

[Title of document] Description

[Title of invention] Cap with a roughly disk shape and a wheel including the same

[Field of the invention]

[0001]

The present design relates to a wheel for an automobile ; more specifically , it relates to the shape of a cap attached to an aluminum wheel configured so as to cover a center hole for attaching to the axle and onto which a seal or plate imprinted with a mark or emblem or the like is adhered and displayed , and to the attachment part of said cap.

[Background of the invention]

[0002]

Fig.6 shows a conventional configuration . Conventionally , there is a cap 8 having a plurality of finger parts 8b , and the finger parts 8b are inserted into a wheel 7 , being deformed in the process , so that a nail part 8a of the finger parts 8 b becomes interlocked with a groove 7a on the wheel 7 .

Meanwhile , when the cap 8 is to be removed , a tool is applied from the inside , and a hammer or the like is struck against the end surface of such of tool ; this operation is difficult and difficult to work .

Further , with the conventional cap , a base 8c of the finger 8b can easily break ; once it breaks it can no longer be used . Because a cap is relatively conspicuous , a customer who cares about a car's external appearance often will not just replace one cap with a new article , but will replace all caps , in order to keep an even appearance , meaning that unnecessary time , resources and money are spent on work .

[Disclosure of the design]

[Problems to be solved by the device]

[0003]

The present design was conceived in order to solve the above problems of the conventional technology ; its object is to provide an easily attachable and removable cap that does not have weak portions vulnerable to breaking .

Another object is to be provide a wheel to which a cap , that does not have weak portions vulnerable to breaking , is easily attachable and removable .

[Means for solving the problem]

[0004]

A cap is attached to a hollow portion of a wheel , grooves are provided on both the inner peripheral surface of the hollow portion and the outer peripheral surface of the

cap , and when the cap is attached to the wheel a single annular space is formed .

By inserting a C-spring or O-ring into such annular space the cap is attached to the wheel .

Further , an O-ring is sandwiched between an annular surface of the wheel and inner surface of the cap ; the repelling force of the O-ring eliminates the slight movement of the cap with respect to the wheel (hereinafter referred to as “rattling”).

Alternatively , a magnet is sandwiched between an annular surface of the wheel and inner surface of the cap ; the magnetic force of the magnet eliminates rattling .

[Effect of the device]

[0005]

The present design provides a cap that does not have portions vulnerable to breaking and a wheel to which such a cap can be attached .

Thus , with the exception of cases where the cap itself collides with an obstacle while the automobile is traveling , the cap is not damaged during the attachment or removal of cap , eliminating the need for unnecessary replacement work .

Further , because there is no unnecessary replacement of caps , cap material is not wastefully used , and unnecessary expenses are avoided .

[The best gestalt for devising]

[0006]

A cap that attaches to a center hole in a wheel has a roughly disk shape and has an outer peripheral groove along the outer peripheral surface of said disk shape .

Because this is a cap with a roughly disk shape , it is easy to manufacture and does not have part susceptible to breaking . The outer peripheral surface refers to a surface at the maximum external diameter of the roughly disk ; when the cap has been attached to a wheel , an outer peripheral groove along the outer peripheral surface of the cap and an inner peripheral groove along the inner peripheral surface of the wheel meet , thus forming a single annular space .

The cap has a recessed portion on one disk surface and a central hole in a central portion of the disk shape .

The recessed portion is for attaching a seal or plate imprinted with a mark or emblem , and the central hole is for facilitating the work of attaching such seal or plate and or processing the cap .

The cap has an inner surface groove on the inner surface , such surface being the surface that attaches to the wheel .

This design provides a shape that allows for easy adhesion of an O-ring , allowing for an O-ring to be sandwiched between the annular surface of a wheel and the inner

surface of a cap .

The cap has a magnet attached to the inner surface thereof .

This design provides a cap with a magnet sandwiched between an annular surface of a wheel and inner surface of the cap .

[0007]

An automobile wheel has a hollow portion formed by the inner peripheral surface and annular surface at the end of a center hole on the cosmetic surface side . In addition, the wheel has a inner peripheral groove in said inner peripheral surface .

This design provides a hollow portion for attaching a cap to a wheel . When a cap has been attached to a wheel , an inner peripheral groove along the inner peripheral surface of the wheel and an outer peripheral groove along the outer peripheral surface of the cap meet , thus forming a single annular apace .

A wheel has a cap to which a C-spring has been inserted into the annular space formed by said wheel inner peripheral groove and said cap outer peripheral groove .

