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Wheel and method for manufacturing of the same

The present invention concerns a wheel, especially a wheel for shopping trolleys or carts, such wheel comprising a wheel body, which has a hub part and a peripheral part, where the peripheral part has axially separated, circular annular flange parts, which form a running surface on the wheel body, and, lying between the annular flanges, a peripheral surface, which comprises surface portions in a polygonal configuration around the periphery of the wheel body.

Shopping trolley wheels of the above-mentioned type are known, in which the wheel can facilitate keeping the trolley stationary when it is being transported on an inclined escalator-type conveyor belt, by the running surfaces of the wheels being made of axially separated, circular peripheral angular flanges which can fall down into the longitudinal grooves on the bearing surface of the conveyor belt, so that one of the flat peripheral surfaces in the polygonal configuration lying between the annular flanges can rest in contact against the upper side of the conveyor belt and in this way make an undesirable rolling of the wheel more difficult. Such wheels have been made as solid, relatively heavy wheel bodies.

In order to achieve a relatively light wheel construction, it has earlier been suggested to make wheel bodies from two complementary, bowl-shaped wheel halves joined together in order to form a relatively hollow wheel body. The peripheral parts of the wheel halves in such a wheel body can in this way be held together and joined to each other through a tread being moulded around the outer periphery of the wheel body (cf., for example, SE-A-9402565-7). Such an enclosing moulding of a tread around the peripheral surface of the wheel halves is, however, not possible in a wheel of the type described in the introduction.

An object of the present invention is to achieve a wheel made

of two wheel halves joined together, which has axially separated circular peripheral annular flanges and has a polygonal peripheral surface between the annular flanges, where the peripheral parts of the wheel halves are held together by an elastic ring which at the same time can be used as a noise and vibration damper to let the wheel roll quietly and comfortably.

This object is achieved by a wheel of the type described in the introduction by the wheel body being made up of complementary wheel halves, where each wheel half has near the peripheral part a groove extending completely around the wheel half and which, radially inside the peripheral planar surfaces, extends axially inwardly from the outside of the respective wheel half to an essentially radial, inner web part in the respective wheel half, said web part in the wheel halves having axial openings establishing communication between the grooves of the two wheel halves, the peripheral parts of the wheel halves being held together by an elastic material injected into the grooves and openings.

The invention also concerns a method for manufacturing such a wheel, in which the method is characterised in that the two complementary wheel halves are placed together and positioned in a mould, whereafter the peripheral parts of the two wheel halves are fixed to each other by injection of an elastic material in the mutually communicating space in the wheel halves, which goes all around, and lies radially inside, the peripheral planar surfaces of the wheel.

Preferably simultaneously with the fixing of the peripheral parts of the wheel halves, a fixing of the hub parts in the same takes place through an at least partially enclosing die cast moulding of a cylindrical bearing set in the hub part.

Further details and characteristics of the invention will be made clear below with reference to the accompanying drawings, in which:

Fig. 1 is a cross-section through two complementary wheel

halves placed together before fixing of the hub and peripheral parts of the wheel halves;

Fig. 2 is a side view of one of the wheel halves shown in Fig. 1;

5 Fig. 3 shows a partial sectioned view corresponding to Fig. 1 after fixing of the hub and peripheral parts of the wheel halves and a cylindrical bearing set in the hub part;

Fig. 4 is a side view of the wheel shown in Fig. 3;

10 Fig. 5 shows an alternative embodiment of the wheel in a view corresponding to Fig. 1;

Fig. 6 is a side view of one of the wheel halves shown in Fig. 5;

Fig. 7 shows a further embodiment of the wheel in a view corresponding to Fig. 1; and

15 Fig. 8 is a side view of one of the wheel halves shown in Fig. 7.

Fig. 1 shows a cross-section of a first embodiment of a wheel 10 according to the present invention. The wheel 10 is
20 comprised of two preferably identical, complementary wheel halves 12. Each wheel half 12 has an inner hub part 14, a disc-shaped radial part 16 and an outer peripheral part 18, and is made preferably from a curable plastic or another material which is shape-stable after moulding. Each hub part
25 14 has a cylindrical inner part 22 and an annular support element 24 for the radial support of an end of a cylindrical bearing 26 (Fig. 3). In the embodiment shown, the annular support element 24 assumes the form of a ring extending radially inward relative to the cylindrical part 22. This
30 ring has a number of notches 28 distributed around the circumference, whereby a number of annularly arranged radial support bosses 24' for the cylindrical bearing 26 are formed.

