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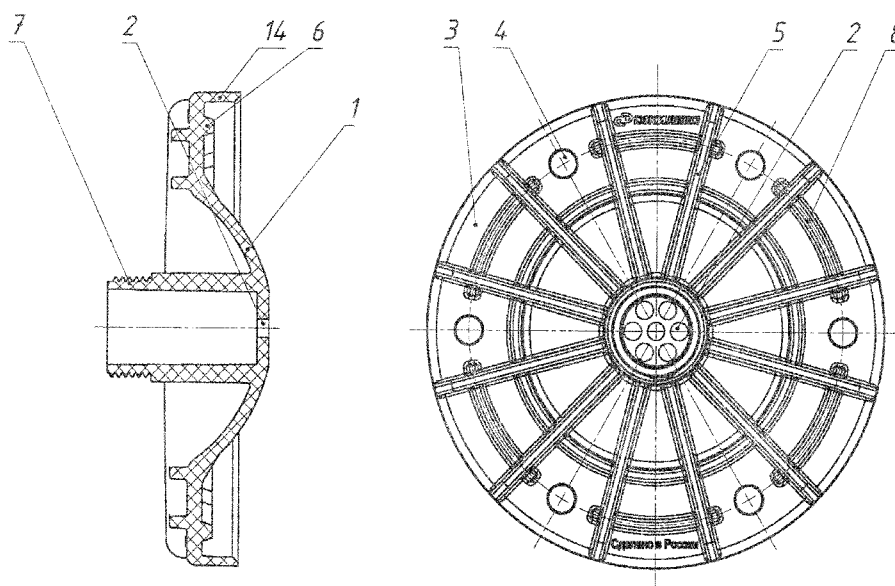


Fig. 1

(57) Abstract: The plastic flange contains the central section (1) with the flow hole (2) and the connecting fitting (7), made integral with the annular peripheral section (3), on which there are holes (4) for fasteners and radial stiffeners (5) are made located around the central section (1) on one side of the flange. On the other side of the flange there are concentrically arranged the outer mounting ring (14) on the outer edge of the peripheral section (3) and the stop collar (6) around the central section (1). The central section (1) is made convex, for example, of a spherical shape (a hollow sphere segment) or of a convex conical shape (a truncated hollow cone part) and averted with convex from the connecting fitting (7). A pipe manifold or a main pipeline of water supply arrangements is connected to the fitting 7 in conventional manner. The pass of the fitting (7) is connected to the flow hole (2) of the central section (1). The flange is made of glass-filled polypropylene. On the peripheral section (3) between the holes (4) for the fasteners the arcuate stiffeners (8) are



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made. Between each adjacent holes (4) for fasteners one arcuate stiffener (8) and two radial stiffeners (5) are made. Radial and arcuate stiffeners (5,8) are made of different heights and connected together at the intersections. The monolithic plastic flange made of glass-filled polypropylene has such advantages as increased bearing capacity, as well as reliability and durability, lower cost of foundry, stainlessness, lower weight.

## **Flange**

### **Field of the invention**

The invention relates to connecting elements of hydraulic equipment and can be used as part of hydraulic accumulators, tanks of various applications and other products, mainly having an elastic membrane or partition.

### **Prior art**

A pipe joint flange is known, which is a sheet metal work made by cold-forming method, consisting of a round base with a flanged edge with mounting holes, and a central cup-shaped protrusion in the form of a hollow cylinder with a round through hole, characterized in that when the sheet metal thickness from which the product is made is 3 mm, the diameter of the cup-shaped protrusion in the form of a hollow cylinder to the diameter of its passage hole ratio is 2:1, and the height of the cup-shaped protrusion does not exceed half the diameter of the passage hole with scattering of all these dimensions within  $\pm 15\%$  (RU 167377).

A flange is known with a central passage hole, and with a conical surface, the generatrix of which is located on the axis of the flange at an acute angle, including a sleeve with a cylindrical surface mounted in the inner hole and rigidly connected to the flange, a protective coating is applied on the side of the inner and outer surfaces of the sleeve with a range of operating temperatures from  $-60$  to  $150^{\circ}\text{C}$ , and the coverage area of the welded joint is limited to the weld joint area (RU 57661).

