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TIRE-CASING WITH INTERLOCKING TREAD-PORTION

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Fig. 1.

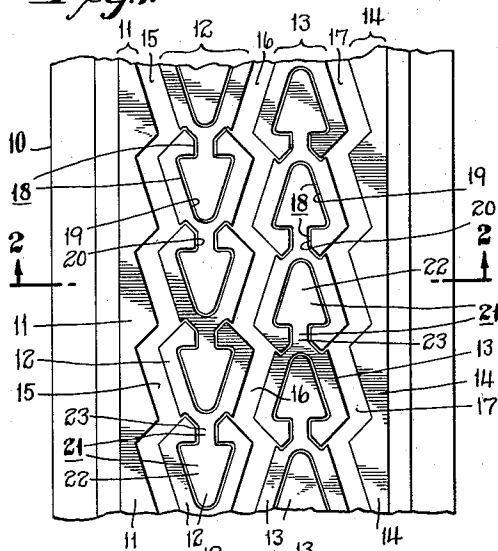


Fig. 3.

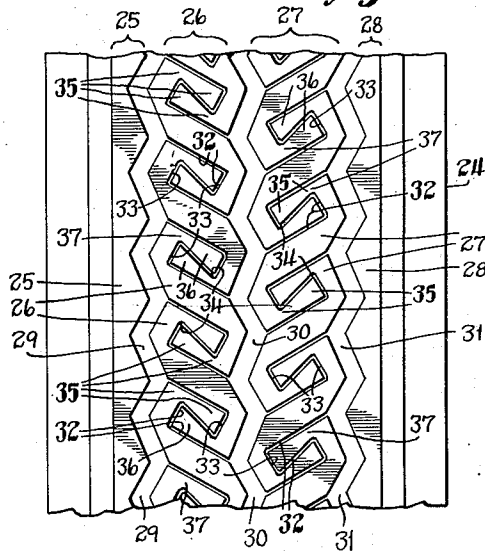


Fig. 2.

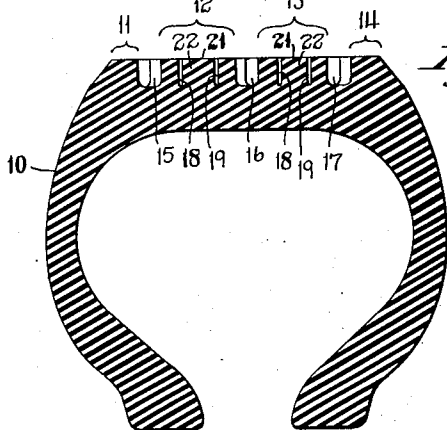


Fig. 4.

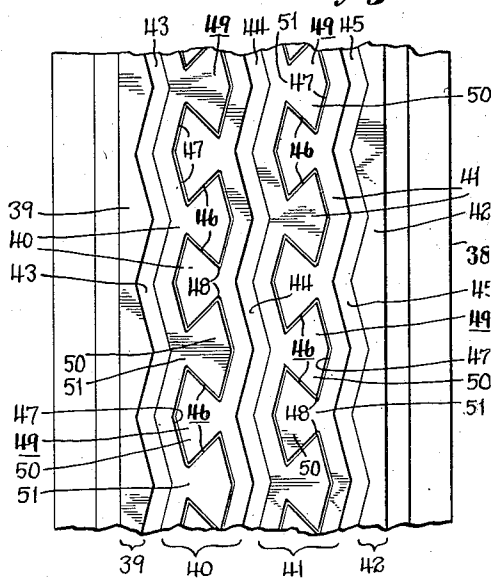
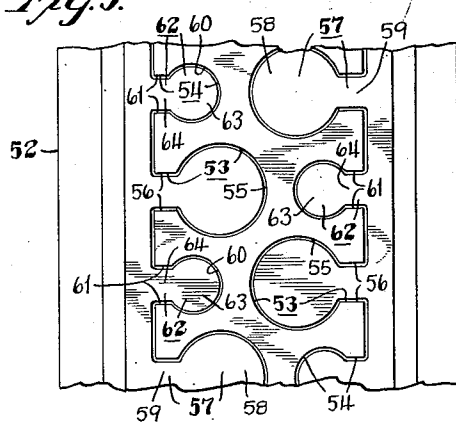


Fig. 5.



