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**EP-A1- 0 322 530**
**DE-A1- 19 652 933**
**DE-U- 7 129 399**
**US-A- 4 609 077**
**EP-A1- 0 716 246**
**EP-B1- 0 989 320**
**WO-A1-2016/120800**
**DE-A1- 102013 012 238**
**JP-A- 2007 285 385**
**JP-A- H0 425 627**
**JP-A- H08 303 499**
**JP-U- S5 693 529**
**JP-U- S5 929 432**
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**Fortsættes ...**

**Maschinenübersetzung von JP S5693529 U**
**1 January 2007, SPRINGER, ISBN: 978-3-540-49868-1, article MEISSNER MANFRED: "Metallfedern, Grundlagen, Werkstoffe, Berechnung, Gestaltung und Rechnereinsatz", pages: 1 - 166**
**1 October 2005, VIEWEG & SOHN VERLAG, ISBN: 978-3-8348-0078-7, article BÜRGEL RALF: "Festigkeitslehre und Werkstoffmechanik. Band 2", pages: 1 - 109**
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**Onlineshop Beuth-Verlag- DIN EN ISO 1302 Berichtigung 1- 2008-08 (abgerufen am 08.02.2022)**
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Description

The invention relates to a novel friction lining holding spring for a motor vehicle partial-lining disk brake lining and a novel motor vehicle disk brake lining having a friction lining holding spring.

It is known in principle to releasably clamp/fix a motor vehicle disk brake lining with the aid of the elastic prestress of a "spring clip" by means of axially oriented plug-in mounting in an inner wall of a pot-shaped actuating member (such as, in particular, a hydraulic brake piston). For this purpose, a (friction lining) holding spring is provided on a backplate of the motor vehicle disk brake lining, said spring resting directly or indirectly, by means of a U base section, on the rear side of the backplate and being fixed permanently thereon, cf. WO 92/18785 A1, WO 94/29611 A1 and DE 101 36 235 A1. For the purpose of releasable fixing on the actuating member, the holding spring has two elastically deformable U-spring straps, which are arranged diametrically opposite one another and, after correct push-in mounting in the brake piston, are clamped into the inner wall of the pot-shaped actuating member/brake piston with a defined, radially outward-oriented elastic preloading force.

The friction lining holding springs of the type in question have an offset knee piece on the U-spring strap thereof. One disadvantage of the known arrangement is regarded as the fact that push-in mounting of the friction lining holding spring is considered to be in need of improvement from ergonomic points of view. It is disadvantageous that the force requirement increases progressively as push-in mounting in the interior of the brake piston progresses. The desired improvement should be available with reduced effort, whether mounting is manual or robot-assisted, both at the vehicle brake manufacturer and for the purpose of servicing in the vehicle environment.

It is therefore an object of the present invention to present a friction lining holding spring which is easy to use, or a motor vehicle disk brake lining which has a friction lining holding spring and can be mounted in an improved manner, for use in a motor vehicle partial-lining disk brake.

To solve the problem, the proposal according to the invention is that each knee piece has an integrated gearing means, which is in particular designed as an uneven brake piston insertion trajectory such that, in the case of insertion into the brake piston, there is a predefined gearing reduction effect for the purpose of automatically influencing or modelling the necessary force requirement. Accordingly, as push-in mounting (feed) of the friction lining holding spring according to the invention progresses, automatically adapted force reduction with a gearing effect in accordance with the physical principle of splitting the working force or extending the working travel is made available by means of the insertion trajectory in such a way that the working force requirement at least does not increase progressively as push-in mounting progresses. The two physical measures mentioned (working force splitting, working travel extension) can be embodied jointly (side-by-side) on the knee piece. In particular, the trajectory can produce a correspondingly adapted gearing effect by means of travel extension and/or force component fractions (axial force fraction, radial force fraction) with automatically modified splitting as a result, with the result that, as the mounting feed motion progresses, a reduced, constant or at most linearly increasing push-in force requirement is sufficient to elastically preload the brake piston holding spring. Accordingly, the specific insertion trajectory profile of the knee piece defines the achievable gearing effect or the degree of force relief achieved.

