(19) DANMARK

(10) DK/EP 2807041 T3

Patent- og Varemærkestyrelsen

(12) Oversættelse af europæisk patentskrift

(51) Int.Cl.: *B 60 C 7/12 (2006.01)* *B 60 C 15/024 (2006.01)* *B 65 F 1/14 (2006.01)*

(45) Oversættelsen bekendtgjort den: **2016-09-12**

(80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2016-06-29**

(86) Europæisk ansøgning nr.: **13706578.5**

(86) Europæisk indleveringsdag: **2013-01-28**

(87) Den europæiske ansøgnings publiceringsdag: **2014-12-03**

(86) International ansøgning nr.: **FR2013050167**

(87) Internationalt publikationsnr.: **WO2013110904**

(30) Prioritet: **2012-01-26 FR 1250774**

(84) Designerede stater: **AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**

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(54) Benævnelse: **Hjuldæk og hjul til en beholder til opsamling af affald**

(56) Fremdragne publikationer:
EP-A2- 1 522 427
DE-C- 855 810
DE-U1- 9 303 111
US-A- 1 552 081
US-A- 1 927 801
US-A- 3 203 461

This invention relates to the field of waste collection bins with wheels. These collection bins usually have a plastic tank, possibly equipped with a hinged lid, with wheels mounted at the bottom, generally by adding an axle.

Collection bins with wheels can be divided into two broad categories: two-wheeled bins and four-wheeled bins. The construction of the wheels is generally identical on the two types of bin. As shown on Figure 1, a wheel 1 generally has a hub 2 made of plastic, intended to be mounted on an axle or shaft, the hub 1 being integral with a web forming a rim 3 on which is mounted a tyre 4. The peripheral surface of the tyre, usually made of rubber (possibly recycled) forms the tread of the wheel. Documents DE855810C and US-A-1927801 describe other tyres.

Collection bins, especially those having two wheels, are routinely moved and handled during collection operations. Their movement on footpaths and the road (and in particular, where applicable, the descent from the footpath to the road) cause shocks and vibrations which make the bins noisy. This noisy aspect of the wheeled bins is reinforced by the fact that, to ensure that the wheels are sufficiently strong and durable, the tyre is usually a solid, thick part, making it relatively non-deformable, even when made of a rubber-based material. The tyre therefore provides little damping and transmits to the bin tank the shocks and vibrations to which it is subjected via the rim and the hub, which are generally very rigid, with little or no damping. In addition to the noise aspect, the virtually complete transmission of the vibrations and shocks received by the tyre to the rim and the hub may also, in case of extreme and/or repeated stresses, lead to their destruction.

Various solutions have been proposed in order to reduce the rolling noises of a collection bin, by improving the structure of the tyres. For example, it has been proposed to provide the tyre with grooves making the outer surface of the tyre partially flexible, to obtain a damping effect. This solution nevertheless proved to be of limited efficiency.

This invention aims to overcome the drawbacks of existing solutions by providing a tyre and a wheel for collection bin in order to drastically reduce the generation of noise when rolling, but also to reduce the weight of such a wheel, as well as the quantity of material necessary for its production.

To this end, the invention relates to a tyre, as defined according to claim 1, intended to be mounted on a wheel rim of a waste collection bin, said tyre being of generally annular shape and comprising:

- an outer belt having an outer surface forming a running surface;
- an inner belt carrying a contact surface with the rim;

the contact surface being formed by the surface enveloping the vertices of a plurality of ribs projecting radially from the inner belt of the tyre.

The inner belt carries a central core, projecting radially from the belt, and to which the ribs are connected.

In one embodiment, the ribs are arranged on either side of the central core.

In one embodiment, the opposite ribs, located on either side of the central core, face each other two by two.

In one embodiment, the opposite ribs, located on either side of the central rib, are interdigitated.

In one embodiment, the radially inner surface of the core is not coincident with the contact surface.