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UNITED STATES PATENT OFFICE

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TIRE-CASING WITH INTERLOCKING
TREAD-PORTION

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The present invention relates to improvements in tire-casings and contemplates the provision of tire-casings having interlocking tread-portion or elements upon its road-engaging surface.

One of the main objects of the present invention is to provide a tire-casing having a superior construction and arrangement of tread-portion or elements whereby a high degree of traction is combined with substantial uniformity of wear resistance.

Another object of the present invention is to provide a tire-casing of the character referred to having a superior construction and arrangement of tread-portion or elements whereby a high degree of traction is combined with substantially noiseless operation.

A further object of the present invention is to provide a tire-casing having a multiplicity of separate tread-portion or elements but in which a high degree of stability is provided.

Other objects and advantages will appear to those skilled in the art from the following, considered in conjunction with the accompanying drawings.

In the accompanying drawings, in which certain modes of carrying out the present invention are shown for illustrative purposes:

Fig. 1 is a broken view looking toward the outer periphery of a tire-casing constructed in accordance with the present invention;

Fig. 2 is a transverse sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary view similar to Fig. 1 but showing another form which the present invention may assume;

Fig. 4 is a view similar to Figs. 1 and 3, but illustrating still another form which the interlocking tread-portion of the present invention may assume; and

Fig. 5 is a view similar to Figs. 1, 3 and 4 and showing a still further form which the road-engaging surface of a tire-casing may assume in accordance with the present invention.

In Figs. 1 and 2, there is shown a tire-casing or tire-shoe generally designated by the reference character 10 and which structurally may assume any one of the wide variety of forms, as is well known in the art, and in which the fabric reinforcements, cables, etc. are omitted in Fig. 2 for clarity of illustration. The said tire-casing, in the instance shown, is formed upon its periphery or road-engaging surface with four (more or less) ribs 11, 12, 13 and 14 extending in a circumferential direction as indicated in Fig. 1, and it will be understood that the said ribs are extended

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completely around the tread-portion of the tire-casing in the usual manner of tire constructions.

The ribs 11 and 12 are separated from each other by a relatively wide zigzag or serpentine groove or channel 15 also extending generally in a circumferential direction. In turn, the ribs 12 and 13 are separated from each other by a groove 16 similar to the groove 15 just referred to. A groove 17 similar to the previously described grooves 15 and 16 serves to separate the ribs 13 and 14. These grooves are of more or less standard width for any particular type or size of tire. Obviously and as is well known in the art, the grooves 15, 16 and 17 just referred to may be straight grooves rather than zigzag or serpentine grooves as shown.

Each of the ribs 12 and 13 is formed with a plurality of tread-coupling recesses, each generally designated by the reference character 18, and in the instance shown of substantially arrow-head-shaped configuration. Each of the said tread-coupling recesses has a relatively large coupling-socket portion 19 opening through the periphery or outer face of the tread. Each of the said tread-coupling recesses also includes a contracted throat-portion 20 communicating with the said coupling-socket portion 19 and, like the same, opening through the outer face of the tread.

Located within each of the tread-coupling recesses 18 above referred to, is one of a plurality of similar tread-coupling lugs, each generally designated by the reference character 21. Each of the said lugs includes a bulbous coupling-head portion 22 conforming in outline to the outline of the coupling-socket portion 19 in which it is located. Each of the said tread-coupling lugs 21 also includes a contracted neck-portion 23 which extends through the adjacent one of the throat-portion 20, and which is integral with its complementary coupling-head portion in the direction paralleling the road-engaging surface of the tire-casing.

