Sept. 29, 1970 K. MEIER 3,530,739

STEERING-WHEEL ASSEMBLY

Filed April 16, 1969

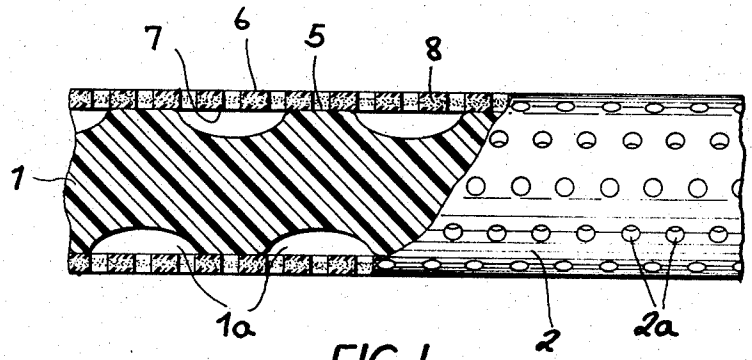


FIG. 1

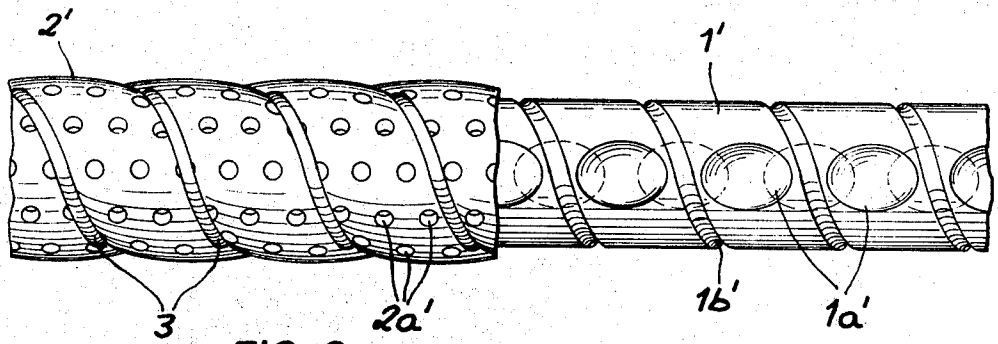


FIG. 2

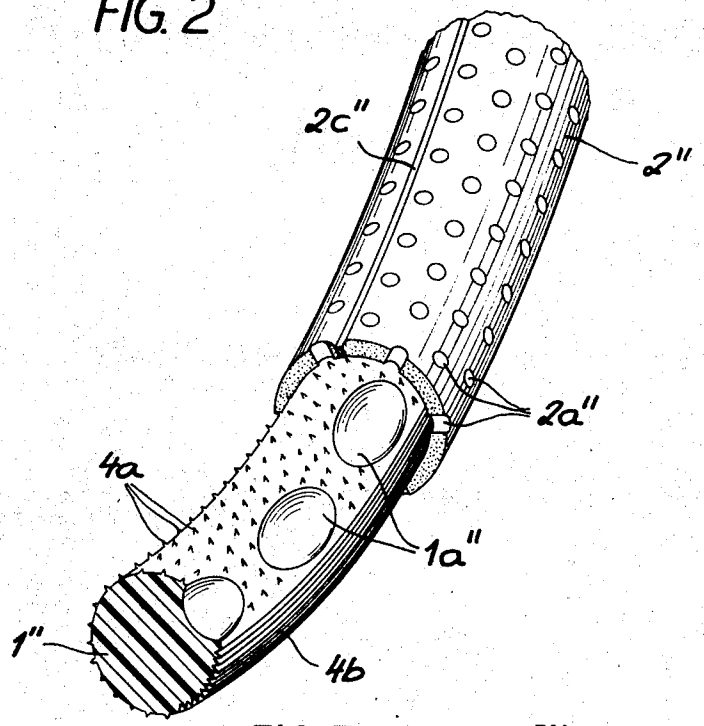


FIG. 3

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# STEERING-WHEEL ASSEMBLY

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Continuation-in-part of application Ser. No. 684,686, Nov. 21, 1967. This application Apr. 16, 1969, Ser. No. 816,658

Claims priority, application Germany, May 28, 1968, K 61,357

Int. Cl. B62d *1/06;* G05g *1/10*

U.S. Cl. 74—552 10 Claims

## ABSTRACT OF THE DISCLOSURE

A toroidal steering wheel is formed with a plurality of surface indentations. A toroidal resilient plastic sheath tightly envelops this wheel spanning these indentations to form the wheel-gripping surface. This sheath consists of a spongy resiliently compressible porous layer and a nonporous surface layer with a multiplicity of throughgoing perforations communicating with the indentations. The indentations can breathe through these perforations, when the gripping sheath or cover is compressed and released.

This application is a continuation-in-part of my copending application Ser. No. 684,686, filed Nov. 21, 1967 and entitled "Cover for Automobile Steering Wheels, Tennis Rackets, and the Like."

