portions of the casing is shown

in position to be slipped under the binder, the other base portion of the casing being in place upon the rim. Fig. 6 illustrates the binder C made in one length and transversely divided at one point, said figure being on a reduced scale. Fig. 7 is a view similar to Fig. 6 with the binder transversely divided into several lengths of sections. Fig. 8 is an enlarged detail showing a modified form of binder-joint. Fig. 9 is a detail illustrating a section on line *c c* in Fig. 5.

The wheel-rim A is understood to be an annulus provided with continuous marginal flanges 1. The wheel-rim shown is of the form commonly known to the trade as a "standard clencher-rim." I may, however, depart somewhat from this particular form—as, for example, the marginal flanges 1 may be more or less transversely curved, or they can be made without such transverse curvature, it being observed, however, that in all cases these marginal flanges form side abutments which prevent abnormal lateral spread on the part of a longitudinally-divided casing B, having base portions which are adapted to bear upon the seating portion of the rim and engage the marginal flanges thereof. As specifically shown, the base portions 2 of the tire-casing fit against the seating portion 3 of the rim and also engage in annular grooves or recesses formed by the transversely-hook-shaped marginal flanges of the standard clencher-rim illustrated.

The casing B, having a longitudinally-divided base, is firmly held upon the rim by a centrally-arranged annular binder C, which is applied between the annular base portions 2 of the casing and rendered effective as a clamp and lock by a clamping and locking device.

The form of binder C illustrated is similar to that shown in Patent No. 520,901, dated June 5, 1894, and, as illustrated in Fig. 6, said binder is transversely divided at one point. I may, however, also transversely divide such binder at a plurality of points, so as to provide an annular binder composed of a series of sections or lengths, as illustrated in Fig. 7 of this application and hereinafter more particularly referred to.

The form of binder C shown has inwardly-

converging side flanges 4, whereby the binder is wedge-shaped in cross-section. When a binder of this or equivalent form is used, I form the base portions 2 of the casing with inwardly-converging edge portions 5, corresponding with the transversely-inclined sides 4 of the binder, so that when the tire and binder are in place and the binder is drawn toward the seating portion of the rim it will wedge between the base portions of the casing and not only force them against the marginal rim-flanges, but also act to clamp them down upon the seating portion of the rim. This arrangement also provides the casing and binder with a considerable extent of contacting-surfaces and enables the casing to resist strains tending to separate it from the rim at any point or points.

The clamping and locking device comprises a key having a head 6 upon one end of a stem 7 and means for longitudinally adjusting the stem through the rim in directions radial to the center of the wheel. The binder is recessed to receive the head 6 of the key, it being observed that while such recess may be formed in any suitable way it is herein shown as being formed by the space between the side flanges 4 of the binder. In the form shown the key-head is wedge-shaped, having flattened sides and inwardly-converging edges 8, corresponding in inclination with the inner faces of sides 4 of the binder, so as to engage such sides when the key is turned about the axis of its stem to an extent to bring the plane of its flattened head 6 transverse to the rim, as in Figs. 2 and 5. When, therefore, the key-head is thus positioned within a recess in the binder, it will interlock therewith, and when adjusted toward the center of the wheel its inclined sides will bind against the sides 5 of the binder as a wedge and draw the binder inwardly toward the rim, thereby causing the binder to wedge in between the base portions 2 of the casing and to exert thereon a clamping action.

When the key is given a quarter-turn from the position shown in Figs. 2 and 5, its flattened side will be parallel with the general plane of the wheel, as in Fig. 4, so that the binder can be raised independently of the key-head and removed from the wheel and also replaced thereon.

In order to fit and lock a tire upon the rim, one of the base portions 2 of the casing can be first placed upon the rim, as in Fig. 4, and the key turned as therein shown, so as to permit the binder to be placed in position to receive the key-head. The key can then be given a quarter-turn, so as to cause its head to interlock with the binder, and by then slightly pushing the key-stem outwardly through the rim-hole 9, which is provided for the stem of the key, the binder will be raised from the rim, as in Fig. 5, and when thus raised the remaining one of the base portions

