

Jan. 16, 1940.

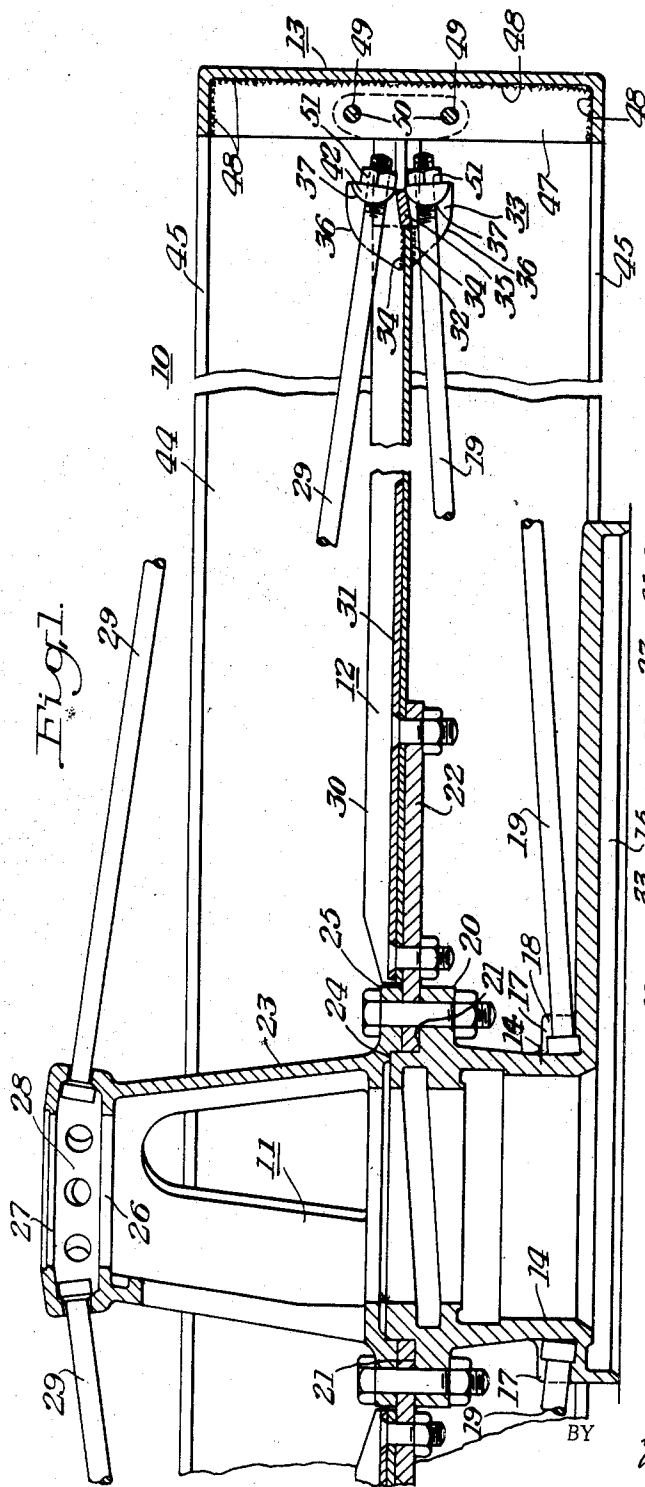
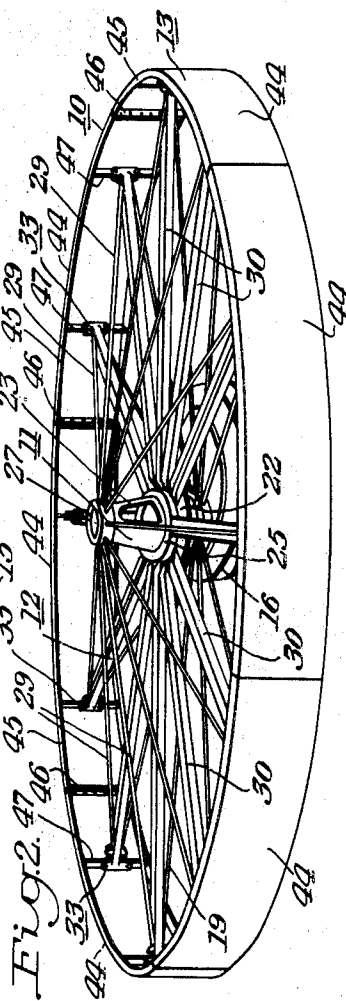
J. B. PICARD

2,187,693

BAND WHEEL CONSTRUCTION

Filed July 3, 1937

2 Sheets-Sheet 1



INVENTOR.
John B. Picard.
BY Edward A. Lawrence.
his ATTORNEY

Jan. 16, 1940.