The peripheral part 18 of each wheel half 12 has a groove 30
35 extending completely around the wheel half. The groove is delimited by a wall part 32 which goes inwardly axially from the disc part 16, a radial annularly shaped web part 34 and an outer axially orientated wall part 36. The web parts 34 of the wheel halves 12 abut against and support one another

in the embodiment shown in Fig. 1 and have openings or holes 38 spaced around the circumference, which join the grooves 30 to each other.

5 An annular flange 40 with a circular peripheral surface 42 which forms a running surface on the finished wheel projects from the outer end of the respective outer axial wall part 36. The outer peripheral surface 44 of the wall part 36 lying
10 between the annular flanges 40 forms a flat surface in a polygonal configuration around the periphery of the wheel. In the embodiment shown, each such flat surface 44 forms one side of a hexagon. The annular flanges 40 are dimensioned in such a way that they, when for instance the wheels are used
15 on a shopping trolley which is to be transported via an inclined conveyor belt of the escalator type between different floors in a building, can fall down in longitudinal grooves in the bearing surface of the conveyor belt, so that one of the flat peripheral surfaces 44 lying between the
20 annular flanges 40 on each wheel can come to rest in flat contact with the upper side of the conveyor belt, thus making rolling of the wheel on the belt more difficult.

In Figs. 3 and 4, a complete wheel is shown manufactured from the wheel halves 12 which are shown and described in
25 connection with Figs. 1 and 2. In addition to the wheel halves 12, the complete wheel comprises a cylindrically shaped bearing 26, which has an outer, elongated cylindrical bearing sleeve 48 and an inner cylindrical bearing sleeve 50. Ball-shaped bearing bodies 52 are contained in a respective
30 bearing race at each end of the cylindrical bearing. The cylindrical bearing 46 is axially fixed in the hub part 14 of the wheel by means of an enclosing filling 54 of elastic material in a space outside the outer bearing sleeve 48 and between the support rings 24 and also by means of a ring 56
35 axially formed outside the support rings 24, which is continuously united with the filling 54. Apart from fixing the cylindrical bearing 46 in the hub part 14, the filling 54 and rings 56 bring about a locking together of the two wheel halves 12 in the central part of the wheel 10.

The peripheral part 18 of the wheel halves 12 are held together by a filling 58 of elastic material similar to that cast in the grooves 30 and in the holes 38 connected to these. In accordance with the present invention, the grooves 30 are formed in such a way that not only do they form via holes 38 a continuous space for a filling 58 to join together the peripheral part 18 of the wheel halves 12, but they also, at the same time, form a suitable space in which the filling 58 made of elastic material can form a suitable damping element, which damps vibration and noise which can occur, when the wheel is running, at the running flanges 40 of the wheel and the peripheral wall part 36 therebetween. An elastic plastic material, for example an elastomer, such as poly-urethane rubber or similar material, can suitably be used for fixing of the peripheral part 18 of the wheel halves 12 and for damping of vibration and noise.

The locking together of hub and peripheral parts 14 and 18, respectively, of the wheel halves 12 as well as fixing of the cylindrical bearing 26 in the hub part and forming of the damping element 58 is most advantageously achieved in the same sub-operation and using the same elastic material, even it is also conceivable to perform the moulding of the elastic material in different materials and at different times.