In one embodiment, the outer belt and the inner belt are connected to each other by an intermediate part having a plurality of ribs.

In one embodiment, the ribs are connected to each other so as to form an intermediate monobloc part.

In one embodiment, the intermediate part has a generally sinusoidal shape.

In one embodiment, the tyre according to the invention is obtained by moulding, in particular by moulding a material derived from the recovery of ground tyre residues.

The invention also relates to a waste collection bin wheel, comprising a hub secured to a rim and a tyre as defined above.

In one embodiment, the tyre is mounted tightly on the rim.

The invention will be better understood on reading the following description, given as an example only and with reference to the accompanying figures in which:

- Figure 1, described above, shows a sectional view of a conventional wheel;
- Figure 2 is a perspective view of a tyre according to the invention;
- Figure 3 is a half side view of the tyre of Figure 1:
- Figure 4 is a broken cross-section with intersecting planes AA of the tyre of Figure 3.

Figures 2 to 4 show a tyre according to the invention, obtained in one piece by moulding. The tyre 10 has a generally annular shape of axis XX. The tyre 10 has a radially inner belt 12 and a radially outer belt 14, connected to each other by an

intermediate part 16. The tyre 10 is designed to be mounted by elastic clamping on a waste collection bin wheel.

The outer belt 14 has a radially outer surface which forms the running surface 18 of the tyre 10. In the example of Figures 2 to 4, the profile of the running surface 18 is flat, but any other type of profile can of course be considered (convex profile, presence of grooves and/or tread patterns, etc.)

The inner belt 12 is intended to be clamped by elastic deformation on the outer surface of a rim. The inner belt 12 therefore carries a radially inner surface which forms, when the tyre is mounted on a rim, a contact surface 20 with the latter. The contact surface 20 is therefore adapted to cooperate with the profile of the rim designed to carry the tyre. In the example, the tyre of Figures 2 to 4 is intended to be mounted on a rim having on its radially outer part a concave circular profile, for example substantially similar to the profile of the rim of Figure 1.

The inner belt 12 and the outer belt 14 are attached to each other, being connected by the intermediate part 16, this part being solid or as detailed below, formed by a light structure such as a network of ribs.

The contact surface 20 of the inner belt 12 is formed by at least a portion of the crests of a plurality of ribs 26, 28 arranged on either side of a central core 22. The central core 22 and the ribs 26, 28 extend radially relative to the axis XX of the tyre 10, projecting from the inner belt 12. The ribs 26, 28 are uniformly distributed around the axis XX, being separated from each other by a constant angular interval. In addition, they extend along an axial direction (parallel to the axis XX) from the inner surface 24 of the central core 22, to which each rib 26, 28 is connected. The ribs are further arranged so that their largest dimension is oriented in a direction parallel to the axis XX. In the example of Figures 2 to 4, the ribs 26, 28 face each other two by two, but it may be preferred that the ribs are offset, and in particular interdigitated. A different number of ribs on either side of the central core may also be preferred.

In order to present the required profile to fit the rim, the height of the ribs 26, 28 decreases along the axial direction, from the central core towards each respective edge of the inner belt 12. In the example, the crest portion of each rib which is contained in the contact surface 20 has a circular profile. In addition, in order to produce the tyre by moulding, each rib has a cross-section that decreases from the

base to the top (for example, a substantially triangular or trapezoidal cross-section), which simplifies the demoulding operation.

In the example, the radially inner surface 24 of the central core 22 has a flat profile. Thus, this inner surface 24 does not participate in the contact between the tyre 10 and the outer surface of the rim. This flat profile forms in this case a clearance with respect to a complete circular profile, which makes it easier to adjust the tyre 10 on the rim, the tyre being mounted slightly tight. Alternatively, other profiles may be preferred for the inner surface of the core 22.