2 of the casing can also be placed upon the rim. After this the key can be drawn inwardly toward the wheel-center, so as to draw down the binder and cause the latter to wedge in between and also clamp the opposite base portions of the casing, it being understood as a matter of course that the usual inflatable inner tube should be introduced prior to thus ultimately seating the casing upon the rim. When the tire is thus locked upon the rim, as in Figs. 2 and 3, the key is held against turning by a spline or feather device. As illustrated, the key is provided with a longitudinal groove 10, and the opening 9, which is formed in the rim for the key-stem is made oblong or laterally enlarged, as at one side, to receive a spline 11, which is adapted to fit in groove 10 of the key. The spline 11 is formed at one end of a sleeve D, which is adapted to receive and slide upon the key-stem. The key-stem is longer than the sleeve D, so that when the parts are assembled, as in Figs. 2 and 3, the inner end portion of the key-stem will project beyond the inner end of the sleeve, and this inner end portion of the key-stem is threaded for a thumb-nut E, which can be adjusted upon the threaded portion of the key-stem so as to engage the inner end of the sleeve and while serving to draw the key inwardly toward the wheel-center also clamp the headed outer end 12 of the sleeve against the wheel-rim. When the parts are brought together, as in Figs. 2 and 3, the spline 11, engaging the key, will hold the latter against turning, and the engagement of such spline with the wheel-rim will also hold the sleeve upon which it is formed against axial rotation.

I propose in practice to provide a plurality of locking devices for drawing inwardly and holding the binder, and where the binder comprises a plurality of lengths or sections, as in Fig. 7, one or more of such locking devices should be provided for each length or section of the binder.

In Fig. 6 the binder C is divided transversely at one point, as at 13, while in Fig. 7 it is provided with several transverse divisions, as at 13, 14, and 15, so as to produce a binder composed of a series of lengths or sections. Where a transverse split or division thus occurs in the binder, I form the end of one length or section with a lip 16, arranged to extend over the adjacent end portion, so as to cover over the transverse split, and thereby prevent the inner air-tube from being forced into the crack when it is inflated.

In Fig. 8 the binder is divided by a gap in which is placed a short binder-section 17, having at each end a lip 18, arranged to lap the adjacent end portions of the main length of the binder.

Broadly considered, the locking and binding devices comprise a centrally-arranged binder arranged for engaging the base portions of a

longitudinally-divided casing and a key which can be adjusted to interlock with the binder and also adjusted so as to release the binder, the key being also arranged for adjustment  
 5 in directions radial to the center of the circle described by the rim. I do not, therefore, confine myself to the specific form of binder and key illustrated. As shown, the binder has a continuous recess for the key-heads; but if,  
 10 for example, a transversely-concave binder is used with its convex side nearest the rim, so as to provide it with practically converging sides and adapt it to wedge between the base portions of the casing and also bind  
 15 thereon, the locking connection between the binder and key will be modified accordingly. For example, the binder in such case could be provided at intervals with lugs, notches, or recesses for the key-heads modified in accordance with such arrangement. I regard, how-  
 20 ever, the special construction illustrated as being highly efficient and involving matters of further improvement. In the construction illustrated in the drawings the binder C is in-  
 25 dependent of the pneumatic tire. With the arrangement shown the binder can be raised, as in Fig. 5, and by then lifting one edge of the casing to the position shown at the right in said figure, then drawing the base portion  
 30 shown at the right over and free from the rim, then turning the key-head to the position shown in Fig. 4, and after then removing the binder from the key-head the opposite base portion of the casing can be removed from the  
 35 wheel-rim, and this is a practical way in which such casing can be removed.

In Fig. 4 the binder is close to the wheel-rim, while in Fig. 5 the binder is shown raised away from the wheel-rim and within  
 40 the chamber of the hollow casing B.

What I claim as my invention is—

1. The combination with a wheel-rim having marginal flanges, and a hollow or pneumatic tire casing divided longitudinally to  
 45 provide opposite base portions adapted to engage the rim-flanges, of a centrally-arranged independent binder adapted to engage the two base portions of the casing, said binder being transversely divided and arranged to be drawn  
 50 and wedged against the base portions of the casing and in alternation therewith to be lifted up within the chamber of the casing; a rotary and longitudinally-adjustable key adapted to detachably interlock with the binder and sup-  
 55 ported for adjustment radially as to the wheel-rim to draw the binder against the base portions of the casing and in alternation therewith to raise the binder within the chamber of the casing according to the direction in which  
 60 the key is longitudinally adjusted; and means for adjusting the key in a direction radially toward the center of the rim.

2. The combination with a wheel-rim having marginal flanges, and a hollow or pneumatic tire casing divided longitudinally to

provide opposite base portions adapted to engage the rim-flanges and having beveled opposing inner edges, of a transversely-wedge-shaped and transversely-divided binder applied to engage and wedge between the two  
 70 base portions of the casing, said binder forming an annular channel with its opening opposite the central portion of the rim-seat; a rotary adjustable key adapted to detachably interlock within the binder and supported for  
 75 adjustment radially as to the wheel-rim; and means for adjusting the key in a direction to clamp the binder against the base portions of the casing.

