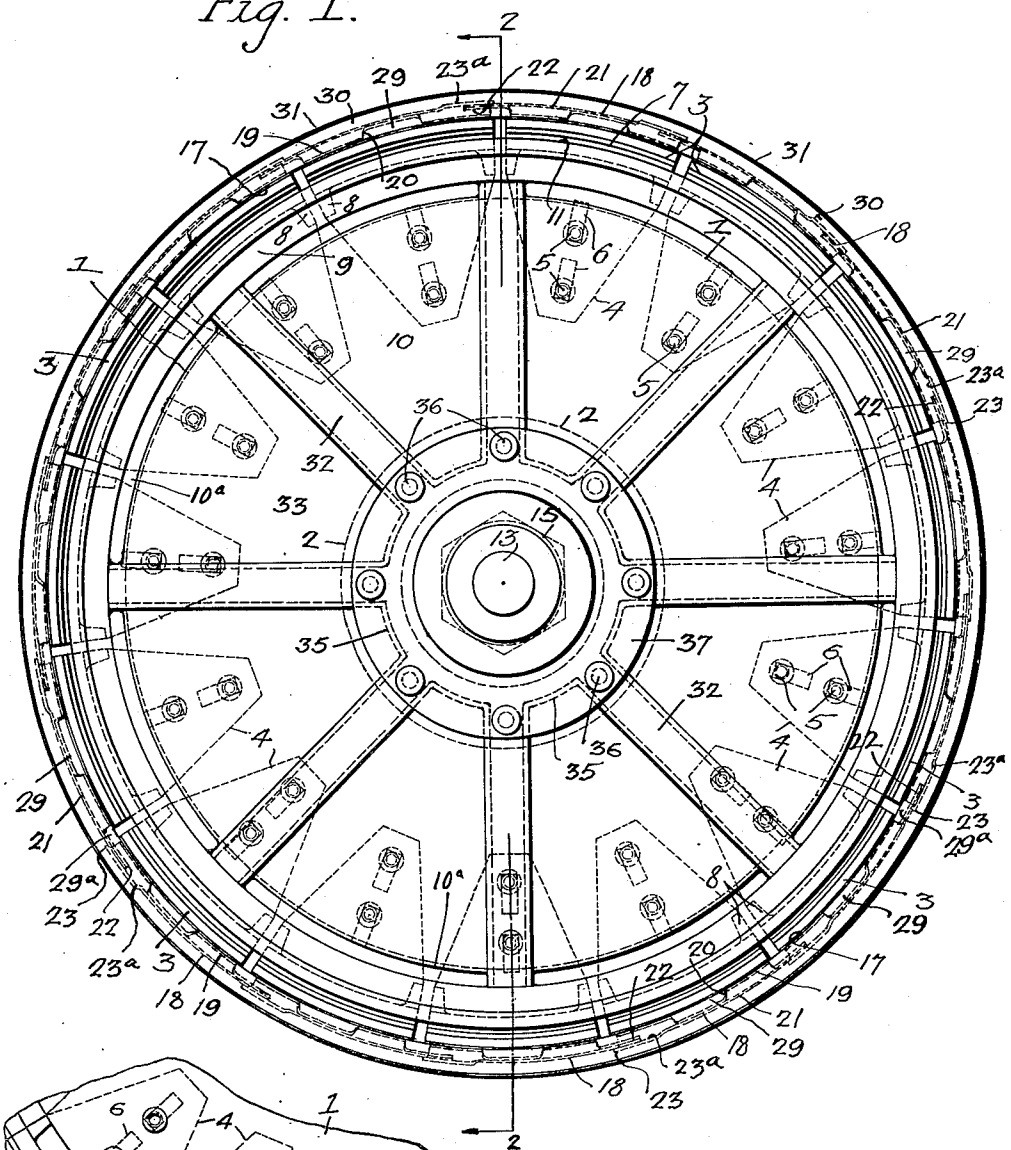
Jan. 17, 1933. J. M. MASON 1,894,909

EXPANSIBLE WHEEL

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Fig. 1.



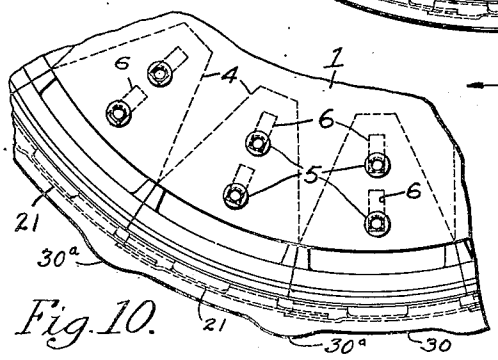


Fig. 10.

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Fig. 2.