A mounting facilitation measure which can in principle be exploited independently of or in addition to gearing effects envisages that the entire holding spring, the U-spring legs thereof or at least the knee piece is provided with a special

surface treatment, at least in the direction of the brake piston inner wall. Inter alia, the surface treatment can comprise a special coating of the holding spring. A particular preference is, for example, to incorporate friction-reducing constituents as an additive into an anticorrosion coating which is applied to the metal surface of the brake piston holding spring. As an alternative, it is possible for an antifriction coating to be additionally applied as a top layer to an anticorrosion coating. Uncoated metal surfaces, in particular, can be advantageously treated if at least the contact surface thereof which is involved is largely free from pores, i.e. is of smoothed design (ground, polished, brushed or the like). It is advantageous here if a groove direction according to DIN ISO EN 1302 (micrograph) is oriented very largely parallel to the mounting push-in direction M of the friction lining holding spring. The reduced-friction surface treatment lowers prevailing contact or sliding friction in contact zones between the brake piston inner wall and the knee piece.

Finally, the invention defined above is explained by means of various drawings and embodiments, in some cases in comparison with a known holding spring design. In the drawing:

Figure 1 shows schematically a view and mounting force development of a conventional known friction lining holding spring during the process of insertion into a brake piston,

Figure 2 shows schematically a view and mounting force development of a preferred embodiment of a friction lining holding spring according to the invention,

Figure 3 shows the embodiment according to figure 2 on an enlarged scale,

Figure 4 shows a schematic comparison of a mounting stage sequence a) according to the invention (top row of images), b) of the conventional type (bottom row of images), and

Figure 5 shows an enlarged partial view of a friction lining holding spring similar to figure 3.

A friction lining holding spring 1 is fixed on a rear side of a backplate 2 of a friction lining 3 of a motor vehicle partial-lining disk brake. The front side of the backplate 2 bears a friction material 4. The friction lining holding spring 1 is cut out in one piece from a thin sheet steel material. It comprises a base section 5, which is arranged largely flat and so as to be stiff in bending and has a central fastening tab 6 comprising a cup and a through-opening 8 for the purpose of fixing on the backplate 2. Laterally at the ends of the base section 5 there are in each case two U-spring legs 9, 10, which are arranged symmetrically with respect to one another, are bent in the form of U-shaped yokes and are set in a trapezoidal shape. Both U-spring legs 9, 10 branch off from the base section 5 at an obtuse angle, wherein each U-spring leg 9, 10 ends with a knee piece 11, 12, which is offset again in the same direction. On the far side of their offset point, known knee pieces 11, 12 are rectilinear and flat (figure 1).

The proposal is for a knee piece 11, 12 which is curved in itself or offset several times and the spring leg 9, 10 of which thus incorporates a force reduction. In particular, it is possible to incorporate a progressive lever mechanism effect, thus ensuring that the force requirement for push-in mounting is linear. In other words, the friction lining holding spring 1 (or alternatively the actuating member, or both components) contains a curved insertion contour which, as a result, generates a progressive lever mechanism effect. One particular advantage of an embodiment of the present invention is that a specially curved insertion contour avoids an exponential rise in the mounting force requirement by virtue of a lever mechanism transmission ratio of nonlinear configuration.

In other words, the present invention allows particularly favorably optimized engagement between the actuating member and

the holding spring. In particular, the insertion contour of the knee piece 11, 12 has a degressive curvature.

The curvature of the insertion contour of the knee piece 11, 12 can be configured as a circular arc or can be curved in some other way, depending on the required gearing effect.

Elliptical or involute curvature is possible in principle, depending on the desired reduction effect. A contact angle between the spring arm and the actuating member is changed positively over the mounting travel thereof.