Each tread-coupling lug 21 and the material surrounding each of the tread-coupling recesses 18 are integral and continuous with the rest of the tire-casing in a radial direction, but each tread-coupling lug 21 is, throughout the major portion of its outline, separate from, but substantially contiguous with the surrounding portions of the tread in directions paralleling the outer or road-engaging surface of the tire-casing 10. Preferably, the gap or slot between the lateral walls of the tread-coupling recesses 18 and their respective complementary tread-coupling lugs 21 is relatively narrow and may, for instance,

be in the order of $\frac{1}{64}$ of an inch, though both wider and narrower spacings are contemplated. These slots, commonly called traction-slots, must be narrow enough to permit ready engagement between adjacent tread-elements whenever they are in contact with the road when the tire is in use on a vehicle. Traction-slots are thus distinguished from grooves in that there is little or no appreciable volume of rubber removed from between adjacent elements of the tread. The term "traction-slot" as used in the claims is, therefore, to be construed in the light of the above definition. It will be noted that the interlocking tread-elements which make up the circumferential ribs are defined, within each rib, by the traction-slots, while the margins of the tread elements adjacent the edges of each rib are defined by the grooves between the ribs. Furthermore, the term "contiguous" is used herein to mean that adjacent tread-portions or lugs are in close proximity with each other and may or may not actually touch depending on the width of the slit between them and the forces exerted on the tread under various conditions. In any event, as stated above, when the tread-portions are subjected to the normal traction-stresses, adjacent portions will readily touch in interlocking engagement with each other.

Consequently, the interlinking or coupling of the various tread-portions, in the manner above described and as indicated in Figs. 1 and 2, provides maximum traction and flexibility, while still providing mutual support after only relatively minute increments of movement between the various interlocked tread-portions or tread-elements. Furthermore, the construction and arrangement of parts substantially eliminates uneven wear and objectionable noise.

The elimination of noise is largely attained by the gradual transition in stiffness provided by the interlocking features of the tread-portion of the tire-casing, and irregular wear is substantially eliminated since the interlocking features restrict movement between the elements, which is a recognized cause of heel-and-toe wiping action.

Furthermore, in quick stopping, starting, or in case of tendencies to sidewise skidding of the vehicle on which the tire is mounted, the interlocking tread-elements provide mutual support and a maximum amount of skid-resisting edges.

The tire-casing or tire-shoe 24 indicated in Fig. 3 is basically the same as that shown in Figs. 1 and 2, though the interlocking elements of its tread-portion are of slightly different configuration. In Fig. 3, the tire-casing 24 is formed with four (more or less) annular ribs 25, 26, 27 and 28, though the ribs 26 and 27 are each, in effect, compound ribs, as will be presently described.

The rib 25 is separated from the adjacent rib 26 by a relatively wide groove or channel 29 and the rib 26 is separated from the rib 27 by a similar, but centrally located, groove or channel 30. In turn, the rib 27 is separated from the adjacent rib 28 by a groove or channel 31 similar to the previously described grooves or channels 29 and 30.

Each of the intermediate ribs 26 and 27 is provided with a plurality of tread-coupling recesses each generally designated by the reference character 32 and each comprising a relatively large (in a lateral direction) coupling-socket portion 33 and a contracted throat-portion 34.

Located within each tread-coupling recess 32 above referred to is one of a plurality of similar tread-coupling lugs each generally designated by

the reference character 35. Each of the said lugs includes a coupling-head portion 36 conforming in outline to the outline of the coupling-socket portion 33 in which it is located. Each of the said tread-coupling lugs 35 also includes a contracted neck-portion 37 extending through the adjacent one of the throat-portions 34 and which is integral with its complemental coupling-head portion in the direction paralleling the road-engaging surface of the tire-casing 24.

As was described in connection with the showing of Figs. 1 and 2, each tread-coupling lug 35 and the material surrounding the same are integral and continuous with the rest of the tire-casing in a radial direction. Each tread-coupling lug is, however, throughout the major portion of its outline, separated from, but substantially contiguous with the surrounding portions of the tire-casing tread in directions paralleling the road-engaging surface of the tire-casing.