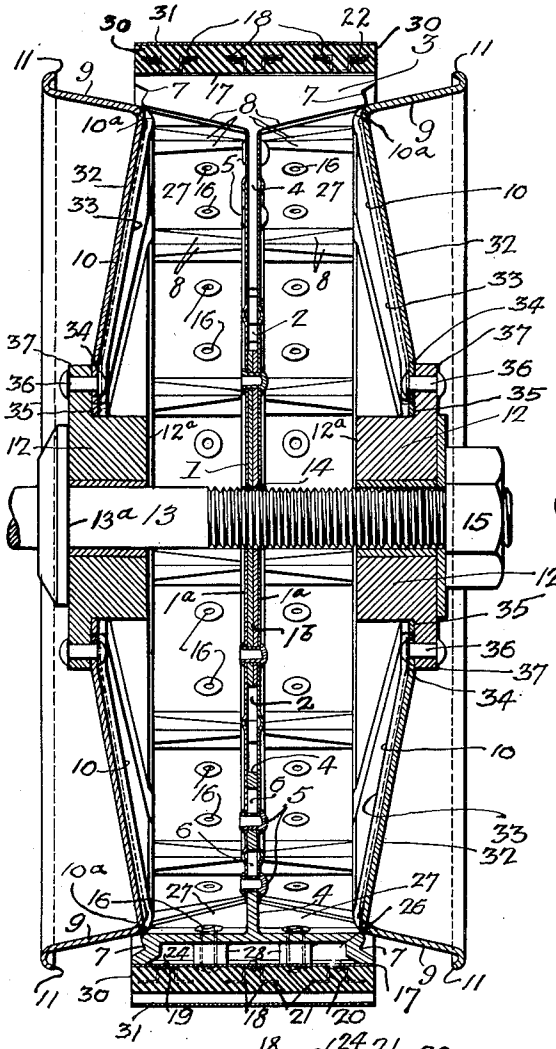


Fig. 4.

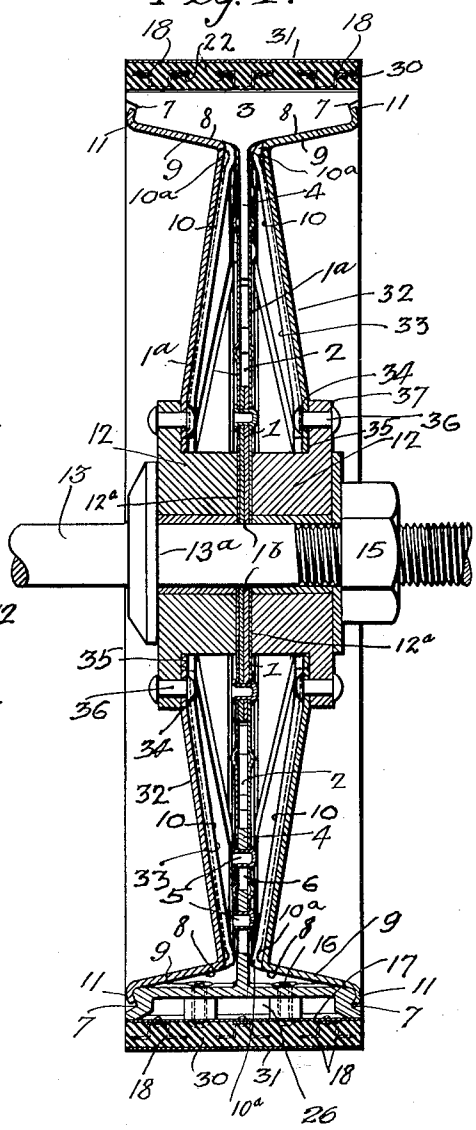
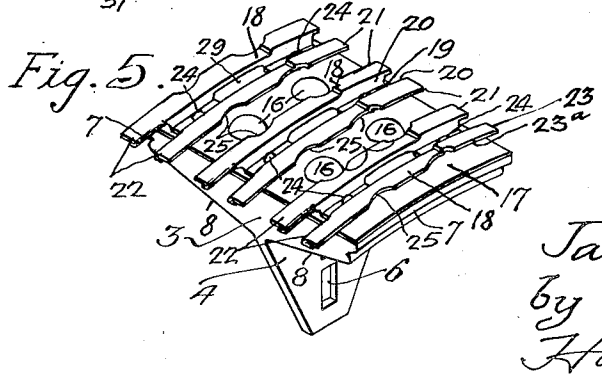


Fig. 5.



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Fig. 5.

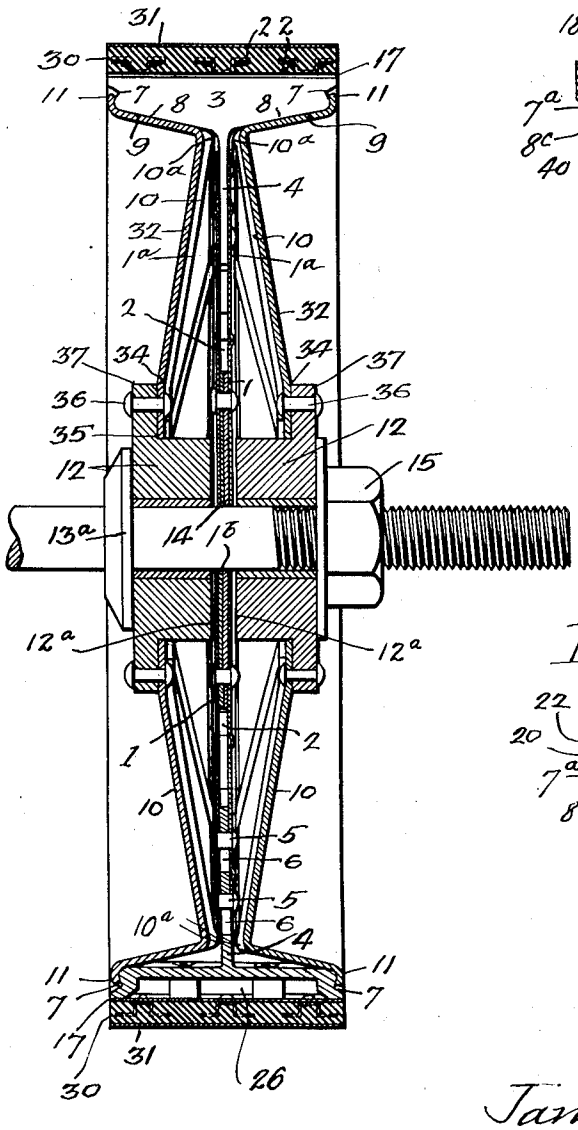


Fig. 7.