Figs. 5 and 6 show an alternative embodiment of the grooves 30 on the peripheral part 18 of the wheel halves 12, where the radial web parts 34' are held somewhat axially separated from one another to form a third intermediate space 60 for the damping of vibrations and noise. Otherwise this embodiment corresponds to that shown in Figs. 1 and 2.

Figs. 7 and 8 show a further embodiment of a wheel according to the present invention, in which the flat peripheral surfaces 44 in Figs. 1-6 are replaced by functionally equivalent radially outwardly directed support elements 62, placed at the corners of a imaginary hexagon. During transport on an inclined escalator-type conveyor belt, the wheel can in this way be kept stationary on the underlying surfaces

by two adjacent support elements 62. As shown in Fig. 8, the annular formation 30 has further a circular annular shape in contrast to the hexagonal shape in Figs. 1-6.

- 5 It is of course possible to vary the number of flat surfaces or projections at the corners in the polygonal configuration. This number ranges preferably from between five and ten.

CLAIMS

1. Wheel, especially a wheel for shopping trolleys or carts, said wheel (10) comprising a wheel body, which has a hub part (14) and a peripheral part (18), where the peripheral part has axially separated circular annular flange parts (40),
5 which form running surfaces (42) on the wheel body, and a peripheral surface lying between the annular flanges (40), which comprises surface portions (44, 62) in a polygonal configuration around the periphery of the wheel body, characterized in that the wheel body is comprised of
10 complementary wheel halves (12), where each wheel half near its peripheral part (18) has a groove (30) extending completely around the wheel half and which, radially inside the peripheral planar surfaces (44, 62), extends axially inwardly from the outside of the respective wheel half (12) to an
15 essentially radial, inner web part (34, 34') of the respective wheel half (12), said web parts (34, 34') of the wheel halves having axial openings (38) establishing communication between the grooves (30) of the wheel halves, the peripheral parts (18) of the wheel halves being held together
20 by an elastic material (58) injected into the grooves (30) and openings (38).

2. Wheel according to Claim 1, characterized in that the hub parts (14) of the wheel halves (12) are held together by an
25 elastic material (54, 56) which is moulded to at least partially enclose a cylindrically shaped bearing (46) in the hub parts (14).

3. Wheel according to Claims 1 or 2, characterized in that
30 the elastic material (54, 56, 58) is an elastomer, such as synthetic rubber, for example polyurethane rubber or the like.

4. Wheel according to any of Claims 1-3, characterized in
35 that the essentially radial web parts (34) of the wheel halves (12) abut each other substantially along a radial

central plane of the wheel body.

5 5. Wheel according to any of Claims 1-4, **characterized** in that the peripheral surface portions consist of flat surfaces (44) in a polygonal configuration.

10 6. Wheel according to any of Claims 1-4, **characterized** in that the peripheral surface portions consist of radially projecting support elements (62) placed at the corners of an imaginary polygon.

15 7. Wheel according to any of Claims 1-6, **characterized** in that the number of peripheral surface portions in the polygonal configuration are preferably five to ten.

20 8. Method for manufacturing a wheel (10), especially a wheel for a shopping trolley or cart, said wheel comprising a wheel body, which has a hub part (14) and a peripheral part (18), where the peripheral part (18) has axially separated, circular annular flange parts (14), which form running surfaces (42) on the wheel body, and a peripheral surface, lying between the annular flanges, which comprises planar surfaces (44, 62) in a polygonal configuration around the periphery of the wheel body, **characterized** in that two wheel
25 bodies forming complementary wheel halves (12) are joined together and placed in a mould, whereafter the peripheral parts (18) of the wheel halves (12) are fixed to each other by injection of an elastic material (58) in mutually communicating spaces (30, 60) extending completely around the wheel
30 halves (12) and lying radially inside the peripheral planar surfaces (44, 62).

35 9. Method according to Claim 8, **characterized** in that preferably simultaneously with the fixing together of the peripheral parts (18) of the wheel halves (12), the hub parts (14) of the wheel halves are fixed together by a moulding which at least partially encloses a cylindrically shaped bearing (46) set in the hub part (14).