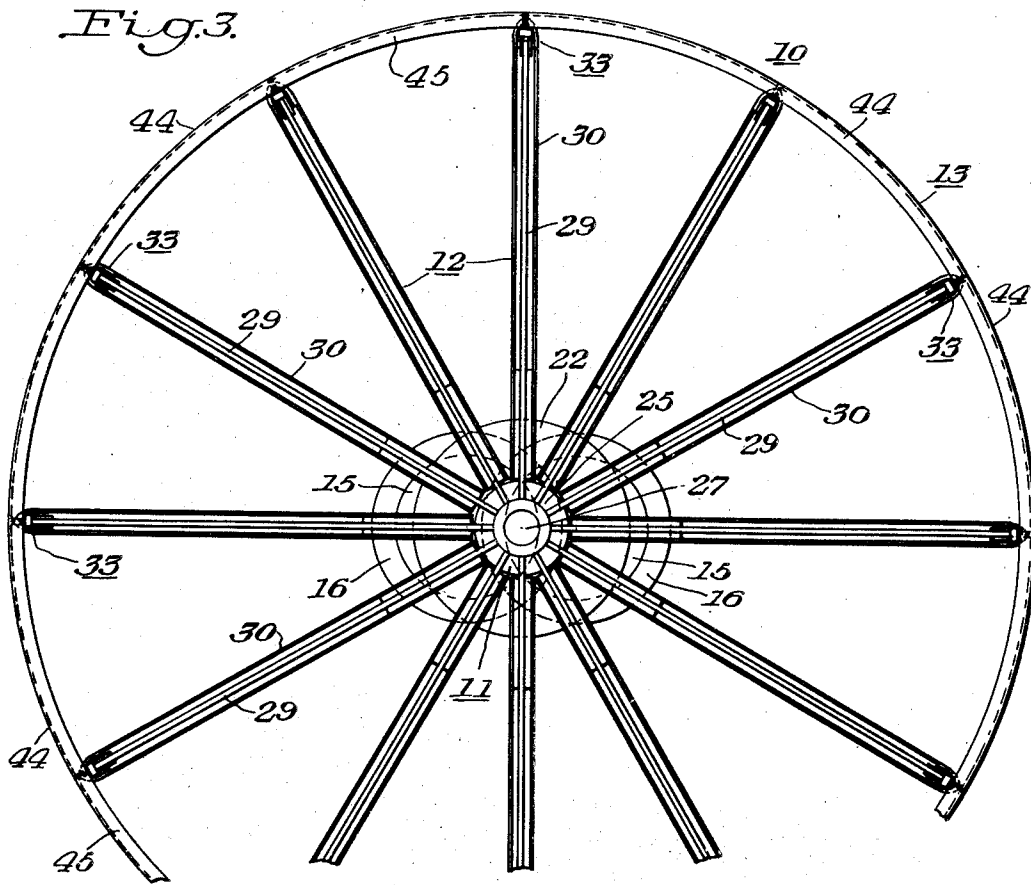
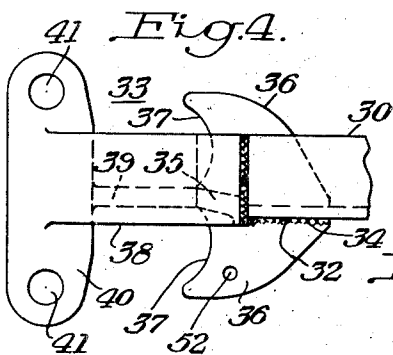
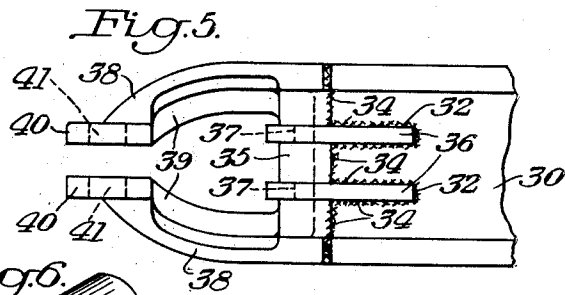
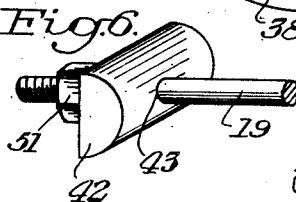
J. B. PICARD