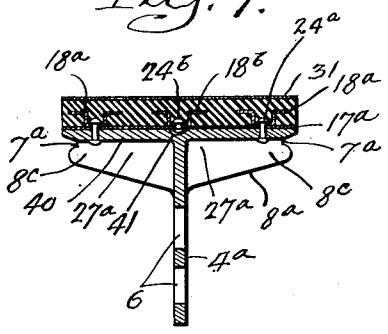
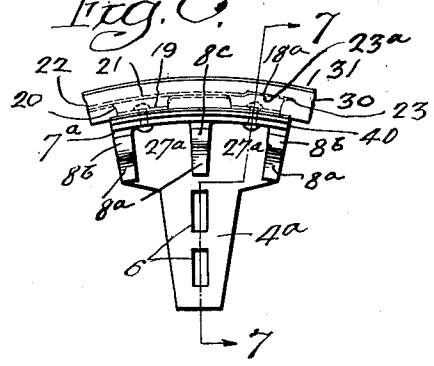


Fig. 6.



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Fig. 8

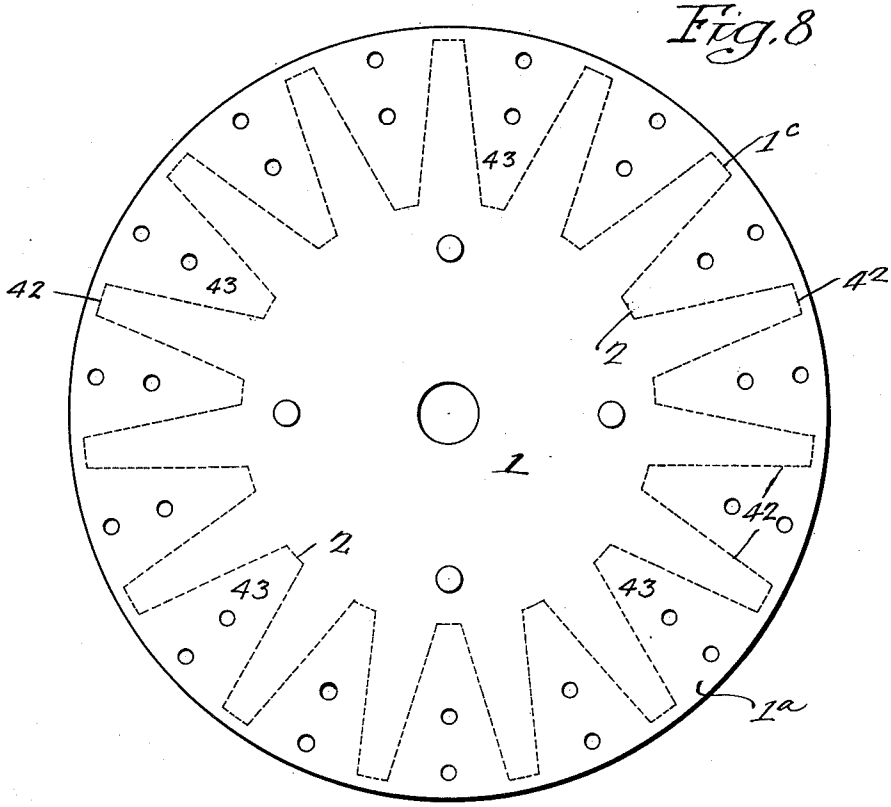
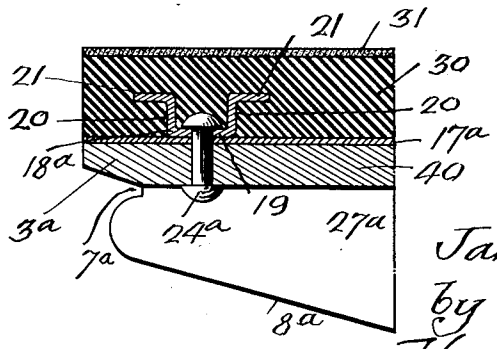


Fig. 9.



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UNITED STATES PATENT OFFICE

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EXPANSIBLE WHEEL

Application filed February 28, 1928. Serial No. 257,690.

This invention relates to improvements in expansible wheels having either a resilient or relatively firm working face and the principal object of the invention is to provide a wheel of this character particularly adapted to operate at high rotational velocities.

More specifically the invention contemplates provision of a device for abrading, polishing and similar uses comprising an annular replaceable abrading or polishing element, a resilient annular tire mounted upon an expansible circular supporting structure, the whole bound into a strong unified structure capable of withstanding such strains and stresses as may be encountered and making practical the construction of wheels of relatively large diameters adaptable for operation at high rotational velocities.

In the accompanying drawings, I have shown the embodiment of the invention which I now deem preferable, but it is to be understood that the drawings are for illustrative purposes only and are not to be construed as limiting or defining the scope of the invention, the claims forming a part of this specification being relied upon for that purpose.