10. Method according to Claim 9, **characterized** in that the fixing together of the peripheral parts (18) of the wheel halves and the hub parts (14) is done using the same material.

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11. Method according to Claim 10, **characterized** in that the material is an elastomer, such as synthetic rubber, for example polyurethane rubber or the like.

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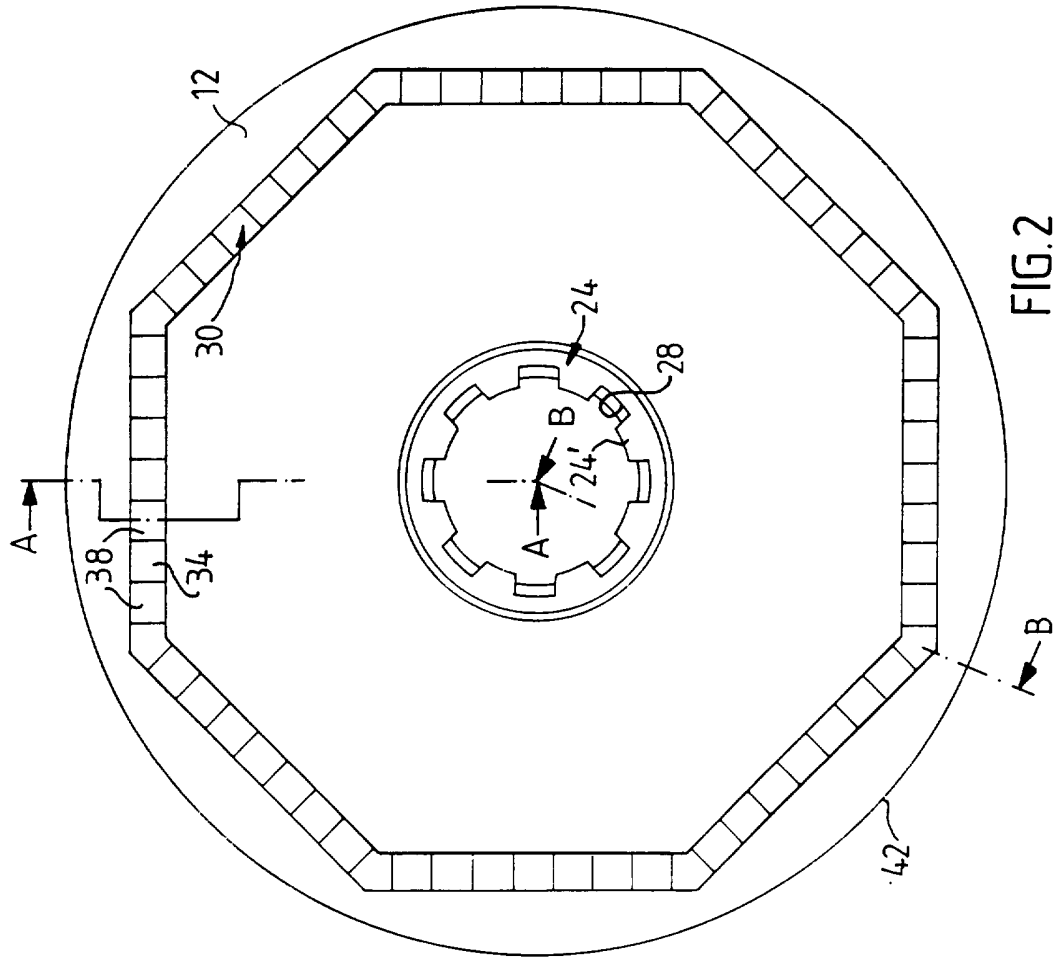