My present invention relates to a steering-wheel assembly and, more particularly, to a steering wheel for an automotive vehicle in combination with a grip-improving cover therefor.

My copending application Ser. No. 684,686 discloses a cover which extends principles originally set forth in U.S. Pat. No. 3,312,124 issued on Apr. 4, 1967 to Klaus Meier and myself and entitled "Steering-Wheel Assembly for Automotive Vehicles." A cover of this type is provided in the region of the perforations with a number of channels along the upper surface of the cover in the region of its engagement with the hand of the user, these channels being of an extent exceeding a hand's breadth. Thus, according to a specific feature of that invention, each of the perforations may be formed on a protuberance above a pocket of the cover whereby channels are formed between the protuberances or else longitudinal ridges provided connecting aligned protuberances and defining between the ridges respective troughs which constitute the channels.

Below the engagement surface of the cover, therefore, the foamed or cellular layer may be formed with individual pockets communicating with and individual to the perforations by pressing the protuberances from the generally flat layer. Alternatively, common channels may extend longitudinally along the inner surface of the cover in communication with respective sets of such perforations and, advantageously, with the perforations along a common line. According to a further feature of this invention, the cover, which may be used with any manipulatable member, especially a steering-wheel crown, a tennis racket or a tool handle, is provided with an outwardly bulging protuberance at each of its perforations. The cover may have a resilient cellular or foamed and porous inner layer and an outer, gas-impermeable skin which may be formed during the normal foaming process at which the band is made. Thus, if the foamed band is a polyvinyl chloride or other thermoplastic foam, the perforated but otherwise fluid-impenetrable surface skin can be produced by calendering the foamed band at a temperature in the region of the softening point thereof without completely compressing the band. This process forms a relatively tough skin. As pointed out in the aforementioned patent, a similar skin can be provided on the underside of the cover.



A system of this latter type has the significant advantage that air expressed from the channels or compartments between the wheel cover and the surface of the wheel, passes into the region of contact of the vehicle-operator's hand and the upper surface of the wheel cover through the perforations in the latter. This "breathing" action facilitates circulation of blood in the hand, prevents or limits the development of heat in the wheel-gripping position and thus limits perspiration, and precludes sticking of the hand to the wheel-cover surface.

It is the principal object of my present invention to provide a steering-wheel assembly which is improved still further.

A more particular object is to provide an assembly of the character described which facilitates blood circulation in the hands of the vehicle operator by improved aeration of the gripping surface of the vehicle wheel.

I do this, in accordance with the principal features of my present invention, by providing a steering-wheel assembly wherein the surface of the steering wheel is formed with a plurality of hollows, recesses or indentations with closed peripheries or boundary edges. A cover or sheath consisting of a porous thermoplastic resiliently compressible cellular or foamed synthetic resin core layer with a pair of fluid-impermeable skins unitarily connected therewith and formed with a multiplicity of throughgoing perforations is stretched tightly over the wheel. It thus spans the hollows, engaging the wheel all around each hollow, thereby creating large cells or compartments which communicate with the ambient atmosphere only through the perforations.

According to a further feature of my invention, this sheath is held on the wheel by a helically wound band or strip. This strip lies between the hollows on the wheel. The surface of the toroidal wheel is formed with a helical groove to receive this strip.

The sheath, according to yet another feature of my invention, can be welded onto the steering wheel if this latter is also of synthetic-resin material (e.g. by thermal or heat sealing when both sheath and wheel are composed of a thermoplastic or by solvent welding). It is also held from slipping on the wheel merely by providing ridges, roughened portions or multifarious protuberances unitarily on the surface of the wheel. In any case, the sheath is preferably a band which is folded over or wound helically around the wheel with its abutting edges welded together (e.g. by heat sealing simultaneously with the bonding of the sheath to the wheel).

Such an assembly has several advantages. First of all, it is, so to speak, extremely cool to use. The hollows breathe through the perforations each time the sheath is depressed into them so that, even in the hottest of weather, the driver need not be bothered by a perspiration-covered steering wheel. Furthermore, such a steering-wheel assembly offers a sure grip for the driver at all times. In addition, its smooth attractive appearance belies the fact that it offers the driver this excellent grip.

The above and other objects, features and advantages will become more readily apparent from the following description, reference being made to the accompanying drawing, in which:

FIG. 1 is a partly sectional view of a portion of a steering-wheel assembly according to my invention;

FIG. 2 is a further embodiment of the assembly of my invention; and

FIG. 3 is a perspective view, partly broken away of yet another embodiment of my invention.

As seen in FIG. 1 a portion of a toroidal steering wheel **1** made of thermoplastic synthetic resins is formed with depressions or hollows **1***a* whose closed periphery is raised above the floor of the hollow which is therefore of the configuration of a crater. A thermoplastic synthetic-resin sheath **2** is stretched over this wheel **1**. This sheath **2** is welded to the wheel **1** at a dielectric or thermal weld **5** so that it hugs this wheel everywhere except at the hollows **1***a* and all around the periphery of each of them. The bonded wheel cover is formed with throughgoing perforations **2***a* through which the hollows **1***a* can breathe.

