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J. M. MASON

1,939,711

EXPANSIBLE WHEEL

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Fig. 1.

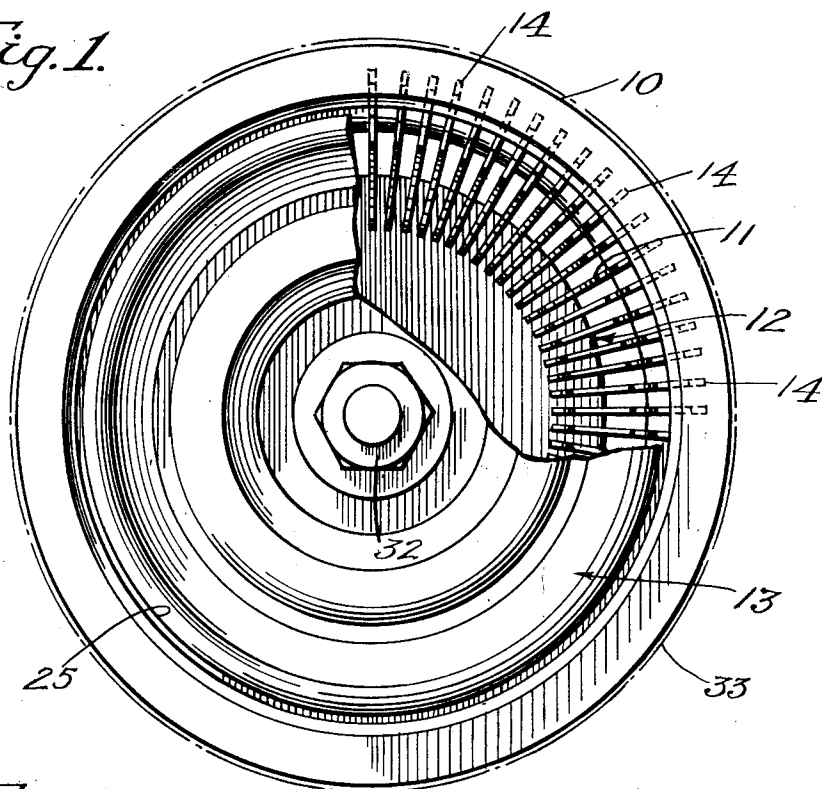


Fig. 2.

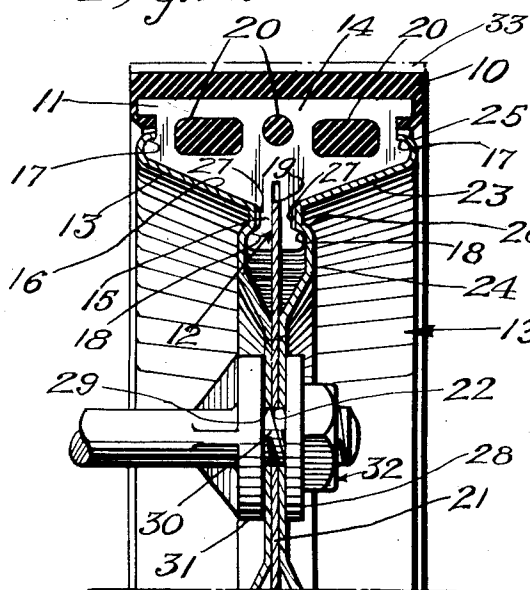
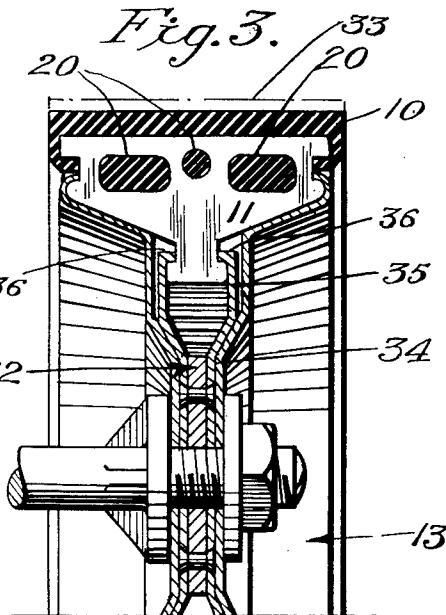


Fig. 3.