In the attached drawings:

Figure 1 is a side elevational view of a wheel made in accordance with my invention;

Fig. 2 is a section on the line 2, 2, Fig. 1, showing the rim contracted and the abrasive or other band hanging loosely thereon;

Fig. 3 is a sectional view similar to that of Fig. 2, but showing the wheel in an intermediate position between the contracted and the final expanded states;

Fig. 4 is a sectional view similar to that of Figs. 2 and 3, but showing the wheel in its final expanded position, with the inner faces of the hub members in operative contact with the central supporting member;

Fig. 5 is a view in perspective of one of the radially movable rim elements carrying anchoring cleats;

Fig. 6 is a side elevation of a modified form of rim element carrying the anchoring cleats and resilient face;

Fig. 7 is a transverse sectional elevation taken on the line 7—7, Fig. 6;

Fig. 8 is a side elevational view of a modified form of the central supporting member showing a plurality of slots or cavities for the reception of the segmental rim elements; and

Fig. 9 is an enlarged sectional view of a rim element with the retaining plate, anchoring cleats and annulus in place.

Fig. 10 is a sectional elevation of a portion of the rim in the contracted state, with the annulus attached, showing transverse portions of the annulus of relatively greater thickness.

With reference to the drawings, the device in its preferred form comprises a central fabricated disk 1, preferably formed of two corresponding disk elements 1^a and 1^a assembled in a fixed relation and spaced by means of one or more inner plates 1^b. One or more circumferential recesses 2 are formed in the periphery of the disk 1, see Figs. 1 and 8. A plurality of independent rim segments 3, one of which is shown in perspective in Fig. 5, are carried by and equally spaced around the periphery of the disk 1.

As clearly illustrated in the drawings, each of the segments 3 on its under side is provided with a depending tongue 4 which is slidably mounted and radially guided within said peripheral recess 2. Each of the elements 3 is movably attached to the disk 1 in the present instance by a pair of radially aligned rivets 5 which pass through and are rigidly secured in the disk 1, and extend through slots 6 formed in the tongues 4 of the segmental elements 3.

As illustrated in Fig. 1, the slots 6 are also arranged radially of the disk 1 which arrangement provides for limited radial movement of the elements 3 relative to the disk. In the contracted position the segmental elements 3 are equally spaced and closely arranged around the periphery of the disk 1 so as to provide a cylindrical but interrupted face. The longitudinal side edges of the segmental elements 3 are formed, in each instance, with a longitudinal recess or groove 7, and the under face of each segmental member, at each side of the tongue 4 between the

longitudinal side edges and the depending tongue 4, are inclined away from the latter as indicated at 8, 8, and in this respect correspond with a pair of frusto-conical peripheral faces 9, 9, formed respectively on each of two side or retaining plates 10.

The plates 10 are of a circular formation and are constructed of pressed sheet metal or other relatively flexible material. The plates 10 are provided with hub elements 12, to be mounted on a spindle or shaft 13, which extends through a central aperture 14 formed in the disk 1, and thereby support the wheel on the shaft. When the plates 10, 10 are forced toward each other on the shaft 13 as shown in Fig. 4, the disk 1 is closely confined between the inner surfaces of the hub elements 12 and the frusto-conical peripheral faces 9, 9 of the plates 10, 10 constitute seats for the segmental members 3, 3.

The outer peripheral edges of the plates 10 are beaded over into a hook formation indicated at 11, which engages in the longitudinally extending recesses 7 in the members 3, as shown in Fig. 4, and thereby firmly retains these members in position. As shown in Figs. 2, 3 and 4, the spindle 13 is threaded in part and the hubs 12, 12 are confined between a shoulder 13^a formed on the shaft and a nut 15 mounted on the threaded portion of the shaft or spindle 13.

It will be noted that when the plates 10, 10 are held together in the operative position as shown in Fig. 4, the tongues 4, 4 of the segmental members 3, 3 are forced radially outward in the peripheral recess 2 of the supporting disk 1 to the maximum extent allowed by the slots 6, and accordingly the rivets or pins 5 which secure these members within the disk 1 constitute additional means for holding the elements 3 in opposition to the centrifugal forces developed when the wheel is rotated. The members 3 are, therefore, doubly held, i. e., by the hook formation 11 immediately adjacent the periphery of the wheel and by the rivets or pins 5 within the wheel and the wheel is thus made entirely safe and practical for operation at high velocities.

The wheel in its entirety is a comparatively flexible structure. This flexibility arises from the following structural provisions and is provided for purposes to be hereinafter explained. The two corresponding disk elements 1^a, 1^a of the central supporting member 1 are constructed of relatively flexible material such as sheet metal. The central spacing member or members 1^b is formed preferably of hard fibre or the like. These parts are formed and assembled substantially as shown in order to provide a sufficient degree of flexibility to permit the elimination of any warp or distortion that may have developed in these parts. This end is attained by providing a degree of flexibility in the outward or peripheral portion with comparative rigidity in the central portion. Should any warp or distortion have occurred in these parts it is corrected when the side plates 10, 10 are forced together to expand the wheel as shown in Fig. 4. This is accomplished by the opposing pressures exerted on the supporting members 1, by the adjacent faces 12^a, 12^a of the hub members 12, 12 and by the corresponding pressures exerted by the peripheral portions of the said plates 10, 10 upon the rim elements 3, 3.