2,187,693

BAND WHEEL CONSTRUCTION

Filed July 3, 1937

2 Sheets-Sheet 2



INVENTOR
John B. Picard
BY
Edward A. Lawrence
his ATTORNEY

UNITED STATES PATENT OFFICE

2,187,693

BAND WHEEL CONSTRUCTION

John B. Picard, Toledo, Ohio, assignor to The
National Supply Company, Pittsburgh, Pa., a
corporation of Pennsylvania

Application July 3, 1937, Serial No. 151,863

11 Claims. (Cl. 74—230.9)

This invention relates generally to band wheel pumping powers and more particularly to improvements in the construction of the band wheel.

The band wheel of a pumping power is a large diameter wheel rotatably supported on a vertical axis and having a rim provided with a smooth outer peripheral surface arranged to receive and carry a running belt for driving the pumping power. The hub of the wheel is connected to a crank or an eccentric disc which works within an outer portion driving the latter in an orbital path. Pull rods are connected to the outer portion of the eccentric and extend radially therefrom to the oil well pumping apparatus in the field, thus providing a reciprocating motion for the operation thereof. A pumping power centrally located within an oil field may thus furnish power to a number of oil wells.

This manner of central pumping is not new in the art and has been highly developed along certain lines of the pumping power mechanism which deal with problems of lubrication and crank or eccentric construction.

These band wheels are constructed in various sizes ranging from twelve to thirty-six feet in diameter and the width or face of the rim may vary from twelve to thirty inches. It is impractical to build a wheel of this size and character for shipment in one piece. It is therefore designed and constructed in such a manner that it may be easily assembled in the field. Many forms of wheel construction have been resorted to in the past to produce a structure that when assembled in the field provides a true wheel, which is a difficult task especially in view of the fact that the rims of these wheels are composed of from four or six sections.

The problem has been approached from different angles involving the use of different types of spokes, bracings and tie rods having different modes of adjustment and attachment. The tie rods have been set radially and tangentially relatively to the hub. They have been of the bolt or rod type, the former being threaded at one end and the latter being threaded at both ends. The ends of the tie rods have been angularly disposed with respect to the axis thereof in the manner of the ordinary construction of an automobile or bicycle wheel. Again the upper tie rods have been designed to cross the lower tie rods adjacent the rim of the wheel. However, these designs provided a rigid anchoring means for the tie rods of the wheel and usually resorted to turnbuckles for adjusting the wheel to maintain its trueness, which is difficult and sometimes

impossible to do especially when the parts lose internal stresses causing them to warp or become warped due to improper adjustment followed by long usage.

The principal object of this invention is the provision of a new and improved construction of a band wheel.

Another object of this invention is the provision of means for maintaining the trueness of a band wheel during operation.

Another object is the provision of means permitting rapid and efficient assembly of a band wheel.

Another object relates to the simplicity of construction of a band wheel.

Another object is the provision of improved means for adjusting the band wheel.

Other objects and advantages appear in the following description.

In the accompanying drawings wherein a practical embodiment of the principles of this invention are illustrated:

Fig. 1 is an enlarged vertical section taken through a band wheel showing the application of this invention, with parts broken away.

Fig. 2 is a perspective view illustrating a complete band wheel assembly.

Fig. 3 is a plan view of a band wheel showing the relative position of the members thereof, with parts broken away.

Fig. 4 is an enlarged elevation of an anchor member which forms a part of this invention.

Fig. 5 is a plan view of the anchor member shown in Fig. 4.

Fig. 6 is a perspective view of a self-adjusting washer for use in connection with a tie rod and the anchor member shown in Figs. 4 and 5.

Referring to the drawings, 10 represents the band wheel which includes generally the hub 11, the spoke and tie rod structure 12, and the rim 13.

The hub structure 11 is provided with a hollow bore to receive the usual upright spindle for rotatably supporting the band wheel and its associated parts.