A flange made of sheet metal is known, containing a central hole, a flat surface for placing the seal used to join the mating flange, an external bend in the form of a side surface, which is a stiffener, and mounting holes in the amount of not less than four (RU 2620535).

These known steel flanges have no sufficient bearing capacity, are corrodible, labor-intensive, have a large mass and high cost.

A plastic flange is also known, containing a tubular body with a thrust face, a ring with holes for bolt rods and stiffeners oriented from the ring to the thrust face and adjacent to the ring in the spaces between the holes, the body, ring and stiffeners are made in one piece, the minimum rib height on the ring side is equal to the difference in the radii of the hole centers for the bolt rods and the outer surface of the housing (SU 568783, prototype).

The disadvantages of this flange are poor strength characteristics due to the non-optimal choice of material with a very limited shelf and service life, insufficient fracture resistance in the middle part of the flange and insufficient bending resistance in the peripheral part of the flange, which reduces the bearing capacity, reliability and durability of its operation, limits the allowable number of repair and other assembly and disassembly works.

### **Summary of the Inventions**

The technical problem being solved by this technical solution is the creation of an effective and compact flange suitable for mass production by modern technological means, as well as the expansion of flanges range.

The technical result, which allows to solve this problem, consists in increasing the bearing capacity of the flange due to the fact that the central and peripheral parts of the flange have improved geometric and strength characteristics, providing for the increased reliability and durability of its operation, the allowable number of repair and other assembly and disassembly work has been increased. Simultaneously, the dynamic performance of the flange is improved, the design of which is less susceptible to vibrations, since it is substantially bent in the middle, and conditions are created for long-term operation (increased resource) with minimal wear of the flow part, which also allows to increase operational reliability.

The essence of the invention is that the plastic flange contains a central section with a flow hole and a connecting fitting, made integral with the annular peripheral section, on which there are holes for fasteners and radial stiffeners are made located around the central section on one side of the flange, on the other side of which the outer mounting ring and the stop collar are concentrically arranged around a central section made convex and averted with convex from the connecting fitting, the pass of which is connected to a flow hole of the central section.

The flange is preferably made of glass-filled polypropylene.

Preferably, in the peripheral section between the holes for the fasteners arcuate stiffeners are made.

Preferably, between each adjacent holes for fasteners one arcuate and two radial stiffeners are made.

Preferably, the radial and arcuate stiffeners are made of different heights and are interconnected at their intersections.

In special cases of implementation, the connecting fitting is made with an external thread or the connecting fitting is made with a hole for an insert adapter with an external thread.

Preferably, the flow hole of the central section is made with separating elements.

Preferably, the central section is made convex spherical in shape.

#### **Short description of drawings**

In the drawing of Fig. 1, the flange without an adapter is shown, in Fig. 2 the flange with the adapter, Fig. 3 presents an example of the flange installation as part of a hydraulic accumulator, Fig. 4 shows volumetric general view of the flange.

#### **Detailed Description of the Invention**

The plastic flange contains a central section 1 with a flow hole 2 and a connecting fitting 7, made integral with an annular peripheral section 3, on which there are holes 4 for fasteners and radial stiffeners 5 are made located around the central section 1 on one side of the flange. On the other side of the flange there are concentrically arranged an outer mounting ring 14 on an outer edge of the peripheral section 3 and a stop collar 6 around the central section 1. The central section 1 is made convex, for example, of a spherical shape (a hollow sphere segment) or of a convex conical shape (a truncated hollow cone part) and averted with convex from the connecting fitting 7. A pipe manifold or a main pipeline of water supply arrangements is connected to the fitting 7 in conventional manner. The pass of the fitting 7 is connected to the flow hole 2 of the central section 1.

The flange is made of glass-filled polypropylene.