The side plates 10, 10 are also constructed of a relatively flexible material, preferably sheet metal, formed in such manner as to provide a comparatively rigid peripheral section with a degree of flexibility between the peripheral section and the hub member 12. The hub element 12 is preferably formed of a cast metal such as aluminum, on which the side plates 10, 10 are mounted substantially as shown. The peripheral rigidity of the side plates 10, 10 is obtained by providing a plurality of circumferential depressions or embossings 10^a; and further stiffening results from the angular relation of the frusto-conical portion 9 to the main body of the plate and from the beaded hook formation 11.

The above described structure combines sufficient strength and rigidity to withstand the stresses and strains imposed by the work it is designed to perform and yet is sufficiently flexible to permit it to take advantage of the forces generated by rotation which tend to cause a body to assume a position at right angles to its axis of rotation, thus compensating for any slight non-alignment of the wheel. The side plates 10, 10 are so formed that the rim elements 3, 3 are forced to their final expanded position before the inner faces 12^a of the hub members are in operative contact with the central supporting member 1 (see Fig. 3).

The above described flexibility of the side plates 10, 10 between the peripheral and hub sections permits the hubs 12 to be forced into operative contact with the central section of the supporting member 1 by means of the nut 15 on the threaded shaft 13 and the additional pressure necessary to effect this contact serves to lock more firmly the segmental rim elements 3, 3 and to align the central supporting member 1 and the segmental rim elements 3, 3 with the side plates 10, 10.

The above mentioned operative contact of the inner faces 12^a of the hub members 12, 12 with the central supporting member 1 provides a clutch action which forms a further means for transmitting the rotation of the shaft 13 to the wheel, and forms positive means for preventing any circumferential movement or slippage between the side plates 10, 10 and the structure comprising the central supporting member 1, the rim elements 3, 3, an annulus 30 hereinafter fully de-

scribed, and the means for attaching the annulus to the rim elements 3, 3.

With the aforedescribed construction and the cooperating slanting surfaces 8 and 9 of the members 3 and the plates 10, respectively, it will be apparent that when the plates are separated, as shown in Fig. 2, the members 3 are moved radially inward to the extent of the slots 6, this having the effect of reducing the circumferential measurement of the wheel, for a purpose hereinafter described.

Each of the members 3 has secured to its outer face, by suitable means such as rivets 16, a plate 17 which carries a plurality of longitudinally extending cleat members 18. The cleat members in the present instance are each substantially channel-shaped in form, and comprise a base section 19, having parallel sides 20, 20 projecting outwardly from the face of the plate 17, and lateral flanges 21, 21 projecting transversely from each upstanding side 20.

The length of the bases and sides of the members 18 is preferably somewhat less circumferentially than the length of the members 3, the ends of said bases and said sides being spaced inwardly from the respective ends of the members 3. The lateral flanges 21, 21 of each of the elements 18 are provided at one end with an extension 22 and at the opposite end with an extension 23. The lateral flanges 21 are offset adjacent the extension 23 to provide recesses 23^a therein. When the segmental elements 3, 3 are assembled in the circumferential slot 2 of the disk 1, the extensions 22, 22 of the cleat members 18 enter the offset recesses 23^a, 23^a of the next adjacent cleat member 18. Thus the lateral flanges 21, 21 form a series of parallel, continuous supporting and retaining rings for the resilient annulus 30, extending entirely around the wheel and spaced transversely thereof in the expanded as well as in the contracted position of the rim. Both in the expanded and the contracted position of the rim the extensions 22 are in contact with the upstanding sides 20, which serves as an additional means for preventing any relative transverse movement of the rim elements.

The cleat members 18, 18 are secured to the plate 17 by means of rivets 24, 24 which pass through apertures formed respectively in the plate 17 and the base portions 19 of the said cleat members 18. The lateral flanges 21, 21 are cut away as illustrated at 25 to permit the rivets 16 to be set to secure the plates 17 to the segmental elements 3, and the openings 25 on the extreme outer edges of the wheel provide space for a sufficient amount of the material of the annulus to pass through and unite the portions thereof which lie above and below the continuous rings formed by the outermost flanges 21, if and when the adjacent outer edges of the annulus should become worn away in operation at the points between the recesses 25. The bases 19 and upstanding side walls 20, 20 of each cleat member 18 are cut away as illustrated at 29, for purposes hereinafter set forth.

The body portion of each of the segmental members 3 is hollowed as illustrated at 26 in Figs. 2, 3 and 4, for the purpose of reducing the weight of the segments, and for the same purpose the inclined bottom face of each segment is hollowed as at 27 intermediate its ends for any desired distance. The heads of the rivets 16, on the underside of each segmental rim element 3, lie within this hollowed portion 26 and an integral boss or independent spacing sleeve 28 surrounds each of the rivets 16, between the plate 17 and the base of the hollow 26.

While the rim is in the contracted state illustrated in Fig. 2, I form on the outer faces of the closely assembled members 3 and around the retaining cleats 18, and preferably by the process of vulcanization, a continuous facing annulus 30 of rubber or other elastic material, having a plurality of circumferentially spaced transverse portions of relatively greater thickness as shown in Fig. 10 at 30^a, 30^a, in order to compensate for the reduction in thickness at the points of greatest stretch whereby a circular face is obtained in the expanded state. This annulus forms in effect an elastic resilient and relatively soft tire for the wheel. The supporting cleats 18 are entirely embedded in the material of this annulus, which passes through the cut out portions 29 and through the ports 29^a (see Fig. 1), formed by the extensions 22, the ends of the upright sections 20 of cleat members 18, and the ends of the plates 17 of the adjacent segments 3, and is thereby interlocked with the said cleats.