The hub may be conveniently constructed of several parts which when assembled form a unitary hub-structure. This mode of construction has several advantages. The castings being smaller are more adaptable for molding and machining, with small loss in manufacturing. Again different parts of the hub-structure may be made of different kinds of metal each best suited to that particular use.

Thus 14 represents the bottom hub-section, the

lower portion 15 of which forms the arm or attachment of the upper eccentric indicated at 16 in Fig. 2 and Fig. 3. An annular shoulder 17 is formed on the lower perimetral surface of the hub 14 above the arm 15. This shoulder is cored out to provide the upwardly open T-slots 18 uniformly spaced about the perimeter thereof for receiving the bolt heads of the lower tie rods 19. An annular flange 20 is formed on the casting 14 adjacent the upper end thereof, which flange forms an annular seat 21 with the body of the casting.

22 represents a spoke-hub-plate and consists of an annular disc having a central opening to permit the disc to telescope over the upper end of the hub 14 and rest on the seat 21 formed by the flange 20.

23 represents the top hub-section. The lower portion of this section is provided with an annular seat 24 arranged to receive the upper end of the bottom hub-section 14 and an annular flange 25 coextensive with the flange 20 of the hub-section 14.

The flanges 20 and 25 and the plate 22 are provided with aligned holes for pinning or otherwise securing the parts in assembled relation.

The upper hub section 23 is conical in shape to provide improved stress distribution within the structure and it extends appreciably above the rim 13. This construction produces a particular advantage as will be seen from the following description. The upper end of the hub-section 23 is provided with a pair of internal annular flanges 26 and 27 forming between them an annular groove 28 which is reinforced by these flanges. A plurality of uniformly spaced holes are formed in the groove 28 through the wall of the hub to receive the upper tie rods 29. These holes are sufficiently large to permit the insertion of the tie rod through the open end of the upper hub section.

30 represents the spokes of the wheel which are preferably formed of channel iron and are radial of the hub with the channel turned upwardly. Adjacent the hub the web of the channel is reinforced by the strip plate 31 welded therein. The web and the strip 31 are provided with spaced holes which are aligned with spaced holes in the spoke-hub-plate 22, thereby providing an advantageous manner of securing the inner ends of the spokes to the hub structure.

The outer ends of the channel spokes are squared and the end portions of the webs are arranged to fit into the slotted openings 32 of the anchor members 33, while the squared ends of the flanges abut against shoulders on the anchor members, as shown in Figs. 4 and 5. The edges of the webs and flanges of the spokes are welded to the anchor members as indicated at 34 in Figs. 4 and 5.

The anchor member is bifurcated and resembles a stirrup, the horizontal section 35 of which is provided with spaced parallel lugs 36 extending thereabove and therebelow. The lugs 36 are provided at their outer ends with the slots 32 for receiving the web of the channel spokes 30. The other ends of the lugs 36 are provided with aligned concave arcuate seats 37 which form a cradle or shoe on each side of the horizontal section 35. The bifurcated portions 38 which extend from the ends of the section 35 are provided with inwardly extending reinforcing flanges 39 and terminate in the parallel clamping plates 40 which are provided with spaced aligned holes

41 for securing the outer end of the anchor members to the rim of the band wheels.

42 represents a semi-cylindrical washer of sufficient length to span the gap between the spaced lugs and permit the cylindrical surface to rest on the cradle seats 37. Intermediate of its ends the washer 42 is provided with a hole 43 for receiving the threaded ends of the upper or lower tie rods, as the case may be.

The rim of the band wheel illustrated in the drawings is made up in six arcuate sections as indicated at 44 in Fig. 2. The longitudinal edges and the ends of each of these sections are turned inwardly to form the flanges 45. At each end of a section a plate 46 is inserted between the flanges 45 and welded to the web and flanges of the section. The corresponding plates 46 of adjacent sections 44 abut and are provided with registering holes to receive bolts or other connecting means.

Two transverse ribs 47 are placed in spaced relation in each rim section and welded across the channel and to the upper and lower flanges of the rim, as indicated at 48 in Fig. 1. Each of the ribs 47 is provided with spaced holes 49 to receive the bolts 50 which extend through the holes 41 of the plates 40 on the bifurcated end of the anchor members 33 and which straddles the rib, thereby securing the anchor members to the rim. Thus an upward or downward pull produced by an adjustment of an upper or lower tie rod has the effect of bending the rim 13 in the direction of the pull, thereby enabling the outer perimetral surface of the wheel to be brought into its true vertical position by drawing inwardly the upper or lower edge thereof as may be required.