On the peripheral section 3 between the holes 4 for the fasteners the arcuate stiffeners 8 are made. Between each adjacent holes 4 for fasteners one arcuate stiffener 8 and two radial stiffeners 5 are made. Radial and arcuate stiffeners 5,8 are made of different heights and connected together at the intersections.

The connecting fitting 7 in special cases of implementation is made with an external thread (Figure 1) or with a hole for an insert adapter 9 with an external

thread (Figure 2). The flow hole 2 of the central section 1 is made, as a rule, with separating elements 15.

The inventive flange can be installed in a household hydraulic accumulator for water supply arrangements (Fig. 3) having a housing 10 on which a counter flange 11 is turned on edges. Inside the housing 10 there is a membrane 12 sealed between the surfaces of the housing 10 and the inventive flange when screwing fasteners (screws) 13. The stop collar 6 eliminates excessive (destructive) force from pressing the peripheral section 3 at the edge of the membrane 12.

During operation, through the fitting 7 of the flange, water is supplied to the membrane 12 under excessive pressure. In the space between the membrane 12 and the housing 10 there is compressed air, the volume of which varies depending on the water pressure.

Thus, a certain amount of water is accumulated in the hydraulic accumulator under a certain pressure. Water is consumed from the hydraulic accumulator through the fitting 7 when the pressure drops in the pipe manifold of the water supply arrangements or in the consumer mains.

The manufacture of the inventive flange from glass-filled polypropylene imparts high anticorrosive and strength properties. The performance of the convex surface of section 1, directed inside the housing 10 during installation, radial and arcuate stiffeners 5 and 8 prevent deformation and the occurrence and transmission of vibrations from pipelines to the housing 10 of the hydraulic accumulator, provide high load-bearing capacity and thereby reduce restrictions on the pressure level in the hydraulic accumulator.

The separating elements 15 do not allow the membrane 12 to be pulled outward from the hydraulic accumulator housing 10 and can serve as a central stiffener of the flange.

The monolithic plastic flange made of glass-filled polypropylene has such advantages as increased bearing capacity, as well as reliability and durability, lower cost of foundry, stainlessness, lower weight.

#### **Industrial application**

The present invention is implemented with multipurpose equipment extensively employed by the industry.

### Claims

1. A plastic flange comprising an integrally made central section with a flow hole and an annular peripheral section, on which there are holes for fasteners and radial stiffeners are made located around the central section on one side of the flange, on the other side of which an outer mounting ring and a stop collar are concentrically arranged around a central section, characterized in that it is provided with a connecting fitting made integral with the central section, wherein the central section is made convex and averted with convex from the connecting fitting, the pass of which is connected to the flow hole of the central section.

2. The flange according to claim 1, characterized in that it is made monolithic of glass-filled polypropylene.

3. The flange according to any one of claims 1,2, characterized in that arcuate stiffeners are made in the peripheral section between the holes for the fasteners.

4. The flange according to claim 3, characterized in that between each adjacent holes for fasteners one arcuate and two radial stiffeners are made.

5. The flange according to claim 3, characterized in that, the radial and arcuate stiffeners are made of different heights and are interconnected at their intersections.

6. The flange according to any one of claims 1,2, characterized in that the connecting fitting is made with an external thread.

7. The flange according to any one of claims 1,2, characterized in that the connecting fitting is made with a hole for an insert adapter with an external thread.

8. The flange according to any one of claims 1,2, characterized in that the flow hole of the central section is made with separating elements.

9. The flange according to any one of claims 1,2, characterized in that the central section is made convex spherical in shape.