This design provides a configuration such that a C-spring is inserted in the annular space formed between the inner peripheral groove on the wheel inner peripheral surface and the outer peripheral groove of the cap outer peripheral surface , thus fixing the cap to the wheel .

A wheel has a cap to which an O-ring has been inserted into the annular space formed by said wheel inner peripheral groove and said cap outer peripheral groove .

This design provides a configuration such that an O-ring is inserted in the annular space formed between the inner peripheral groove on the wheel inner peripheral surface and the outer peripheral groove of the cap outer peripheral surface , thus fixing the cap to the wheel . In such a case , it is preferable to chamfer the angled portion between the cap outer peripheral surface and inner surface to provide an incline , as this allows an O-ring to be inserted without damage .

Either an O-ring or a magnet is provided between the cap inner surface and wheel annular surface .

With such a configuration , an O-ring is sandwiched between the wheel annular

surface and cap inner surface , and the repelling force of the O-ring eliminates rattling , or else , a magnet is sandwiched between the wheel annular surface and cap inner surface , and the magnetic force of the magnet eliminates rattling .

[Embodiment 1]

[0008]

A first embodiment according to the present design will be explained with reference to FIG. 1 . A wheel 1 has a center hole 1a central portion thereof ; on the cosmetic surface 1b side of the center hole 1a a hollow portion 1f formed an inner peripheral surface 1c and an annular surface 1d is provided ; and the inner peripheral surface 1c has an inner peripheral groove 1e having a bow-shaped cross section .

As shown in FIG. 3 and 4 , a cap 2 has a recessed portion 2a on one surface of a disk-shaped plate and a central hole 2b in a central portion thereof ; it further has an outer peripheral groove 2e having a bow-shaped cross section on an outer peripheral surface 2c and an inner surface groove 2f having a bow-shaped cross section on an inner surface 2d . In addition , a hollowed-out portion 2g has been provided on the inner surface 2d for purposes of weight reduction . Thus the cap 2 is overall in a roughly disk shape .

As shown in FIG. 5 , a C-spring 3 is spring steel wire bent into a circular shape with a cutaway portion 3a provided .

In the present embodiment , before the cap 2 is attached to the wheel 1 , the C-spring 3 is inserted into the inner peripheral groove 1e of the wheel 1 , and an adhesive is used to adhere an O-ring 5 to the inner surface groove 2f of the cap 2 .

When the cap 2 is insert into a hollow portion 1f of the wheel 1 , the C-spring 3 elastically deforms and opens and when the O-ring 5 comes in contact with the annular surface 1d of the wheel 1 and becomes distorted , the C-spring 3 is accommodated within the annular space formed between the inner peripheral groove 1e and the outer peripheral groove 2e .

After once becoming distorted , the O-ring 5 repulses and pushes back against the cap 2 ; thus even if there is a gap between the annular space formed by inner peripheral groove 1e and the outer peripheral groove 2e and the C-spring 3 , rattling is still prevented .

[Embodiment 2]

[0009]

Next , a second embodiment according to the present design will be explained with reference to FIG. 2 . The wheel 1 in this embodiment is the same as the wheel 1

described in the first embodiment , so explanation thereof shall be omitted .

Unlike the cap according to the first embodiment , which has an inner surface groove 2f for attaching the O-ring 5 to the inner surface 2d , a cap 4 according to this embodiment does not have a groove on its inner surface 4d but a magnet 6b is adhered thereto with an adhesive .

In the present embodiment , a magnet 6a is adhered beforehand to the annular surface 1d of the wheel 1 using an adhesive , and a C-spring 3 is inserted beforehand into the inner peripheral groove 1e of the wheel 1 .

When the cap 4 is insert into the hollow portion 1f of the wheel 1 and C-spring 3 elastically deforms and opens , and when the magnet 6b attached to the cap 4 comes in contact with the magnet 6a attached to the annular surface 1d of the wheel 1 , then the C-spring 3 is accommodated within the annular space formed by the inner peripheral groove 1e and the outer peripheral groove 2e .

Because the magnetic forces of the magnet 6b and magnet 6a attract each other , even if there is a gap between the annular space formed by the inner peripheral groove 1e and the outer peripheral groove 2e and the C-spring 3 , rattling is still prevented .