The structure formed by the central core 22 and the ribs 26, 28, due to its recessed nature compared with the known solid structures, makes the tyre 10 more flexible in the region of contact with the rim. Thus, the tyre can deform and absorb a large proportion of the shocks and vibrations to which it is subjected instead of transmitting virtually all of them to the rim and the hub. In addition, the fact that the inside of the tyre is not solid makes it lighter, while providing mechanical strength equivalent to the known solid tyres.

The damping quality of the tyre can be further increased by a suitable structure of the intermediate part 16, which fastens the inner belt 12 and the outer belt 14 to each other. In the example of Figures 2 to 4, the intermediate part 16 includes a plurality of ribs 30 joining the outer belt 14 to the inner belt 12. In an advantageous embodiment, the consecutive ribs are connected in pairs, thereby forming a single ribbed structure of generally sinusoidal or waved shape in the example. Thus, the intermediate part has a generally waved shape whose crests and hollows are located on either side of the median radial plane of the tyre (plane perpendicular to the axis XX). This structure offers the advantage of being very efficient in terms of damping and of being particularly light, while having the required mechanical strength.

The tyre according to the invention offers the advantage of forming a strong lightweight structure, having the required deformation and damping qualities. It is also perfectly suitable for manufacture by moulding, in a single piece. Advantageously, the tyre according to the invention can be moulded from a reclaimed material such as a material derived from the recovery of ground tyre residues (such as the material known as "crumb").

In order to manufacture the tyre according to the invention with a material such as crumb, the partially granular aspect retained in some cases by this type of material

after moulding must be taken into account. In particular, the thickness of the various ribs on the tyre will be planned to be greater than the maximum size of the grains contained in the material after conversion.

As demonstrated above, the tyre according to the invention therefore provides better damping of shocks, better absorption of vibrations than the known tyre, thereby increasing the lifetime of the wheels fitted with this tyre, while reducing the noise nuisances generated by the collection bins. The hub equipped with a tyre according to the invention is subjected to lower stresses, which extends the life of the hub. The tyre itself is better preserved over time, thanks to its ability to absorb some of the shocks and vibrations to which it is subjected. In addition, the structure of the tyre according to the invention offers considerable savings in terms of weight and of the quantity of material necessary for its production. Lastly, the tyre according to the invention is particularly suited to manufacturing by moulding, especially by moulding a material derived from the recovery of ground tyre residues.

Patentkrav

1. Hjuldæk til montering på en hjulfælg af en beholder til opsamling af affald, hvor dækket (10) generelt er ringformet og omfatter:
- et udvendigt bælte (14), hvoraf en udvendig overflade danner en løbeflade (18);
- et indvendigt bælte (12), som bærer en kontaktflade med fælgen (20); hvor kontaktfladen (20) dannes af overfladen, som omslutter spidserne af en flerhed af ribber (26, 28), der strækker sig radialt fremspringende fra det indvendige bælte (12) af dækket (10), hvor flerheden af ribber (25, 28) er forbundet med en central kerne (22), der strækker sig radialt fremspringende fra det indvendige bælte (12).

2. Dæk ifølge krav 1, hvor ribberne (26, 28) er anbragt på begge sider af den centrale kerne (22).

3. Dæk ifølge krav 2, hvor de modstående ribber, som befinder sig på begge sider af den centrale kerne (22), ligger parvis over for hinanden.

4. Dæk ifølge krav 2, hvor de modstående ribber, som befinder sig på begge sider af den centrale kerne (22), er inter-digitale.

5. Dæk ifølge et af kravene 1 til 4, hvor den radialt indvendigt liggende overflade (24) af kernen (22) ikke er sammenfaldende med kontaktfladen (20).

6. Dæk ifølge et af de foregående krav, hvor det udvendige bælte (14) og det indvendige bælte (12) er indbyrdes forbundne med et mellemstykke (16), som omfatter en flerhed af ribber (30).

7. Dæk ifølge det foregående krav, hvor ribberne (30) er indbyrdes forbundne, således at de danner et mellemstykke i ét stykke (16).