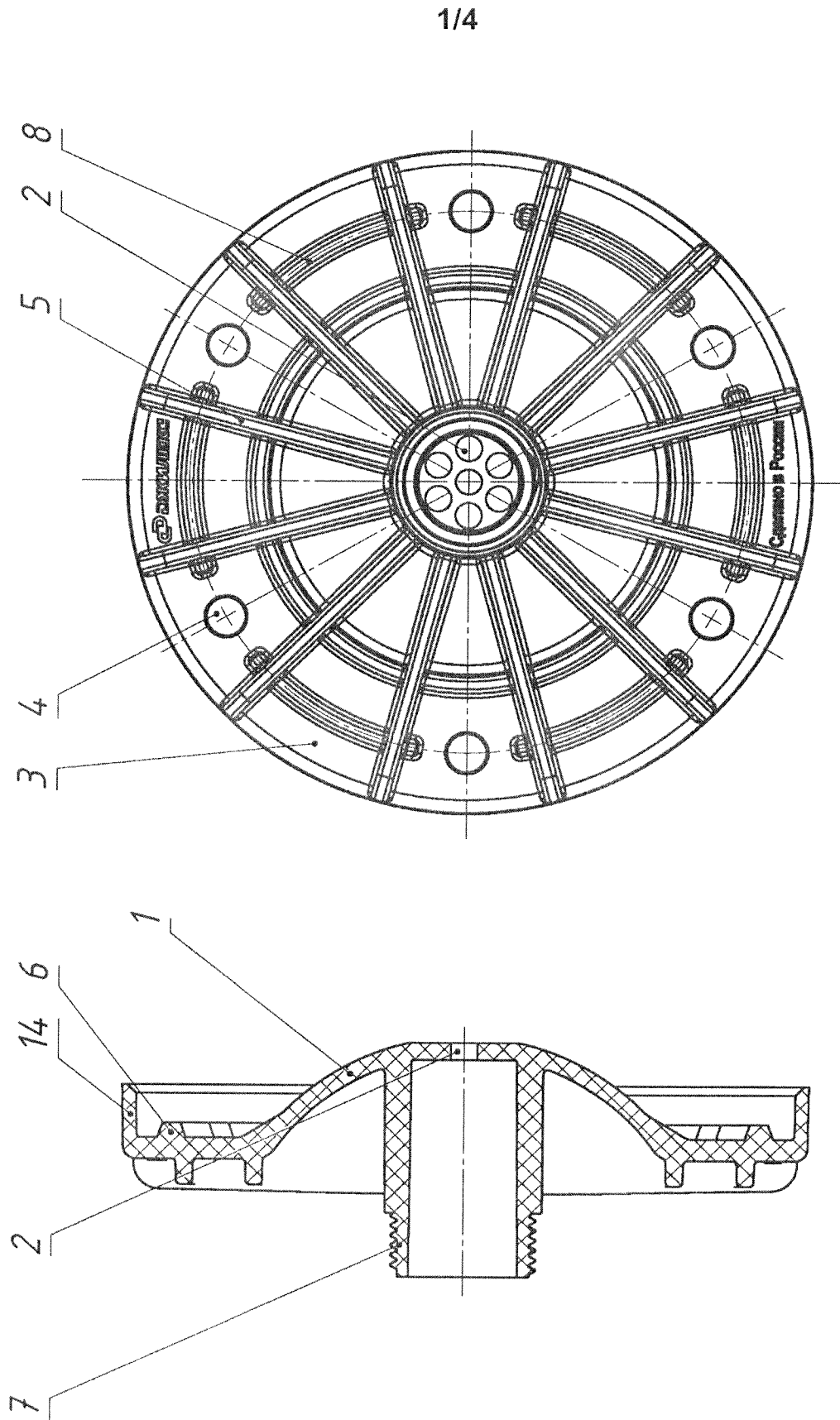


Fig. 1