The sheath **2** has a porous cellular resiliently compressible foamed core **8** and a pair of nonporous outer skins **6** and **7** all of the same material and made as disclosed in the above-cited Pat. No. 3,312,124. The perforations **2***a* are punched through the sheath **2** so that on compression and decompression the core **8** itself breathes.

FIG. 2 shows a steering wheel **1'** covered with a sheath **2'** with perforations **2***a'* as above. Here strip **3** of resilient material such as polyvinyl chloride is wound helically around the wheel **1'** to hold the sheath **2'** in place. The wheel **1'** is formed with a helically extending groove **1***b'* that runs along between its crateral hollows **1***a'* which are formed on diametrically opposite sides of the wheel **1'**. The hollows **1***a'* are also advantageously arranged so that the helical groove **1***b'* can run between them on both sides at even pitch.

As seen in FIG. 3 a synthetic-resin steering wheel **1''** with hollows **1***a''* is enveloped by a sheath **2''** formed with perforations **2***a''*. The edges of the band that originally comprised the sheath **2''** are thermally welded together at **2***c''*. In order that this cover not slip on the wheel **1''** this latter is molded with tiny bumps **4***a* and annular ridges **4***b*.

The improvement described and illustrated is believed to admit of many modifications within the ability of persons skilled in the art, all such modifications being considered within the spirit and scope of the invention.

I claim:

**1.** A steering-wheel assembly comprising a generally toroidal steering wheel having a surface formed with a plurality of hollows each surrounded by a closed periphery raised above the floor of the hollow, and a resilient sheath substantially enveloping said steering wheel and affixed thereto while spanning said hollows closely engaging said peripheries all around said hollows, said sheath being formed with a multiplicity of throughgoing perforations, at least some of said perforations registering with said hollows whereby said hollows communicating with the ambient atmosphere only through said perforations, said sheath comprising an inner resiliently compressible porous cellular core and an outer fluid-impenetrable skin overlying said core and formed unitarily therewith, said perforations extending through said core and said skin, said hollows being of crateral configuration, and a strip wound helically around said wheel over said sheath, said strip lying on said skin between said hollows, said surface being formed with a helical groove extending between said hollows, said strip being lodged in said groove.

**2.** The assembly defined in claim **1** wherein said surface is formed with means for preventing slippage of said sheath relative thereto.

**3.** The assembly defined in claim **1** wherein said steering wheel is annular and of substantially round cross section, said hollows being formed on diametrically opposite sides of said wheel.

**4.** A steering-wheel assembly comprising a generally toroidal steering wheel having a surface formed with a plurality of hollows each surrounding by a closed periphery raised above the floor of the hollow, and a resilient sheath substantially enveloping said steering wheel and affixed thereto while spanning said hollows closely engaging said peripheries all around said hollows, said sheath being formed with a multiplicity of throughgoing perforations, at least some of said perforations registering with said hollows whereby said hollows communicating with the ambient atmosphere only through said perforations, said sheath comprising an inner resiliently compressible porous cellular core and an outer fluid-impenetrable skin overlying said core and formed unitarily therewith, said perforations extending through said core and said skin, said hollows being of crateral configuration, said steering wheel being annular and of substantially round cross section, said hollows being formed on diametrically opposite sides of said wheel.

**5.** The assembly defined in claim **4** wherein said surface is formed with means for preventing slippage of said sheath relative thereon.

**6.** The assembly defined in claim **4** wherein the hollows on one of said sides of said wheel are offset along said wheel from the hollows on the other of said sides of said wheel.

**7.** The assembly defined in claim **4** wherein said sheath comprises an elongated band wrapped around said wheel, said band having its longitudinal edges abutting and welded together.

**8.** The assembly defined in claim **4** wherein said wheel and said sheath are formed of synthetic resin material and said sheath is welded to said wheel.

**9.** The assembly defined in claim **4**, further comprising a strip wound helically around said wheel over said sheath, said strip lying on said skin between said hollows.

**10.** A steering-wheel assembly comprising a generally toroidal steering wheel having a surface formed with a plurality of hollows each surrounded by a closed periphery raised above the floor of the hollow, and a resilient sheath substantially enveloping said steering wheel and affixed thereto while spanning said hollows closely engaging said peripheries all around said hollows, said sheath being formed with a multiplicity of throughgoing perforations, at least some of said perforations registering with said hollows whereby said hollows communicating with the ambient atmosphere only through said perforations, said sheath comprising an inner resiliently compressible porous cellular core and an outer fluid-impenetrable skin overlying said core and formed unitarily therewith, said perforations extending through said core and said skin, said hollows being of crateral configuration, said surface being formed with means for preventing slippage of said sheath relative thereon, said means for preventing slippage of said sheath including a multiplicity of protuberance formed on said wheel between said hollows, and a plurality of closely spaced ridges extending around said wheel.


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U.S. Cl. X.R.

74—558, 558.5