Dec. 29, 1953 T. GLYNN ET AL 2,664,317

COMPOSITION ROLLER SKATE WHEEL

Filed April 11, 1951

FIG. 1.

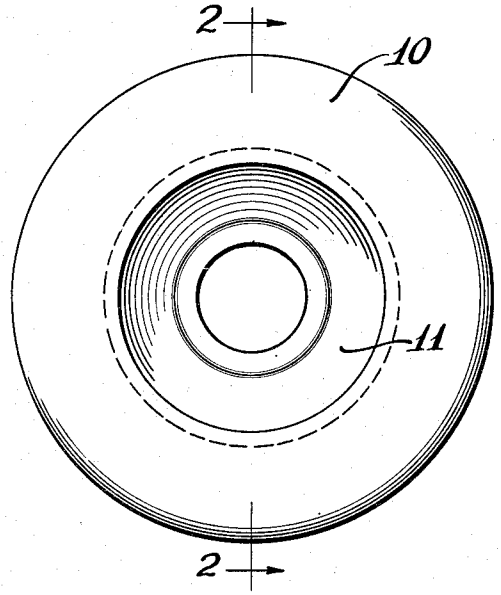
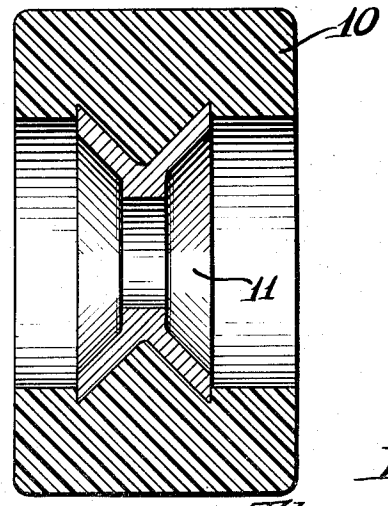


FIG. 2.



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Patented Dec. 29, 1953

2,664,317

UNITED STATES PATENT OFFICE

2,664,317

COMPOSITION ROLLER SKATE WHEEL

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Application April 11, 1951, Serial No. 220,540

1 Claim. (Cl. 301—5.3)

1

This invention relates to improvements in roller skate wheels and refers particularly to a composition roller skate wheel or rim portion thereof which has desirable properties of hardness, friction, resilience and abrasion resistance.

Roller skate wheels for use upon wooden or "Masonite" floors have heretofore been constructed of hard wood, usually fine grained maple. This type of wheel has many defects, among which may be mentioned that it is susceptible to permanent deformation as a result of impacts received and as a result of normal wear. In addition, such wheels do not have desirable frictional characteristics to afford the skater the desired control and comfort when skating. These undesirable features of the usual wooden wheel are detrimental generally in roller skates and are particularly detrimental where the skates are used by roller skate racers and those giving skating exhibitions.

In the present invention a roller skate wheel, or at least the rim or tire of the wheel which comprises the contact surface with the skating floor, is contemplated which has such characteristics as to avoid the disadvantages inherent in the usual wooden wheel.

Wooden wheels heretofore proposed usually have frictional characteristics, that is, as to sliding upon the skating floor parallel to the axis of rotation of the wheel, which are not comparable to our wheel, being about 15% lower than the frictional characteristics of the wheels comprising the present invention, and due to the low abrasive resistance of the usual wooden wheel and the fact that a wooden wheel is non-homogeneous, that is, it has grain, such sliding usually results in flat spots upon the wheel periphery.

In the present invention, the wheel possesses desired frictional characteristics, and being homogeneous and having high abrasive resistance, sliding does not result in flat spots upon the wheel periphery.

Another undesirable feature of wooden roller skate wheels resides in their tendency when subjected to an impact force, to deform and remain in a set deformed condition.

In the wheel of the present invention, although it is not brittle and will not shatter when subjected to impacts, it will deform when subjected to an impact force, but its characteristics of restitution are such that it instantly restores itself to its original shape and cannot be permanently set in deformed condition by the impacts which may be met with in normal use.

Composition wheels for roller skates have

2

heretofore been proposed, but, in all cases known to us, the compositions reflect an inadequate knowledge of the desirable characteristics which should be possessed by a roller skate wheel. Composition wheels heretofore proposed are extremely hard and brittle. Being excessively hard, in order to have any appreciable sliding friction, an excessive amount of harsh abrasive has been employed. The brittleness of composition wheels known to us heretofore has also been so high that they readily chip or crack when subjected to impacts and in addition lack that degree of resilience which affords the skater comfort and control.

In carrying out the present invention a mix is prepared comprising generally a binder, a filler, a friction influencing agent and such modifying agents as vulcanizing agents and accelerators. The ingredients are selected and so treated as to produce a resulting product which has physical characteristics which we have found are desirable for a roller skate wheel. One of the most important characteristics of a desirable roller skate wheel, and that characteristic to which we have found substantially all other characteristics may be related, comprises the hardness of the wheel. Within predetermined limits of hardness which we have found desirable, all other important characteristics of an efficient, desirable wheel may be secured.