It will be here understood, that the material of the annulus is not adhesively attached to any of the parts of the wheel but is restrained by the cleat members 18 as above described from circumferential and lateral movement relative to the rim and yet is allowed to uniformly stretch circumferentially and to uniformly expand radially within certain limits.

In expanding the wheel the movement of the plates 10, 10 toward each other will expand the periphery of the wheel by moving the members 3 radially outward, as previously described, whereby the annulus 30 is stretched at the points and within the limits imposed by the structure. The cooperative telescoping action of the extensions 22 and the offset recesses 23^a of the supporting cleats 18 bridges the space formed between the adjacent ends of the segmental elements 3, 3 when these members are extended to the position illustrated in Fig. 1, and thus minimizes the tendency of the elastic facing to become grooved transversely due to the stretching thereof, and such diminution of

the thickness of the annulus 30 as results is compensated for by the additional thickness provided at these points, as shown in Fig. 10 at 30^a, 30^a.

It will be noted that the apertured retaining cleat members 18 are such as to confine closely the elastic facing to plates 17, the flanges 21, 21 preventing movement outwardly from the periphery of the wheel, and lateral movement of the annulus being precluded by the outwardly projecting side wall portions 20, 20 of the said cleat members 18. This arrangement provides holding means engaging the annulus over substantially its entire circumference without interfering with the necessary freedom of expansion and contraction.

In practice when the nut 15 is released, the plates 10 are separated transversely by the contraction of the elastic annulus 30. A continuous, endless band 31 of emery cloth, sand paper or other suitable material is then slipped over the annulus 30 and the nut 15 thereafter tightened to expand the wheel, which thereby secures the band 31 frictionally on the annulus 30. The band should be smaller in inside diameter than the normal outside diameter of the annulus 30 when the wheel is expanded, so that the band 31 will be stretched firmly on the face of the annulus 30, the body material of which will be slightly compressed by reason of the construction placed upon it by the somewhat smaller band 31.

I have found that abrasive or other bands or belts with leather, felted, knitted or woven backing have a certain degree of stretch, the greater portion of which may be readily removed by expanding the wheel after the band or belt has been fitted on the wheel in its contracted position. There still remains, however, a small degree of stretch in the band or belt which develops under use over an extended period of time. At operative speeds certain portions of the resilient annulus, particularly that portion above the laterally extending flanges 21 of the cleat members 18, due to centrifugal force, will expand, and this expansion tends to compensate for any looseness of the band incident to the residual stretch above described. The degree of residual stretch of the band and the compensatory radial expanding movement of the resilient annulus depends upon several varying factors, such as the character of the backing of the band or belt, the degree of elasticity in the annulus 30, the thickness of the annulus and the position in the annulus of the anchoring cleats 18, the speed of rotation and the diameter of the wheel. By way of illustration, satisfactory results have been obtained by employing upon a wheel of 12 inches in diameter in the expanded position, designed for operation at from approximately 1500 R. P. M. to 2000 R. P. M., a relatively elastic rubber annulus 9/32nds of an inch thick, the annulus being attached in such manner that there is approximately the same amount of material above and below the laterally extending flanges 21 of the cleat members 18. In this case the above described proportions and arrangement permits expansion adequate to compensate for the residual stretch of the band or belt.

To prevent collapsing of the plates 10, 10 when they are drawn together to expand the rim of the wheel, the plates are dished inwardly from the smaller surface of the cone frustrum toward the base thereof. Radial ribs 32, 32 are formed in the dished portions 33, 33 of the plates 10 further to stiffen the plates against collapse. At the center of each plate, where it forms contact with its respective operating collar or hub 12, the plate is offset from its normal plane to a plane coincident with the top plane 34 of the ribs 32, as shown at 35, and rivets 36 pass through the metal, forming the top plane 34 of the ribs 32 and through apertures formed in annular flanges 37 on the collars 12, to secure the plates 10 to their respective collars.

In Figs. 6 and 7, I have shown a modified form 3^a of segmental member 3 in which the hollow portion 26 is eliminated and the hollow portion 27 increased in depth as indicated at 27^a. This form of segmental member comprises a segmental plate or web 40 on which the plate 17^a bears directly, and is secured thereto by rivets 24^a, which also secure the outer cleat member 18*a* to the plate 17^a, the intermediate cleat member 18^b being secured to the plate 17^a in the usual manner by rivets 24^b. Circular depressions 41 are formed in the web 40 to provide clearance for the heads of the rivets 24^b as shown. The tongue 4^a is formed in the usual manner, and the inclined faces 8^a are formed on ribs 8^b at each side of the depending tongue 4^a and on a centrally located rib 8^c, and bind the said body web 40 and the central depending tongue 4^a into an integral unit 3^a. The cavities 27^a are formed at each side of the central tongue 4^a, and between the ribs 8^b, 8^c and 8^b. In this case the longitudinally extending side grooves 7^a, 7^a are formed between the outer extremities of the ribs 8^b, 8^b and 8^c, and the overhanging side edges of the plate portion 40.