After the hub 11 has been assembled and the spokes 30 with their anchor members have been attached thereto the rim sections are secured together and to the anchor members. The semi-cylindrical washers 42 and the nuts 51 are placed on the ends of the lower tie rods 19. The bolt heads of each of the lower tie rods are then dropped into the T-slots 18 of the shoulder 17 and the outer ends of these rods are moved up between the lower lugs 36 and held in position by inserting a cotter key in the aligned holes 52 in the lower lugs 36 as indicated in Fig. 4.

The upper tie rods 29 are inserted through the open end of the hub 11 and outwardly through their respective holes in the channel 28, and the semi-cylindrical washers 42 and the nuts 51 are placed on the outer end of the rods. Each of the tie rods 29 are then placed in their respective positions between the upper lugs 36. By drawing up the nuts 51 on the lower and upper tie rods the arcuate surfaces of the semi-cylindrical washers 42 engage the cradle seats 37 of the anchor member. By tightening up the nuts 51 uniformly around the wheel one may observe the irregularities in the perimetral surface and correct such irregularities by properly adjusting the tie rods controlling the section that is out of true. When making such adjustments on one tie rod the semi-cylindrical washers of the other tie rods may move in their cradle and thereby retain their tension but shift their component force and thereby maintain the true position of the rim.

The chief aim in truing a band wheel is to maintain a true vertical belt-running face. To obtain this condition each of the rim sections and parts of some of said sections must be pulled into line. Thus by applying the tie rods in mov-

able cradle sockets on the anchor members, a swivel action is obtained between the spoke assembly 12 and the rim 13. In the present type of band wheel construction such an adjustment is practically impossible because the inner perimetral surface is provided with a centrally disposed annular flange to which the spokes and tie rod assembly is secured and there is no means for controlling the adjustment of the upper and lower edges of the rim. This constructional fault results in the formation of a pronounced ridge along the center of the belt face which is known as a crowned belt face. In fact a wheel of this character depends largely upon such a crown to maintain the belt in its true running position, whereas the structure comprising this invention does not depend solely upon the crowning on the belt face but provides for an adjustment of the face itself although slight crowning may be employed in addition thereto.

It will be noted that the upper section of the hub structure 11 extends materially above the upper edge of the rim 13, whereas the lower section extends to a less degree below the lower edge of the rim. This is an old expediency in the construction of a band wheel, and the principal reason for this construction is to provide a sufficient lifting advantage for supporting the heavy suspended mass of the rim of the band wheel. By supporting the rim from diametric points on the hub as illustrated in Fig. 3 a symmetrical balance is obtained in the wheel structure and the hub structure supports a dead vertical load in the manner similar to a tent pole. However, when in use the distributed forces may become unbalanced due to vibrations of the belt, or unbalanced loads which are supplied by the mechanism together with the fact that a belt may only contact or be carried by a portion of the wheel. Thus to aid in relieving any momentary strains on opposite parts of the wheel the upper section of the hub is frusto conical in shape, thereby aiding in resisting unbalanced forces from creating undue strains in the other portion of the wheel. It also permits opening of the hub structure for inspection and maintenance of the lubricating mechanism therein.

I claim:

1. In a band wheel, the combination with a hub, a peripheral rim and radial spokes connecting the hub and rim, of a socket in said hub above and below each spoke and in alignment therewith, a socket in the top and bottom of each spoke adjacent the outer end thereof, pairs of tie rods on opposite sides of the spokes supported in said sockets and connecting the hub and the outer end of the spokes, each pair of tie rods being disposed in the same plane as a corresponding spoke.

2. In a band wheel, the combination with a hub, a peripheral rim and radial spokes connecting the hub and rim, of a socket in said hub above and below each spoke and in alignment therewith, a socket in the top and bottom of each spoke adjacent the outer end thereof, pairs of tie rods on opposite sides of the spokes supported in said sockets and connecting the hub and the outer end of the spokes, each pair of tie rods being disposed in the same plane as a corresponding spoke, each assembly of a spoke and tie rods being disposed diametrically to another of said assemblies.