The various elements of both of the ribs 26 and 27 are yieldingly interlocked with each other due to the fact that the respective coupling-head portions 36 of the tread-coupling lugs 35 are larger than the throat-portions 34 of the tread-coupling recesses 32. The tire-casing of Fig. 3 possesses all of the basic characteristics referred to in connection with the description of the showing of Figs. 1 and 2. It should be noted that in the treads shown in both Figs. 1 and 3, the traction-slots forming the interlinking tread lugs extend completely across the circumferential ribs. In Fig. 3 the traction-slots form S-shaped tread-elements which are linked together in chain-like fashion to form ribs 26 and 27.

The tire-casing 38 shown in Fig. 4 is structurally the same in all basic respects as the previously described tire-casings 10 and 24, though here again the interlocking portions or elements of its tread-portion are slightly different in configuration.

In Fig. 4, the tire-casing 38 is shown as formed with four (more or less) longitudinal ribs 39, 40, 41 and 42, though as will presently appear, the ribs 40 and 41 are, in effect, compound ribs, though the portions thereof are interlocked with each other.

The ribs 39 and 40 are separated from each other in the instance shown by a relatively wide groove or channel 43, indicated at the left of Fig. 4. The respective compound ribs 40 and 41 are, in turn, separated from each other by a similar groove or channel 44 located substantially centrally of the tire-casing. The rib 41 is, in turn, separated from the rib 42 by a groove or channel 45 similar to the previously described grooves or channels 43 and 44.

Each of the ribs 40 and 41 is formed with a plurality of tread-coupling recesses each generally designated by the reference character 46 and, in the instance shown, of substantially diamond-shaped configuration. Each of the said tread-coupling recesses includes a relatively large or bulbous coupling-socket portion 47 and a contracted throat-portion 48, both opening through the outer face or road-engaging surface of the tire-casing 38.

Located within each of the tread-coupling recesses 46 above referred to is one of a plurality of similar tread-coupling lugs, each generally designated by the reference character 49. Each of the said lugs includes a substantially diamond-shaped coupling-head portion 50 conforming in outline to the outline of the coupling-socket por-

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tion 47 in which it is located. Each of the said tread-coupling lugs 49 also includes an integral contracted neck-portion 51.

The construction illustrated in Fig. 4 possesses all of the basic characteristics described in connection with the preceding forms of the present invention and repetition is not required.

The tire-casing 52 illustrated in Fig. 5 may be basically the same as the previously described tire-casings, but in the present instance the road-engaging surface is not provided with the relatively wide circumferential grooves or channels of the preceding structures.

The tread-portion of the tire-casing 52 is formed with a plurality of relatively large keyhole-shaped tread-coupling recesses, each generally designated by the reference character 53, and a plurality of relatively small similarly shaped tread-coupling recesses 54.

Each tread-coupling recess 53 includes a bulbous coupling-socket portion 55 and a contracted throat-portion 56.

Located within each of the tread-coupling recesses 53 above referred to is one of a plurality of similar keyhole-shaped tread-coupling lugs, each generally designated by the reference character 57. Each of the said lugs includes a bulbous coupling-head portion 58 conforming in outline to the outline of the coupling-socket portion 55 in which it is located. Each of the tread-coupling lugs 57 also includes a contracted neck-portion 59 extending through the adjacent one of the throat-portions 56 and which is integral with its complemental coupling-head portion 58 in the direction paralleling the road-engaging surface of the tire-casing.

The smaller tread-coupling recesses 54 previously referred to have substantially the same configuration as the larger tread-coupling recesses 53. Each of the smaller tread-coupling recesses 54 includes a relatively large bulbous coupling-socket portion 60 and a contracted throat-portion 61.

Located within each of the tread-coupling recesses 54 above referred to is one of a plurality of similar keyhole-shaped tread-coupling lugs, each generally designated by the reference character 62. Each of the said lugs includes a bulbous coupling-head portion 63 conforming in outline to the outline of the coupling-socket portion 60 in which it is located.

Each of the said tread-coupling lugs 62 also includes a contracted neck-portion 64 extending through the adjacent one of the throat-portions 61 and integral with its complemental coupling-head portion 63.