3. The combination with a wheel-rim having marginal flanges, and a hollow or pneumatic tire casing divided to provide opposite base portions adapted to engage the rim-flanges, of a binder applied for engaging and clamping the base portions of the casing; a rotary adjustable key adapted to detachably interlock with the binder and supported for adjustment in a direction to draw the binder against the base portions of the casing; means for temporarily holding the key against axial  
 85 rotation; and means for adjusting the key toward the center of the wheel-rim.

4. The combination with a wheel-rim having marginal flanges, and a hollow or pneumatic tire casing divided longitudinally to provide opposite base portions adapted to engage the rim-flanges, of a binder having a wedge-shaped recess and arranged to engage the two base portions of the casing, the inner walls of the wedge-shaped recess within said binder being arranged to converge toward the middle portion of the rim-seat; and a rotary adjustable key having a head adapted to turn within the recess of the binder and to detachably interlock therewith as the result of its rotary adjustment, the key being supported for adjustment radially as to the center of the rim, the said head of the key being provided with opposite inclined sides corresponding with the inclined inner walls of the binder.  
 100  
 105

5. The combination with a wheel-rim having marginal flanges, and a hollow or pneumatic tire casing divided longitudinally to provide opposite base portions adapted to engage the rim-flanges, of a centrally-arranged binder adapted to engage the base portions of the tire-casing; a key fitted for rotary and longitudinal adjustment through an opening in the wheel-rim and adapted to detachably interlock with the binder; a sleeve having a sliding connection with the key and adapted to interlock with the wheel-rim, and means for longitudinally adjusting and locking the key.  
 110  
 115  
 120

6. The combination with a wheel-rim having marginal flanges, of a pneumatic-tire casing divided longitudinally along its base to form base portions having transversely-inclined marginal faces converging toward the wheel-rim and spaced to form an annular transversely-wedge-shaped channel; a transversely-  
 125  
 130

wedge-shaped binder arranged to wedge in said channel and as a result of its wedging action therein force the base portions of the casing laterally against the wheel-rim flanges and also inwardly against the tire-seating portions of the wheel-rim; and a device for mechanically adjusting the binder; said binder being constructed with sides converging inwardly and having their inner marginal portions separated and relatively disconnected.

7. The combination with a wheel-rim having marginal flanges, of a hollow or pneumatic tire casing divided longitudinally to provide opposite base portions adapted to engage the rim-flanges, of a binder made transversely wedge-shaped and providing a recess which is open along the inner side of the binder; a key having a head adapted to engage within the recess in the binder and having a stem extending inwardly through an opening in the wheel-rim; a sleeve having a sliding connection with the stem of the key and held against rotation independently of such key; and a nut adjustably applied to a threaded portion of the key-stem, the sleeve being provided with a projection at its outer end and the wheel-rim being provided with an opening to receive such projection when the sleeve is adjusted against the wheel-rim.

8. The combination with a wheel-rim having marginal flanges, and a hollow or pneumatic tire casing divided longitudinally to provide opposite base portions adapted to engage the rim-flanges, of a centrally-arranged binder; a key adapted to detachably

interlock with the binder and having a stem fitted to turn within and slide through an opening in the rim, said key being provided with a longitudinal groove; a sleeve fitted to slide upon the key-stem and having a spline fitted to slide in the groove of the key; a nut for drawing the key toward the center of the wheel-rim and for clamping the sleeve against the inner side of such rim, the wheel-rim being provided with an elongated opening adapted to receive both the stem of the key and an outwardly-projecting end of the spline upon the sleeve.

9. The combination with a wheel-rim having marginal flanges, of a pneumatic-tire casing divided along its base to provide two base portions arranged to seat upon the rim and bear against the inner sides of the marginal rim-flanges; a transversely-divided annular binder externally wedged-shaped in cross-section and having an internal transversely-wedge-shaped channel, the opposite side walls of which converge toward the central portion of the wheel-rim; a wedge-shaped key having a stem extending through a bearing opening in the wheel-rim and a head forming a flattened wedge arranged within the binder and having its converging wedge-shaped bearing-faces adapted to engage the inclined walls of the channel in the binder, and means for adjusting and locking said key.

ELMER N. DOWNS.

Witnesses:

CHARLES G. PAGE,  
OTTILIE C. FREIBERG.