3. In a band wheel, the combination with a hub, a peripheral rim and radial spokes connecting the hub and rim, of a socket in said hub above

and below each spoke and in alignment therewith, a socket in the top and bottom of each spoke adjacent the outer end thereof, pairs of tie rods supported in said sockets and connecting the hub and the outer end of the spokes, each pair being disposed in the same plane as a corresponding spoke, the sockets in said spokes and their corresponding tie rods having arcuate mating surfaces to provide flexibility to facilitate truing the wheel.

4. In a band wheel, the combination of a hub, radial spokes connected to the hub, a peripheral rim, said rim comprising arcuate sections having an outer band receiving surface with inwardly flanged perimetral edges, plates disposed radially to the band receiving surface and secured to the flanges and the inner surface of the sections at the ends of the latter, means for connecting the adjacent plates of the arcuate sections to complete the rim, rib members fixed to the inner surface of said arcuate rim sections and to said flanged edges, said ribs being spaced from said plates, and means connecting the outer end of the spokes to said ribs.

5. In a band wheel, a rim structure comprising arcuate sections having an outer band-receiving surface and their longitudinal edges flanged inwardly, and plates disposed radially to the band-receiving surfaces and secured to the flanges and the inner surface of the sections at the ends of the latter, said plates being provided with bolt holes for connecting the sections together to complete the rim.

6. Anchor means for connecting the tie rods of a band wheel to the rim of the latter comprising a plurality of members each having spaced clamping plates arranged to be secured to the rim and provided with a plurality of arcuate surfaces, and means on the tie rods engaging said surfaces to permit adjustment therebetween, the arcuate surfaces and said means permitting the tie rods to swivel transversely to the plane of the wheel.

7. Anchor means for connecting the tie rods of a band wheel to the rim of the latter comprising a plurality of members each having spaced clamping plates arranged to be secured to the rim and provided with a plurality of arcuate surfaces, means on the tie rods engaging said surfaces to permit adjustment therebetween, the arcuate surfaces and said means permitting the tie rods to swivel transversely to the plane of the wheel, and means for connecting the spokes to said members.

8. An anchor for connecting the spokes and tie rods of a band wheel to the rim thereof which comprises a bracket arranged to be secured to the inner face of the rim, a pair of vertically disposed members on said bracket, said members being spaced apart for receiving tie rods therebetween, aligned arcuate surfaces on said members for receiving cross members arranged to be secured to tie rods to permit the rods to swivel transversely to the plane of the wheel when adjusted, and means on the bracket for receiving a spoke of the wheel.

9. In a band wheel, the combination of a hub, symmetrically positioned spokes extending radially from said hub, an annular rim having an outer peripheral belt surface, ribs fixed to the inner surface of said rim, said ribs being parallel with the axis of said hub and positioned adjacent the end of said spokes, an anchor member secured to the end of each spoke and having spaced clamping plates for connecting said spokes to said

ribs, sockets on each side of said anchor members, upper and lower tie rods extending from said hub and connected to said sockets on opposite sides of said spokes, and means for adjusting the effective length of said tie rods for tilting the peripheral surface of said rim to accommodate the run of a belt.

10. In a band wheel, the combination of a hub, symmetrically positioned spokes extending radially from said hub, an annular rim having an outer peripheral belt surface, ribs fixed to the inner surface of said rim, said ribs being parallel with the axis of said hub and positioned adjacent the end of said spokes, an anchor member on the end of each spoke having connections in spaced relation for fastening each spoke to its corresponding rib, sockets on each side of said anchor members, upper and lower tie rods extending from said hub and connected to said sockets on opposite sides of said spokes, and means for adjusting the effective length of said tie rods for tilting the peripheral surface of said rim to accommodate the run of a belt.

11. In a band wheel, the combination of a hub, symmetrically positioned spokes extending radially from said hub, an annular rim having an outer peripheral belt surface, ribs fixed to the inner surface of said rim, said ribs being parallel with the axis of said hub and positioned adjacent the end of said spokes, means connecting said spokes to said ribs, lugs on said means extending thereabove and therebelow, aligned arcuate surfaces on the outer vertical face of said lugs above and below the axial center of the spokes forming arcuate seats, upper and lower tie rods extending from said hub, members on the outer end of said tie rods having a complementary arcuate surface for engaging the arcuate seat on said lugs, and means for adjusting the effective length of said tie rods, thereby tilting the peripheral surface of said rim to accommodate the run of a belt without producing bending strains on said tie rod.

JOHN B. PICARD.