Accordingly, we have found that by maintaining the hardness of the wheel between about 80 and 100, as measured on the Shore Durometer (C-Scale), a wheel may be made which has desirable frictional characteristics, high abrasive strength, desirable resilience, high wear-resistance, and absence of excessive brittleness. Preferably, the hardness may be maintained between about 92 and 96, measured as above, which except for special uses, we have found results in a wheel of overall optimum characteristics.

The binder which is employed comprises a rubber-resin binder such as, for example, a nitrile type rubber such as Buna N or a styrene type rubber such as Buna S, and the resin preferably comprises a heat hardenable resin of the phenolic type. It is desirable, to secure optimum strength characteristics that the rubber and resin be compatible, that is, that they be mutually soluble.

The filler employed may be of the type known as a reinforcing filler, zinc oxide being preferably used. Due to its tendency to mark skating floors carbon black is unsuitable and such toxic reinforcing fillers as the ethyl silicates are unsuitable.

The use of a friction augmenting agent is of

importance both as to the type employed and its condition, that is, it must be maintained in finely divided form and not agglomerated. In addition, for a predetermined friction, the time of cure must be controlled. As has been hereinbefore described the frictional characteristics of a roller skate wheel bears a close relationship to its hardness and these factors must be correlated. Preferably, we employ a mild friction influencing agent, such as, rottenstone, tripoli, garnet dust or the like and thoroughly mix or disperse the agent in the mixture so as to maintain the agent in finely divided form in the resulting product. A particle size through 100 mesh is preferable.

Suitable auxiliaries, such as, a vulcanizing agent, accelerators and plasticizing agents are also employed. As a vulcanizing agent, sulphur is preferable and any of the well known accelerators may be used. A small amount of plasticizing agent, such as, stearic acid may be employed to facilitate the handling of the rubber component of the binder. Stearic acid, in addition to functioning as a plasticizing agent also tends to activate the zinc oxide used as the reinforcing filler.

The hardness of the resulting wheel is preferably controlled by the proper proportioning of the rubber-resin content. In general as the rubber content of the rubber-resin ratio is increased the hardness is decreased and vice versa.

In its broadest concept our invention contemplates the use of from about 18 to 40 per cent rubber, 22 to 45 per cent resin, 15 to 54 per cent reinforcing filler, 6 to 10 per cent friction influencing agent, the remainder comprising plasticizing agent, accelerators and vulcanizing agent. A preferred composition comprises about 34 per cent rubber of the type contemplated herein, 37 per cent heat hardenable resin compatible with the rubber employed, 20 per cent reinforcing filler, 6 per cent friction influencing agent, and 3 per cent auxiliaries. Within this range of materials a desired hardness of about 80 to 100 is secured, the product having desirable frictional characteristics and having all other physical characteristics found desirable in a roller skate wheel.

As an example of our invention a mix was proportioned as follows: a nitrile type rubber, i. e., butadiene acrylonitrile copolymer, known commercially as "Hycar OR-25"—17 pounds and 10 ounces (34%); a phenolic resin, i. e., a cashew nut shell liquid modified phenol-aldehyde resin known commercially as "Durez 12687"—19 pounds and 1 ounce (36.8%); zinc oxide—10 pounds and 9 ounces (20.4%); rottenstone—3 pounds and 5 ounces (6.4%); and 2.4 per cent auxiliaries proportioned as follows: stearic acid—1.3 ounces; sulphur—11 ounces; a primary accelerator benzothiazyl disulfide—5.5 ounces; and a

secondary accelerator tetramethylthiuram disulfide—2 ounces.

The mix was placed in a suitable mold and cured under pressure for about twelve minutes at about 320° F. The resulting product had a hardness of about 94 as measured on the Shore Durometer (C-Scale); with a seventy-five pound weight on the wheel the static and sliding friction were about 15% higher than a fine grain maple wheel, the wear resistance was about five times that of the maple wheel and when subjected to impact forces of sufficient intensity to permanently deform and chip the maple wheel no deformation or chipping was observable.

Of course, it is to be understood that the roller skate wheel contemplated in the present invention may comprise the entire wheel, minus, of course, the metal bearing race, or the wheel may comprise a composite wheel having a wooden, plastic or metal core wherein our improved composition comprises the rim or rolling surface portion of the wheel.

In the accompanying drawing, Fig. 1 is a side elevational view of a composition roller skate wheel formed in accordance with the present invention, and

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

Referring to the drawing, the reference numeral 10 indicates a rim portion providing a roller surface, composed of the homogeneous composition of the present invention, and the reference numeral 11 indicates a metal bearing race therefor.

We claim as our invention:

A composition roller skate wheel having a rim portion providing a roller surface consisting essentially of a homogeneous mixture of 18 to 40 per cent butadiene-acrylonitrile copolymer, 22 to 45 per cent cashew nut shell liquid modified phenol-aldehyde resin, 15 to 45 per cent zinc oxide, 6 to 10 per cent finely divided rottenstone of a particle size through 100 mesh, and the balance plasticizing, vulcanizing and accelerating agents for said copolymer, said rim portion being heat hardened and having a hardness between about 80 and 100 as measured upon the C-scale of a Shore Durometer.

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