In Fig. 8 the spacing member 1^c of the supporting disk 1 is shown as having a plurality of radially extending arms 42, which divide the peripheral recess 2 of the disk into a plurality of cavities 43 for the reception of the tongues 4 of the individual segments 3, thereby providing a spacer for the disks 1^a, 1^a to a point immediately adjacent the periphery thereof, and thereby obviating any possibility of the disks 1^a, 1^a being drawn toward each other to such an extent that the tongues 4 would bind in the recess.

Considerable modification is possible in the construction of the wheel with no departure from the essential features of the invention.

I claim:

1. In an expansible wheel the combination with a plurality of rim elements, of a central disc for movably supporting said elements, means disposed in side-by-side relation to said central disc for bodily and positively moving each of said elements simultaneously into a predetermined position and then locking the same against centrifugal force, and an annulus movable with and by said rim elements into an expanded position and anchored to said rim elements against bodily radial movement relative thereto.

2. An expansible wheel having a plurality of segmental rim-forming elements, a central supporting member for said rim elements, side plates for actuating and locking said rim elements into an expanded position, said side plates being comparatively rigid in the peripheral and hub portions and being relatively flexible intermediate said portions.

3. An expansible wheel comprising a plurality of segmental rim-forming elements, a central supporting disc, said elements being provided with tongues, means for movably securing said tongues to said supporting member providing for a predetermined relative movement there-between, means for bodily moving said elements into an expanded position, and an annulus movable into an expanded position with and by said rim-forming elements to form a continuous face on the wheel and anchored to said rim-forming elements against bodily radial movement relative thereto.

4. The combination with a plurality of elements adapted to form a rim movable into an expanded position, said elements being provided with tongues projecting from one side thereof, of a supporting member recessed to receive said tongues, means for securing said tongues in said recessed member but permitting a limited radial movement, means independent of said member for supporting and retaining said elements in said expanded position, and an annulus movable with and by said rim-forming elements into an expanded position to form a continuous face on the wheel and anchored to said rim elements against bodily radial movement relative thereto.

5. The combination with a segmental rim, movable into an expanded position, of supporting means for said rim permitting a movement thereof into said expanded position, means including a pair of side members, whereby said rim may be moved into said expanded position, while being locked between the peripheral portions of said side members, said side members being sufficiently flexible to permit a further movement thereof after the locking of said rim in its expanded position, so that said first-mentioned means may be firmly gripped between said side members.

6. In an expansible wheel, the combination with a plurality of rim elements movable into an expanded position, of a supporting member for said elements, and means for actuating said elements into, and for supporting said elements in, said expanded position, said means comprising a pair of side plates, the peripheral portions of which are formed to provide a seat for said rim elements, said means also comprising a pair of supporting hub members for said side plates, respectively, and means for actuating said hub members so that said supporting member may be clamped there-between.

7. In an expansible wheel, the combination with a plurality of rim elements movable into an expanded position, of a plurality of cleat members secured to said rim elements in such manner as to form a plurality of circularly extending recesses disposed in side-by-side relation and interconnected at circumferentially spaced points, said cleat members being so formed that at least one of said recesses is provided with overhanging wall portions spaced from the bottom of said last mentioned recess.

8. An anchor for an annulus element of an expansible wheel, comprising an apertured wall portion, extending circumferentially of and substantially at right angles to, the circular face of the wheel, said anchor also having a transversely extending wall portion and at least one opening through which the material of said annulus may pass.

9. An anchor for the annulus element of an expansible wheel, comprising a pair of spaced circularly extending wall portions, disposed substantially at right angles to the face of the wheel, a pair of spaced base portions interconnecting said side wall portions and a pair of overhanging flange portions for said first mentioned wall portions, extending circumferentially of the wheel, said overhanging flange portions being disposed in radially spaced relation to said base portions, one of said overhanging portions being offset to form a recess at one end thereof and elongated at the other end thereof to provide an interlocking portion.

10. An expansible rim, comprising a plurality of rim segments, an anchor mounted on said segments, adapted to secure a resilient annulus in position, at least one of said anchors comprising a wall portion, extending circumferentially of and substantially at right angles to the circular face of the wheel, and an overhanging circumferentially flanged portion, the free edge of which is in spaced relation to the side of the wheel, said free edge being provided with at least one recess to receive the material of said annulus.

11. In an expansible wheel, the combination with a segmental rim, movable into an expanded position, of means whereby said rim may be moved into said expanded position, a resilient annulus seated on said rim, and means for anchoring said annnulus on said rim against bodily radial and bodily circumferential movement relative to said rim.

12. Apparatus of the character described, comprising a segmental rim, a pair of side members cooperating with the segmental rim for expanding said rim, a resilient annulus, and means carried by said segmental rim for anchoring said annulus against bodily radial and bodily circumferential movement relative to said rim.

13. A wheel, comprising a plurality of segmental elements forming a rim, a pair of side members, a supporting member for said rim positioned intermediate said side members, means coacting with certain of said elements whereby said rim may be moved into an expanded position, a plurality of retaining plates mounted on said rim, and a resilient annulus seated on said retaining plates and adapted to be secured thereto by anchor means.

14. A wheel of the character described, comprising a segmental rim, means for actuating said segmental rim into an expanded position, said segments being circularly separable while being actuated into said expanded position, and a resilient annulus seated on said expansible rim and so anchored thereto at a plurality of circularly spaced points as to permit the stretching of said annulus between said points upon said relative movement.