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UNITED STATES PATENT OFFICE

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EXPANSIBLE WHEEL

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mesne assignments, to Kennard N. Ware,
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Application December 24, 1931
Serial No. 583,045

5 Claims. (Cl. 51—190)

This invention relates to improvements in expansible wheels and more particularly to expansible wheels of the type set forth in my prior application filed February 28, 1928, Serial No. 257,690 for Expansible wheel.

In the application above identified, I have described a type of resilient wheel including a resilient annulus mounted upon an expansible circular supporting structure, the structure being bound together by means including elements for expanding the annulus to cause it to fit within a sanding, buffing or other treating band placed about the annulus.

One object of the invention is the production of a device of this character in which the expansion-providing means is of such nature that the annulus is substantially uniformly anchored and expanded throughout its length and there is no necessity for balancing, grinding or otherwise treating the outer surface of the tire after expansion.

A further object of the invention is to provide a structure of this character which may be relatively cheaply manufactured, which will be durable and efficient in service and a general improvement in the art.

These and other objects I attain by the construction shown in the accompanying drawing wherein, for the purpose of illustration, I have shown a preferred embodiment of my invention and wherein:

Figure 1 is a side elevation of an expansible wheel constructed in accordance with my invention, a portion of the side plate being broken away to show the interior construction;

Figure 2 is a fragmentary vertical sectional view through the assembled wheel; and

Figure 3 is a similar section through a slightly modified construction.

Referring now more particularly to Figures 1 and 2 of the drawing, the wheel comprises an expansible peripheral annulus 10, an annular series comprising a multiplicity of rim-forming elements or supports 11 for said annulus, a guide 12 for the supports 11, and a combined expanding and clamping means 13 for expanding the annulus 10 by radially moving the supports 11 thereof and for clamping the supports 11 in the expanded position of the annulus.

The annulus 10 preferably consists of resilient rubber of a good grade and has embedded therein the rim-forming head portions 14 of the supports 11. The supports 11 each comprises a transversely-extending radially-directed flat plate formed to provide the head portion 14 here-

inbefore referred to and an inward extension or neck 15 which is connected to the head portion at the center thereof. The lower faces of the head portion at opposite sides of the neck portion converge inwardly upon this neck portion as at 16 and the end faces of the head portion are notched to provide outwardly-facing shoulders 17. The inner ends of the neck portions have at opposite faces thereof projections providing outwardly-facing shoulders 18. The purpose of the shoulders 17 and 18 will hereinafter appear.

The neck portion has formed therein a central slot 19 opening through its inner end while the head portion has formed therein relatively large ports 20, the ports 20 serving to permit passage of relatively large portions of the body of the annulus 10 so that the head portions are firmly anchored in the annulus and a substantially radial bearing surface is provided between the annulus and head portion of the support despite the fact that the support is formed from a relatively thin piece of sheet metal or other suitable material. Supports 11 should have such spacing that in the expanded position of the wheel annulus there is no undue flattening between adjacent supports. In a wheel of 8" in diameter, a spacing of approximately $\frac{1}{3}$ " between the outer portions of the supports has been found satisfactory.

The guiding structure for the supports 11 comprises a plate 21 having formed therein an axial opening 22. It will be obvious that supports 11 are capable of radial movement upon the plate 21 but will be held against canting so that the heads 14 will always be in predetermined relation to the axis of the plate 21 and, accordingly, the annulus 10 will be free from unevenness resulting from canting of these plates. It will be noted that plate 21 through engagement with the runner ends of slots 19 serves as a means for limiting contraction of the annulus 10.