As was suggested hereinabove in connection with the description of the embodiment of the invention illustrated in Fig. 4, the ribs shown in Figs. 4 and 5 are, in effect, compound ribs made up of a plurality of continuous sub-ribs each extending completely around the periphery of the tire. These so-called sub-ribs, therefore, have laterally extending tread-lugs comprising relatively large head portions and contracted neck portions which interlock with corresponding portions of adjacent sub-ribs to form the compound ribs 40 and 41 of Fig. 4 and the single compound rib shown in Fig. 5. The ribs 40 and 41 of Fig. 4 are each made up of two sub-ribs, while the compound rib of Fig. 5 is made up of three such sub-ribs.

The tire-casing of Fig. 5, with its interlocking tread-portions, possesses all of the basic char-

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acteristics referred to in connection with the showing of the preceding figures, as will be obvious from the foregoing.

The invention may be carried out in other specific ways than those herein set forth without departing from the spirit and essential characteristics of the invention, and the present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

I claim:

1. A tire having a tire-tread comprising a circumferential rib having a plurality of sequentially arranged substantially contiguous tread-elements defined within said rib by traction-slots, each of said tread-elements having a relatively large head portion and an adjacent contracted neck portion, said portions being constructed and arranged to interlock with corresponding portions of adjacent tread-elements, the width of said traction-slots being narrow enough to permit ready engagement between adjacent tread-elements whenever they are in contact with the road when the tire is in use on a vehicle.

2. A tire having a tread as defined in claim 1 which has a plurality of said circumferential ribs separated by grooves of standard width, said traction-slots being of relatively narrow width compared to the width of said grooves.

3. A tire having a tread as defined in claim 1 wherein the width of said traction-slots is on the order of one sixty-fourth of an inch.

4. A tire having a tire-tread comprising a circumferential rib having a plurality of sequentially arranged substantially contiguous tread-elements defined by traction-slots in said rib, each tread-element having portions thereof constructed and arranged for interlocking engagement with adjacent tread-elements in said rib, said tread-elements being of substantially S-shaped configuration and interlinked in chain-like fashion.

5. A tire having a tire-tread comprising a circumferential rib having a plurality of sequentially arranged substantially contiguous tread-elements defined by traction slots in said rib, said tread-elements being of substantially S-shaped configuration, each of said elements having a relatively large head portion and an adjacent contracted neck portion interlocked in chain-like fashion with corresponding portions of an adjacent tread-element.

6. A tire having a tire-tread as defined in claim 5 wherein each end of said S-shaped elements is provided with a said head portion and a said neck portion.

7. A tire having a tire-tread comprising a circumferential rib having a plurality of sequentially arranged tread-elements each comprising a socket-forming portion and a tread-lug, said tread-lug comprising a relatively large head portion and a contracted neck portion which is integral with said socket-forming portion, each tread-lug being surrounded throughout a major portion of its outline by one of said socket-forming portions and separated therefrom by traction-slots in said rib, the width of said traction-slots being narrow enough to permit ready engagement between said lugs and said socket-forming portions whenever they are in contact with the road when the tire is in use on a vehicle.

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8. A tire having a tire-tread as defined in claim 7 wherein said tread-lugs are of substantially arrow-head configuration.

9. A tire having a tire-tread as defined in claim 7 wherein said head portion is of substantially diamond-shaped configuration.

10. A tire having a tire-tread as defined in claim 7 wherein said tread-lugs are of substantially key-hole shaped configuration.

11. A tire having a tire-tread as defined in claim 7 wherein said tread-lugs are of substantially bulbous configuration, the width of said traction-slots being on the order of one sixty-fourth of an inch.

12. A tire having a tire-tread as defined in claim 7 wherein said head portion is of substantially polygonal configuration.

13. A tire having a tire-tread comprising a circumferentially extending compound rib made up of a plurality of continuous sub-ribs extending circumferentially around the entire circumference of the tire, said sub-ribs being separated by traction-slots which are narrow enough to per-

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mit ready engagement therebetween in the section of the tire which is in engagement with the road when the tire is in use on a vehicle, said circumferentially extending sub-ribs having tread-lugs extending laterally within said compound rib, each tread-lug comprising a relatively large head portion and an adjacent contracted neck portion, said portions being constructed and arranged to interlock with corresponding portions of an adjacent sub-rib.

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