15. A segmental wheel comprising a rim, movable from a contracted position into an expanded position, a resilient annulus seated on said rim, and means for so anchoring said annulus that the portion thereof between successive segments is stretched more than other portions, said portions of greatest stretch being of increased thickness with respect to said other portions.

16. A resilient annulus for an expansible rim of a wheel comprising a plurality of circularly spaced portions of increased thickness.

17. A wheel of the character described, comprising a rim movable into an expanded position, a resilient annulus surrounding said rim, a working band surrounding said annulus and having a residual stretch when said rim has been moved into its expanded position, means on said rim for anchoring said annulus against bodily radial movement relative to said rim, but permitting an increase in the diameter thereof sufficient to compensate for increases in the diameter of said working band due to said residual stretch when said wheel is operated at normal speeds.

18. An expansible wheel having a plurality of rim-forming elements, side plates for actuating and locking said rim elements into an expanded position, said side plates being comparatively rigid in the peripheral and hub portions and being relatively flexible intermediate said portions.

19. An expansible wheel having a plurality of rim-forming elements, side plates for actuating and locking said rim elements into an expanded position, said side plates being comparatively rigid in the peripheral and hub portions and being relatively flexible intermediate said portions to such an extent that when the wheel is rotated at a predetermined rate of speed self alignment thereof is attained.

20. An expansible rim comprising a plurality of segmental rim-forming elements, a resilient annulus mounted on said segments, means for movably supporting said rim elements, means for moving said rim elements into an expanded position, means on said segments for anchoring said annulus against bodily radial movement and bodily circumferential movement relative to said rim, portions of said annulus lying adjacent the respective anchoring means being movable circumferentially relative to said anchoring means, while the rim is being expanded.

21. A wheel comprising a plurality of segmental elements forming the rim of the wheel, a flexible member for movably supporting said segmental elements, a pair of flexible side plates respectively disposed at the opposite sides of said flexible supporting member and adapted to move said segmental elements radially relative to said supporting member, and means for limiting the said radial movement of said segmental elements, the flexibility of said supporting member and said side plate permitting the wheel to assume a plane at right angles to the axis of rotation of the wheel when a predetermined working speed is attained.

22. An expansible wheel comprising a plurality of movable rim-forming elements, means for movably supporting said rim elements, means for bodily moving said elements radially into an expanded position, means for locking said rim elements in said expanded position, a resilient annulus encircling said rim elements and movable thereby into an expanded position, to form a continuous face on the wheel, and means for anchoring said annulus to said rim elements against bodily radial movement relative thereto.

23. An expansible wheel comprising a plurality of movable rim-forming elements, means for movably supporting said rim elements, means for bodily moving said elements into an expanded position, means for locking said rim elements in said expanded position, a resilient annulus encircling said

rim elements and movable thereby into an expanded position to form a continuous face on said wheel, and means for anchoring said annulus on said rim elements against bodily radial movement relative thereto, the anchor means of adjacent rim elements interlocking one with the other to support the annulus intermediate said rim elements.

24. An expansible wheel comprising a plurality of movable rim-forming elements, means for movably supporting said rim elements, means for bodily moving said elements into an expanded position, means for locking said rim elements in said expanded position, a resilient annlus encircling said rim elements and movable thereby into an expanded position, and a plurality of anchor members for said annulus mounted respectively on said rim elements and forming a plurality of interconnected circumferentially extending undercut grooves for maintaining said annulus against radial movement.

25. An expansible wheel comprising a plurality of movable rim-forming elements, means for movably supporting said rim elements, means for bodily moving said elements into an expanded position, means for locking said rim elements in said expanded position, a resilient annulus encircling said rim elements and movable thereby into an expanded position, and a plurality of cleat members mounted respectively on said rim members, said cleat members being adapted to form a plurality of substantially parallel laterally spaced circumferentially extending undercut recesses, to maintain said annulus against bodily radial movement adjacent recesses being interconnected at circumferentially spaced points to maintain said annulus against bodily circumferential movement.

26. An expansible wheel comprising a plurality of movable rim-forming elements, means for movably supporting said rim elements, means for bodily moving said rim elements into an expanded position, means for locking said rim elements in said expanded position, a resilient annulus encircling said rim, anchor means for said annulus secured to said rim elements and imbedded in said annulus, said anchor means having openings through which portions of the resilient annulus extend, said portions serving to integrally unite those portions of the annulus positioned adjacent opposite sides of the anchor means, whereby the annulus forms a continuous face on the wheel and is held against bodily movement both radial and circumferential with respect to the rim elements at all times.

27. An expansible wheel comprising a plurality of movable rim-forming elements, means for movably supporting said rim elements, means for bodily moving said elements into an expanded position, means for locking said rim elements in said expanded position, a resilient annulus movable with said rim elements into an expanded position, and means for anchoring said annulus to said rim elements against bodily radial and circumferential movement therebetween, said anchor means being imbedded in and surrounded by said annulus.

28. Apparatus of the character described, comprising a plurality of radially extending and radially movable elements, a pair of side members co-operating with said elements for radially moving said elements to an expanded position and locking them therein, a resilient annulus encircling said elements and movable thereby into an expanded position to form a continuous face on the wheel, and means for anchoring said annulus against bodily radial and bodily circumferential movement relative to said elements.

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