[Availability on industry]

[0010]

The present design relates to a cap that can be easily attached to and removed from a wheel and that does not have weak portions susceptible to be breaking , and to a wheel to which such a cap is attached , and thus the present design is applicable to the industrial field of manufacturing and marking automobile wheels , in particular , aluminum wheels , and to caps attached to a wheel .

[Brief description of the drawings]

[0011]

[FIG.1] A partial cross section of a wheel showing a portion of a wheel in a state in which a cap is attached .

[FIG.2] A partial cross section of a wheel in a state in which a cap is attached .

[FIG.3] A perspective view of a cap as seen from the recessed portion side .

[FIG.4] A perspective view of a cap as seen from the inner surface side .

[FIG.5] A plan view of a C-spring .

[FIG.6] A partial cross section of a wheel in a state in which a conventional cap is attached .

[Explanation of the indicators]

[0012]

1 : wheel  
1a: center hole  
1b: cosmetic surface  
1c: inner peripheral surface  
1d: annular surface  
1e: inner peripheral groove  
1f: hollow portion  
2 : cap  
2a: recessed portion  
2b: central hole  
2c: outer peripheral surface  
2d: inner surface  
2e: outer peripheral groove  
2f: inner surface groove  
2g: hollowed-out portion  
3 : C-spring  
3a: cutaway portion  
4 : cap  
4d: inner surface  
5 : O-ring  
6a: magnet  
6b: magnet

## CLAIMS:

## [Claim 1]

A cap for attachment to a center hole of a wheel , said cap comprising :

- a roughly disk shape ;
- opposing first and second surfaces respectively defining radially extending inner and outer surfaces ;
- a third surface defining a circumferentially extending outer peripheral surface ;
- an outwardly opening annular groove on said outer peripheral surface , said annular groove being of a semicircular cross sectional shape ;
- an outwardly opening annular groove on said inner radial surface ; and
- an axially extending central hole in a central portion of said cap , said central hole extending through said inner and outer radial surfaces .

## [Claim 2]

A cap according to claim 1 , wherein said cap further comprises :

- an outwardly opening annular recessed portion on said outer radial surface .

## [Claim 3]

A wheel comprising :

- a wheel unit having an axially extending center hole with an inwardly opening annular inner peripheral groove ;
- a cap having an outwardly opening annular outer peripheral groove , said annular groove being of a semicircular cross sectional shape ;
- said cap being disposed on said wheel to form an annular space having a circle-shaped cross section between said wheel inner peripheral groove and said cap outer peripheral groove ; and
- a C-spring in said annular space between said wheel inner peripheral groove and said cap outer peripheral groove , said C-spring having a circular shape with a cutaway portion ; and
- an axially extending central hole in a central portion of said cap .

[Claim 4]

A wheel according to claim 3 , wherein :

said center hole of said wheel unit has a radially extending wheel annular surface ;

said cap having a radially extending cap inner surface ;

said cap being disposed on said wheel unit to form a second annular space between said wheel annular surface and said cap inner surface ; and

a magnet in said second annular space .

[Claim 5]

A wheel according to claim 3 , wherein :

said center hole of said wheel unit has a radially extending wheel annular surface ;

said cap having a radially extending inner surface and an outwardly opening annular groove on said inner surface ;

said cap being disposed on said wheel unit to form a second annular space between said wheel annular surface and said inner surface groove ; and

an O-ring in said second annular space .

[Claim 6]

A wheel comprising :

a wheel unit having an axially extending center hole with an inwardly opening annular inner peripheral groove ;

a cap having an outwardly opening annular outer peripheral groove , said annular groove being of a semicircular cross sectional shape ;

said cap being disposed on said wheel to form an annular space having a circle-shaped cross section between said wheel inner peripheral groove and said cap outer peripheral groove ; and

an O-ring in said annular space between said wheel inner peripheral groove and said cap outer peripheral groove ; and

an axially extending central hole in a central portion of said cap .

[Claim 7]

The wheel of claim 6 , wherein :

said center hole of said wheel unit has a radially extending wheel annular surface ;

said cap having a radially extending cap inner surface ;

said cap being disposed on said wheel unit to form a second annular space between said wheel annular surface and said cap inner surface ; and

a magnet in said second annular space .

[Claim 8]

The wheel of claim 6 , wherein :

said center hole of said wheel unit has a radially extending wheel annular surface ;

said cap having a radially extending inner surface and an outwardly opening annular groove on said inner surface ;

said cap being disposed on said wheel unit to form a second annular space between said wheel annular surface and said cap inner surface groove ; and

an O-ring in said second annular space .