The expanding and clamping structure comprises a pair of dished side plates each including a conic side wall 23 and a bottom wall 24. The side wall 23 is inclined to the axis of the side plate with the same inclination as the inner edges of the heads 14 and has at its outer extremity a hooked flange 25 adapted to engage over and tightly fit against the shoulders 17 of the supports 11 when the side wall 23 is fully seated against the faces 16 and has forced the supports 11 outwardly to the greatest possible extent. The bottom wall 24 is pressed to form a groove 26 the inner wall of which, at the time when the

flange 25 is engaged with the shoulders 17, similarly engages against the shoulders 18. The central portion of the bottom of each side plate is preferably reinforced as indicated at 28 and has formed therein an axial opening 29. The openings 29 of the side plates, and 22 of the guide plate 21 permit passage of a driving spindle 30 having fixed and movable clamping elements indicated at 31 and 32 for shifting the side plates inwardly to expand the support series and the annulus and to clamp the side plates upon the support series and upon the plate 21. The side plates as in the construction illustrated in the prior application above mentioned have their central portions slightly resilient so that they may, after locking the rim elements firmly in position, be caused to clamp upon plate 21. It will be obvious that the conic side walls 23 of the side plates will, by their engagement with the converging faces 16 of the head portions, cause these head portions to be forced outwardly against the yielding resistance of annulus 10 until proper locking of the heads is secured.

It will be obvious that an expansible wheel of this character may be readily produced by simply arranging the support series 11 and the guiding plate 21 thereof in a mold in which the resilient annulus is to be formed and then molding the annulus, with the result that the material forming the annulus passes through the ports 20 forming relatively heavy bonds between the supports and the annulus. It will be obvious that by employing a multiplicity of the supports 11 the variation resulting in the circumference from expansion of the support series and consequent expansion of the annulus will be slight enough so that it will not materially affect the trueness of the periphery of the wheel so that any necessity for finishing the annulus is eliminated. It will, of course, be understood that it is contemplated to employ a wheel of this character in combination with treating bands 33 within which the wheel is expanded so that slight inequalities resulting from the molding or otherwise, will be compensated for and rendered unnoticeable in the structure as actually employed. In the form shown in Figure 3, the guiding structure comprises an assembly of two similar plates 34 between the parallel peripheral portions 35 of which the neck portions 15 extend. These peripheral portions have inturned flanges 36 against which the shoulders 18 of the neck engage in the expanded wheel. This, of course, eliminates the necessity for the grooves 26 of the side plates which are accordingly provided simply with the conic portions 23 and their hook flanges 25. Flanges 36 by their engagement with the head at the junction of the head with the neck will limit contraction of the annulus when the side plates are withdrawn.

Since the arrangement hereinbefore described is capable of certain modifications and rearrangements without in any manner departing from the

spirit of my invention, I do not wish to be understood as limiting myself thereto except as herein-after claimed.

I claim:

1. Apparatus of the type described comprising a rim including a multiplicity of concentric, transversely-extending, radially movable flat plates; a resilient annulus in which the outer ends of said plates are embedded and anchored, and a pair of side members co-operating with said plates for expanding the rim and anchoring the inner ends of said plates.

2. Apparatus of the type described comprising a rim including a multiplicity of concentric, transversely-extending, radially movable flat plates; a resilient annulus in which the outer ends of said plates are embedded and anchored; a pair of side members co-operating with said plates for expanding the rim, said plates including inwardly extending portions adapted to be engaged by said side members, and means engaging said inwardly-extending portions preventing displacement of the plates in the general direction of the axis of the wheel.

3. Apparatus of the type described comprising a rim including a multiplicity of concentric, transversely-extending, radially movable flat plates; a resilient annulus in which the outer ends of said plates are embedded and anchored; a pair of side members co-operating with said plates for expanding the rim, said plates including inwardly extending portions adapted to be engaged by said side members, and means engaging said inwardly-extending portions preventing displacement of the plates in the general direction of the axis of the wheel and limiting radial contraction of the rim when the side members are withdrawn to permit contraction of the rim.

4. Apparatus of the type described comprising a rim including a multiplicity of concentric, transversely-extending, radially movable flat plates; a resilient annulus in which the outer ends of said plates are embedded and anchored; a pair of side members co-operating with said plates for expanding the rim, said plates including inwardly extending plane end portions, and means engaging said inwardly-extending portions preventing displacement of the plates in the general direction of the axis of the wheel and limiting radial movement of the plates during contraction or expansion of the rim.

5. Apparatus of the type described comprising a rim including a multiplicity of concentric, transversely-extending, radially movable flat plates; the outer ends of said plates having circumferentially directed openings formed therein, an elastic annulus molded about said rim and having portions extending through the openings of said plates and a pair of side members co-operating with said plates for expanding the rim and anchoring the inner ends of said plates.

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