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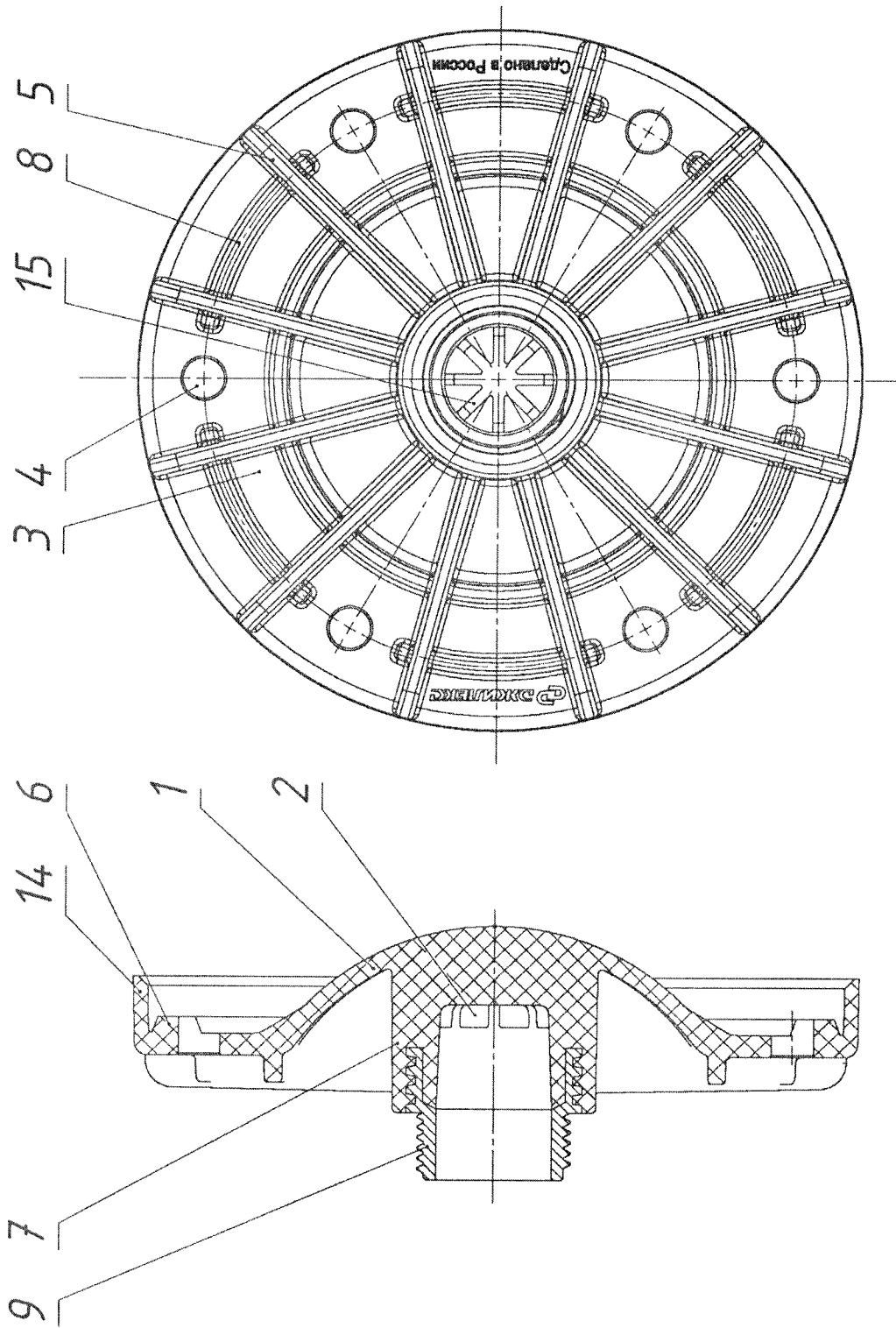