8. Dæk ifølge det foregående krav, hvor mellemstykket (16) har en generel sinusform.

9. Dæk ifølge et af kravene 1 til 8, **kendetegnet ved, at** det opnås ved formning, især ved formning af et materiale, som stammer fra genvinding af rester fra knusning af dæk.

10. Hjul til en beholder til opsamling af affald, omfattende et nav, der er fast forbundet med en fælg og et hjuldæk ifølge et af kravene 1 til 9.

11. Hjul ifølge krav 10, hvor hjuldækket er monteret stramt på fælgen.

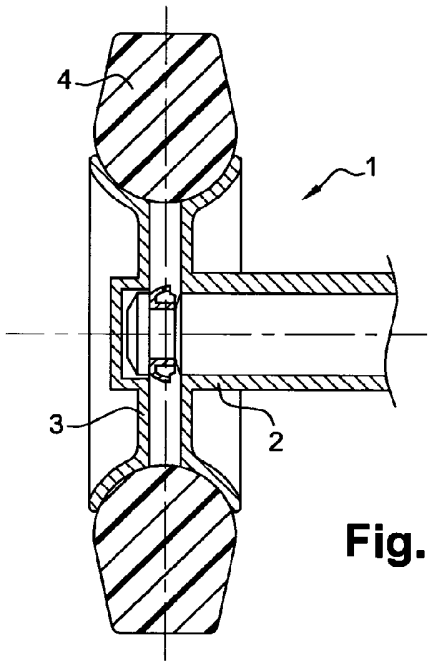

Fig. 1

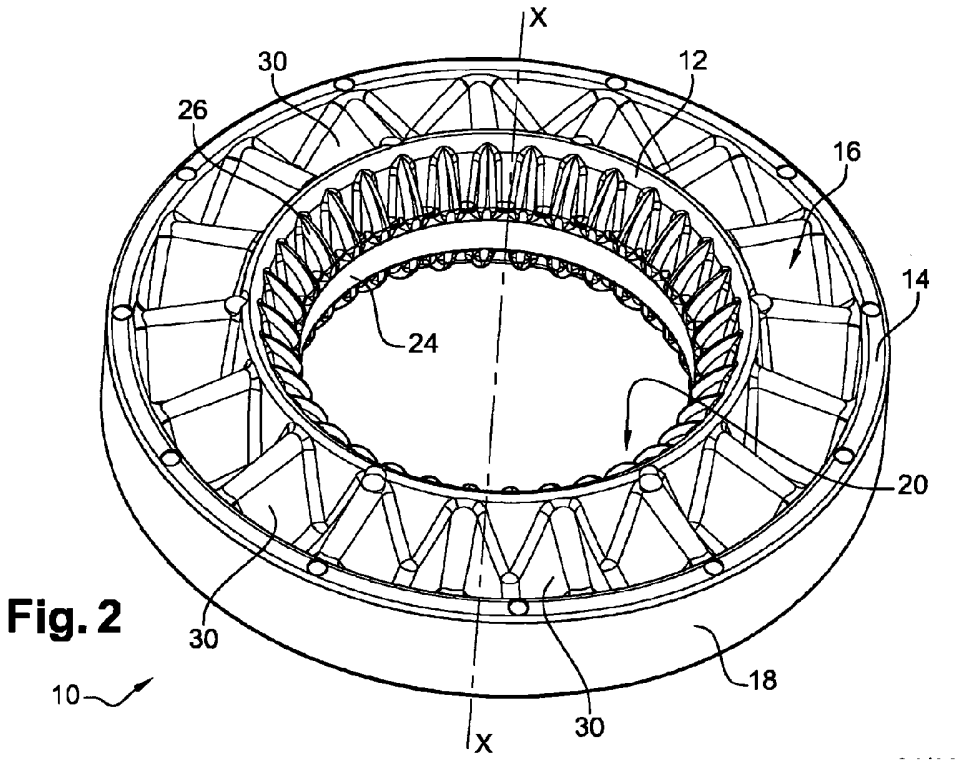

Fig. 2

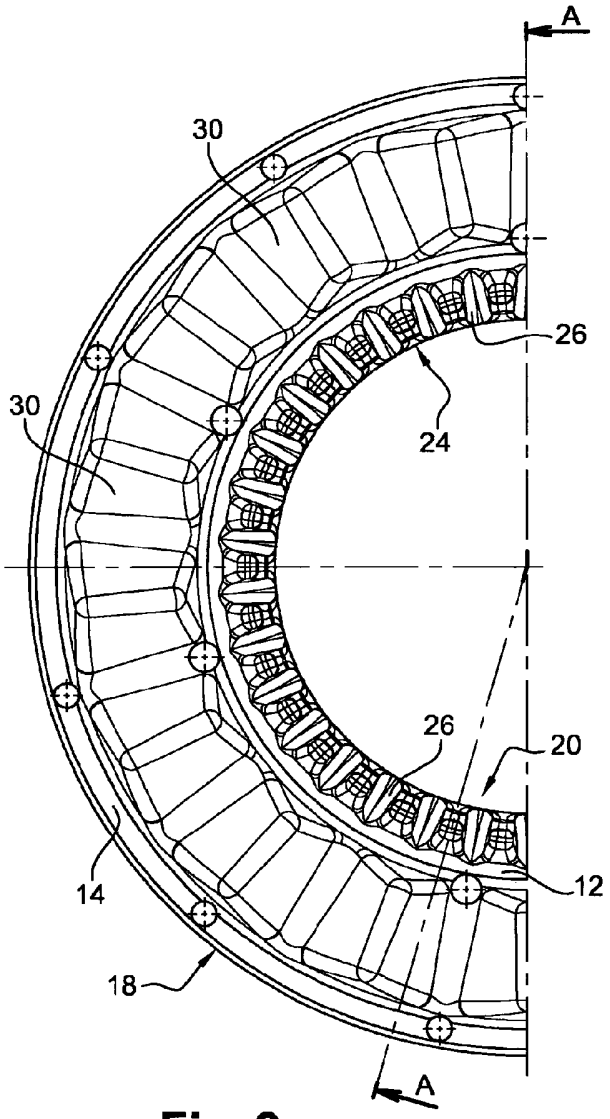
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Fig. 3

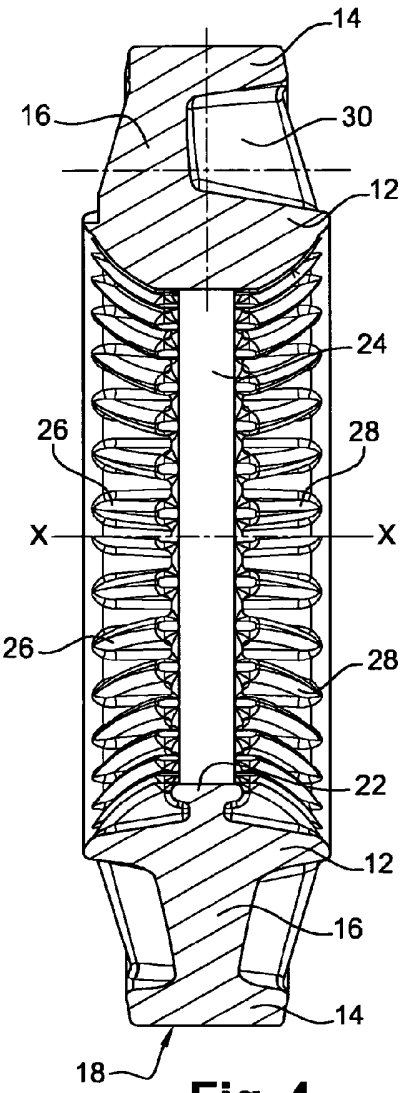
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Fig. 4