FIG. 2

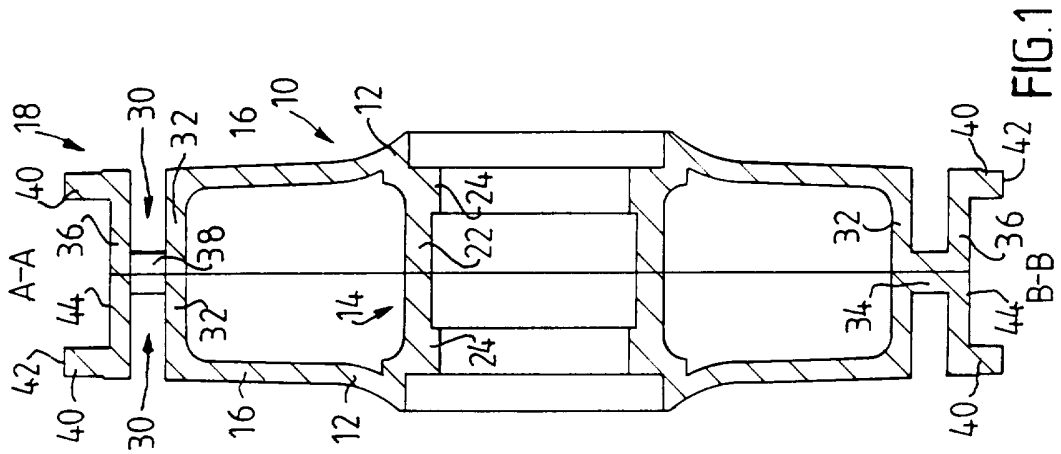


FIG. 1

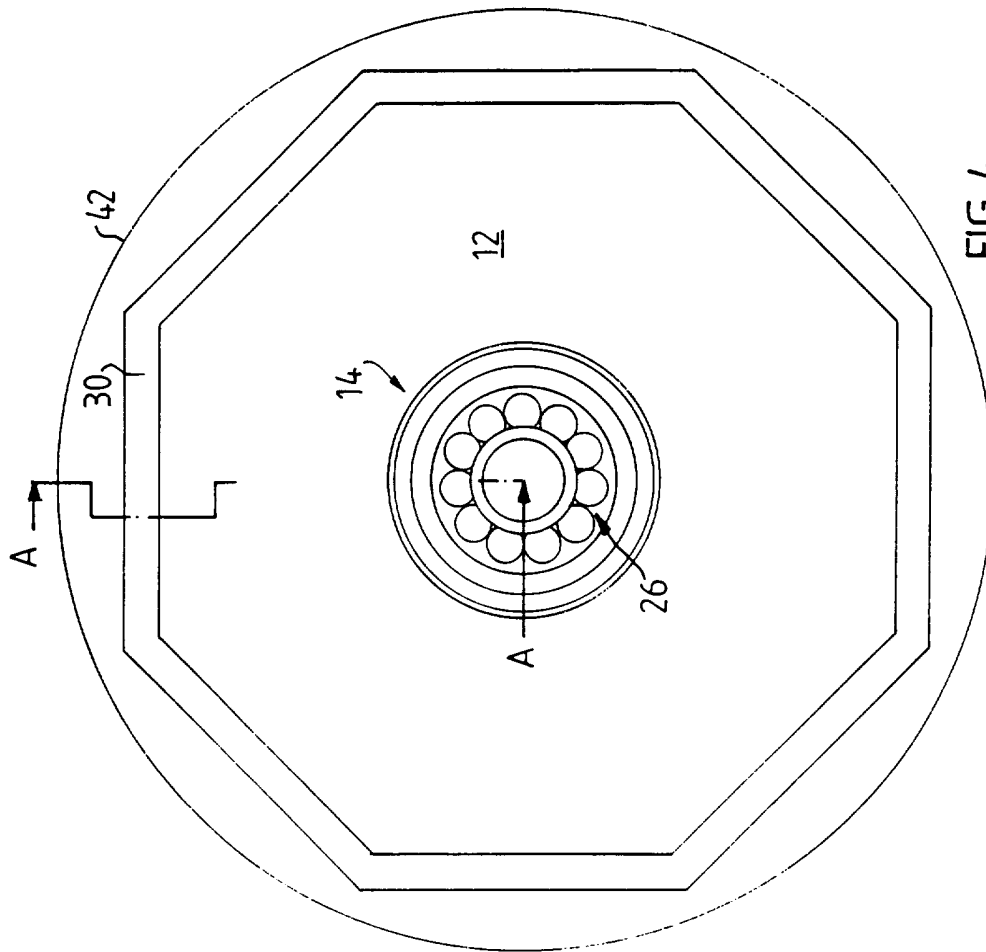


FIG. 4

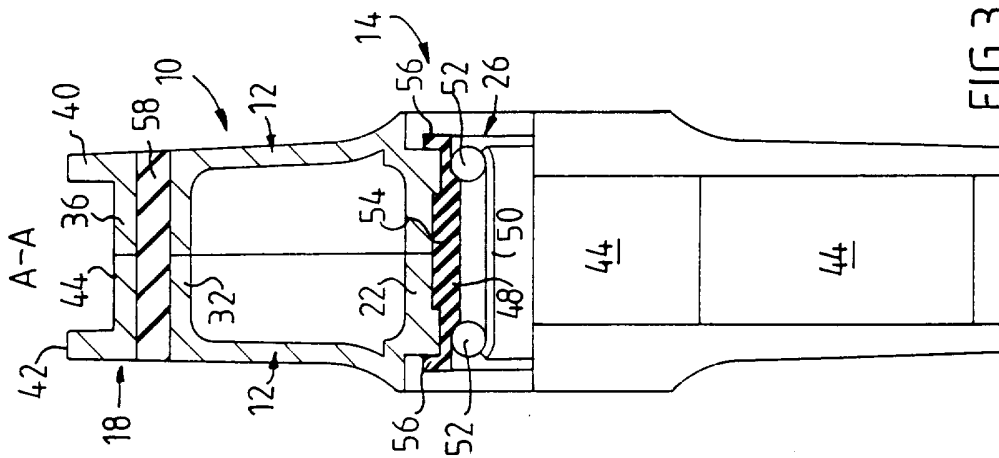


FIG. 3

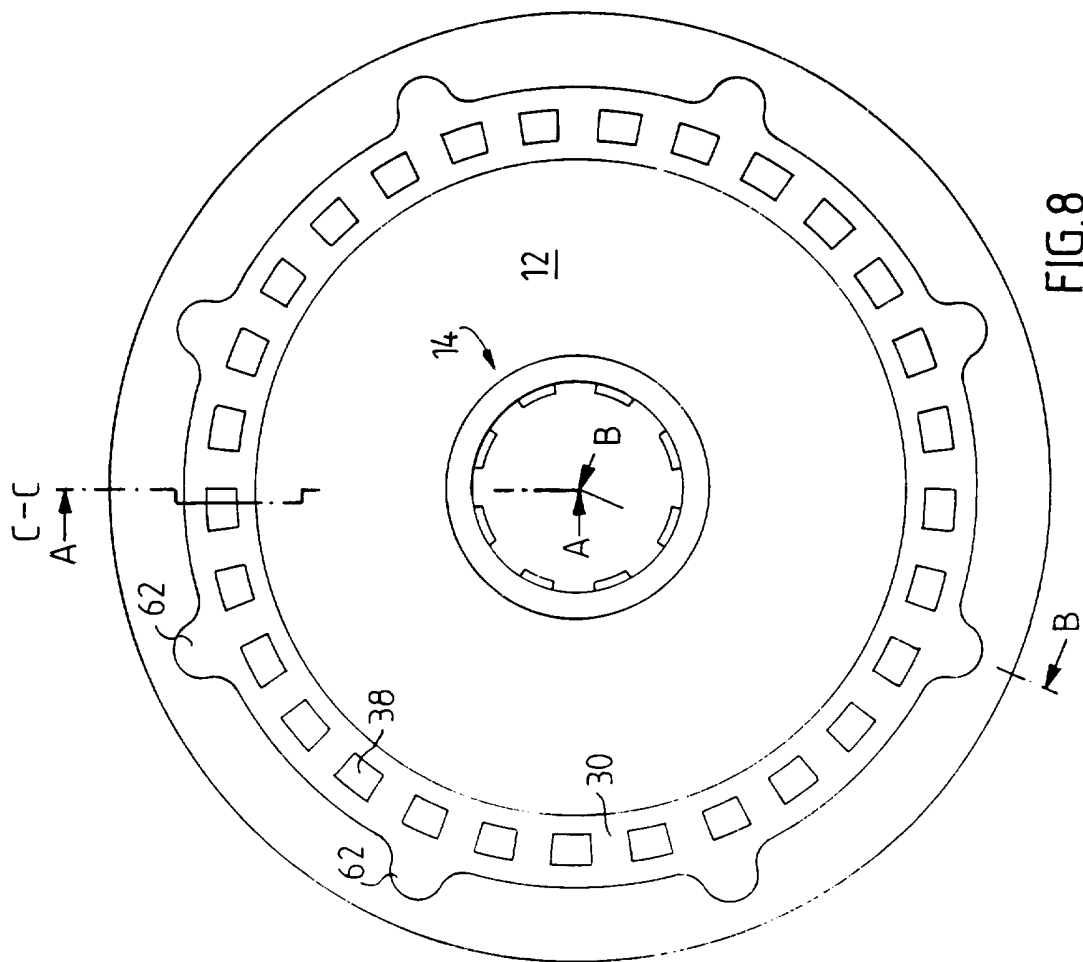


FIG. 8

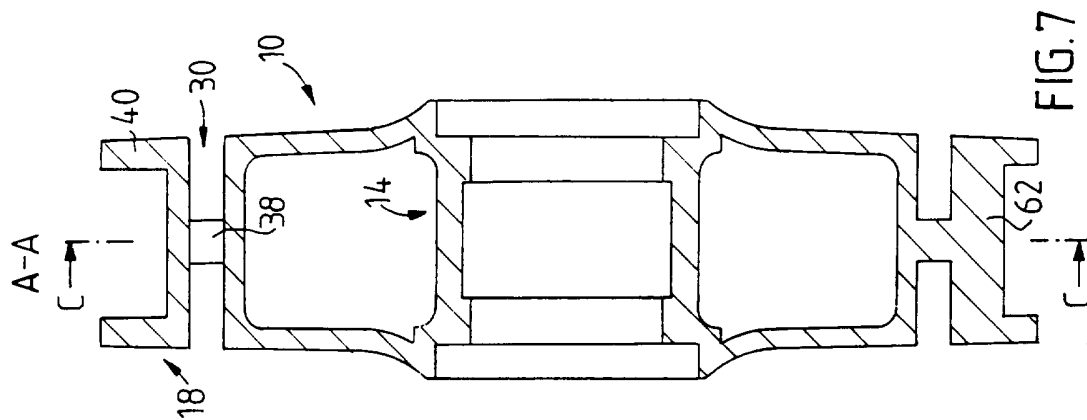


FIG. 7

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 95/01285

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: B60B 5/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: B60B, B29C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 2091651 A (HEDSTROM CO), 4 August 1982 (04.08.82) --	1,8
A	US 3894776 A (BLACK), 15 July 1975 (15.07.75) --	1,8
A	US 4818034 A (DJERF), 4 April 1989 (04.04.89) --	1,8
A	US 3578812 A (LADUE), 18 May 1971 (18.05.71) -- -----	1,8

 Further documents are listed in the continuation of Box C. See patent family annex.

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Date of the actual completion of the international search

12 March 1996

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

Information on patent family members

05/02/96

International application No.

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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US-A- 3894776	15/07/75	CA-A- 992585 DE-A,C,C 2417208 FR-A,B- 2225299 GB-A- 1457963	06/07/76 24/10/74 08/11/74 08/12/76
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US-A- 3578812	18/05/71	NONE	