Fig. 2

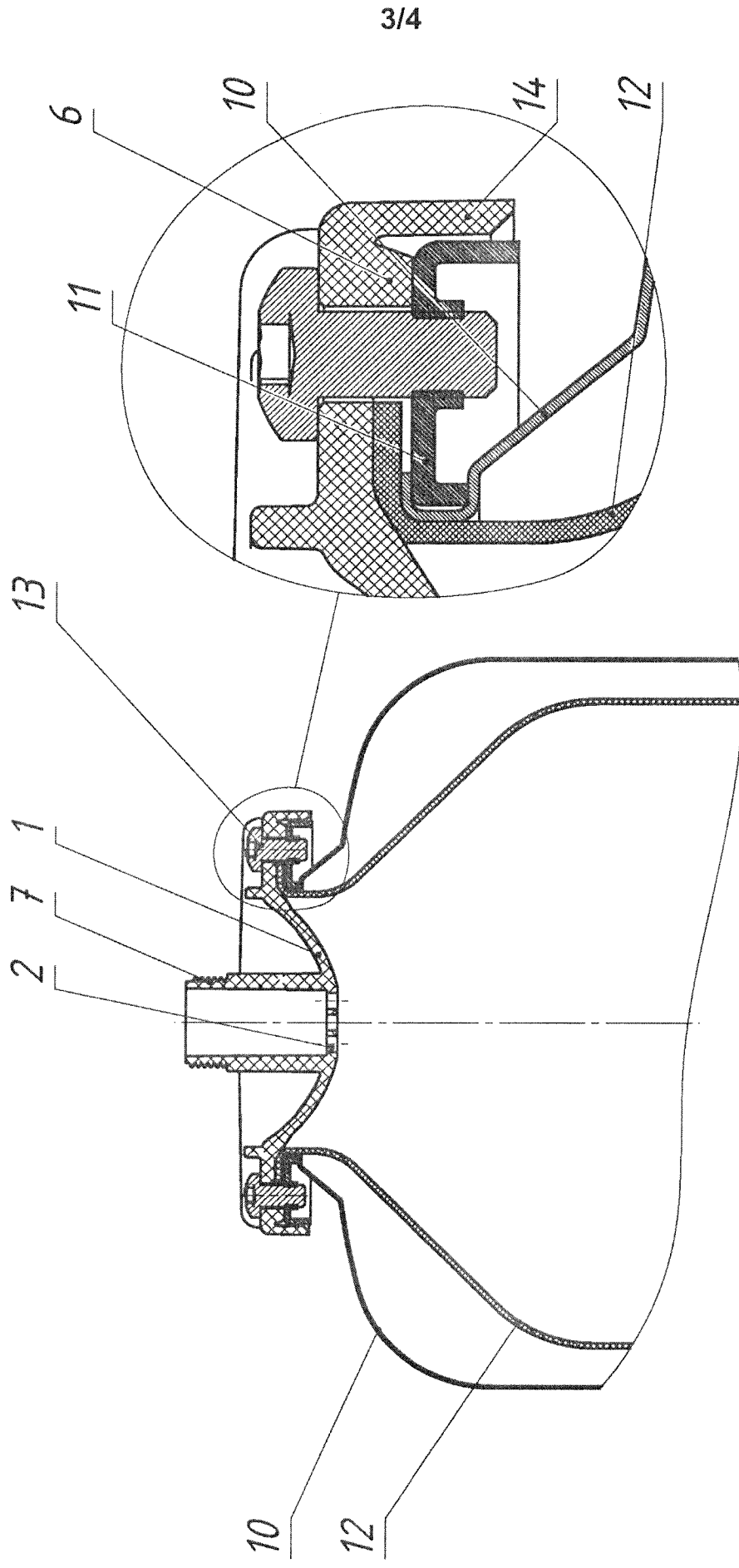


Fig. 3

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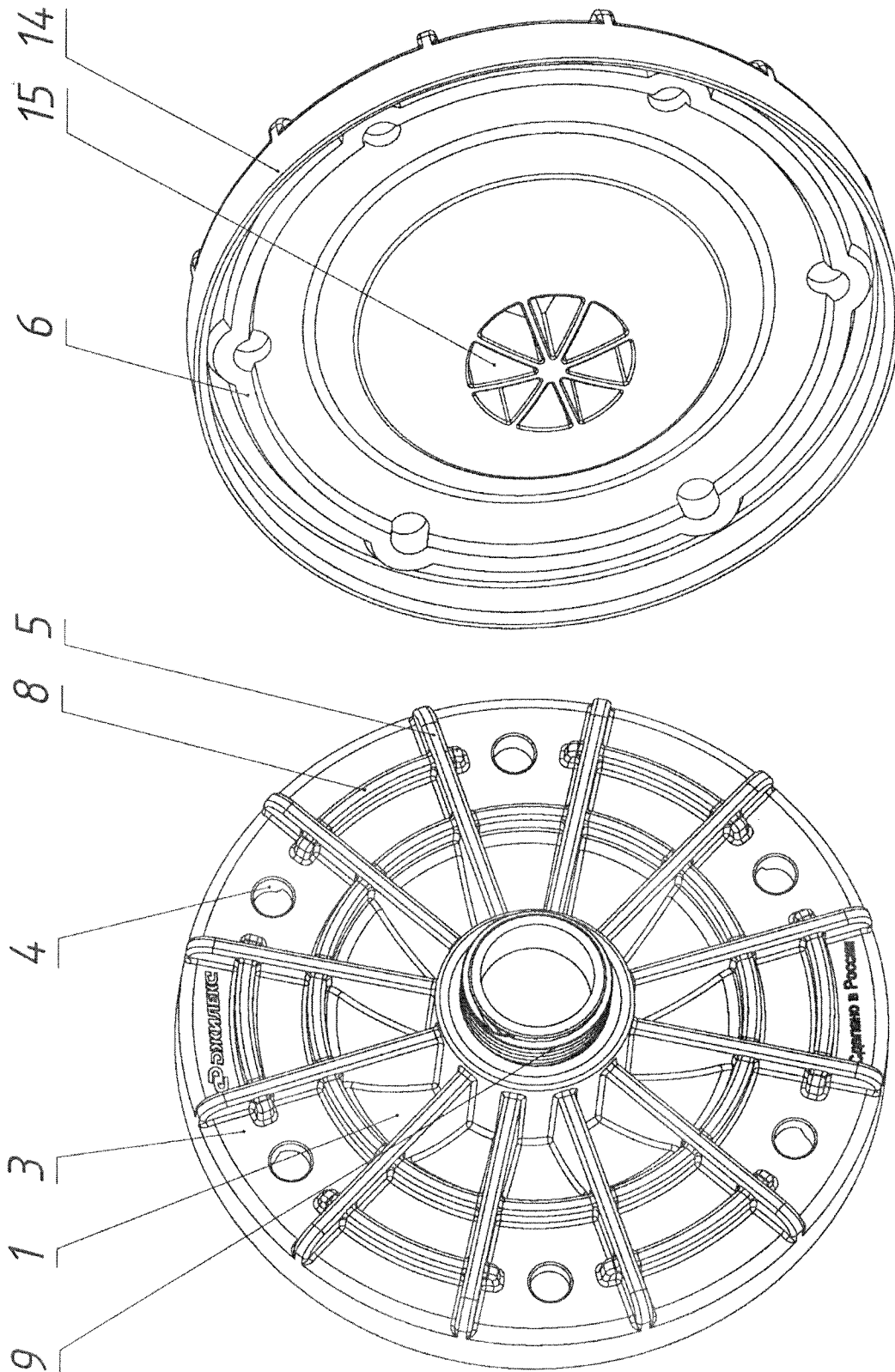


Fig. 4

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/RU 2020/000077

A. CLASSIFICATION OF SUBJECT MATTER		
<i>F16L23/00 (2006.01)</i>		
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)		
F16L 23/00		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
PatSearch (RUPTO internal), USPTO, PAJ, Esp@cenet, DWPI, EAPATIS, PATENTSCOPE		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A, D	SU 568783 A1 (KIEVSKIJ OTDEL SPETZIALNGO KONSTRUKTORSKOGO BURO PO NOVOJ TEKHNIKE MONTADJNIX I SPETZIALNIX STROITELNIX RABOT) 15.08.1977	1-9
A, D	RU 2620535 C2 (LEVIN DMITRIJ OLEGGOVICH) 26.05.2017	1-9
A, D	RU 57661 U1 (OOO «TZELER») 27.10.2006	1-9
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Date of the actual completion of the international search		Date of mailing of the international search report
15 June 2020 (15.06.2020)		25 June 2020 (25.06.2020)
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