The force requirement for axially directed push-in mounting of the friction lining holding spring 1 in the interior of the actuating member varies continuously over the mounting travel. When the end mounting position is reached, the force requirement is significantly reduced and reaches a reduction of about 35% of the force requirement of a previously known configuration, for example (cf. the comparison according to figure 1).

According to the invention, it is likewise made possible in principle for the geometry of the insertion contour of the knee piece 11, 12 to comprise multiply offset subsections, that is to say, in principle, subsections of straight configuration and/or angles bent with an offset in several stages, and/or a combination of curvatures with different radii alone and/or in combination with one or more curved and offset subsection(s). The geometry defines the reduction effect in the engagement between the actuating member and the insertion contour.

In modeling the moment of resistance to bending of the U-spring leg or knee piece 9, 10, 11, 12, it is possible, in particular, for this to be modified in sections by providing cross-sectional profiling, profile modification, wall thickness variation, thickening or a through-opening. All the measures can be present individually or linked in any desired combination with one another, even if such a design is not illustrated by the drawing.

One additional usable variation consists in that the material of the U-spring leg 9, 10 or knee piece 11, 12 can be modified in sections, e.g. by introducing cold work hardening in some sections.

A mounting facilitation measure with a direct effect which can in principle be exploited independently of or in addition to gearing effects envisages that a holding spring 1 provided with an anticorrosion coating, the U-spring legs 9, 10 of which or at least the knee piece 11, 12 of which is provided, at least on the outside - i.e. in the direction of the brake piston inner wall - with a special surface treatment. This can include particularly smoothly paired surfaces or a surface coating containing tribologically slip-reducing constituents. Accordingly, an integrated or specially applied antifriction coating reduces the prevailing contact or sliding friction between the brake piston inner wall and the knee piece 11, 12. The smoothing, i.e. brushing direction, polishing or grinding direction, are aligned with the groove direction oriented parallel to the mounting direction M of the lining holding spring 1.

In short, a design configuration according to the invention of the holding spring 1 or actuating member includes improved engagement of the mechanism, with an improved engagement angle, wherein the gearing effect with the novel improvement has a very advantageous effect on a reduction of the push-in force requirement for simplified friction lining mounting. Accordingly, the present invention comprises a significant relief for a worker.

List of reference signs

1 Friction lining holding spring
2 Backplate
3 Friction lining
4 Friction material
5 Base section
6 Fastening tab
7 Cup
8 Through-opening
9 Spring leg
10 Spring leg
11 Knee piece
12 Knee piece

M Assembly direction
Ax Axial direction
R Radial direction

Patentkrav

1. Friktionsbelægningsholdefjeder (1) for et motorkøretøjs delvis belagte skivebremsebelægning (3), hvilken holdefjeder foreligger udskåret i ét stykke af tyndt stålpladematerialе bøjet som U-formet åg, omfattende et vidtgående plant samt bøjningsstift arrangeret U-formet basisafsnit (5), som har en central fastgørelseslaske (6) med skål (7) og gennemgangsåbning (8) med henblik på fiksering på en bagplade (2) for et motorkøretøjs skivebremsebelægning (3), og med to symmetrisk i forhold til hinanden arrangerede U-fjederben (9,10), der hvert sted på endesiden af det U-formede basisafsnit (5) er afgrenet trapezformet afvinklet i en stump vinkel i forhold til basisafsnittet (5), med indskydningsmontage i et indre rum af et aktiveringsorgan med en bremsestempelindervæg, hvor hvert U-formet fjederben (9,10) har en fri ende, der er udformet som afkrøppet knæstykke (11,12), hvor hvert knæstykke (11,12) råder over et gearingsmiddel, der er udformet som ikke-plant udformet kurve for bremsestemplets indføringsbane sådan, at der ved indføringen i bremsestemplet foreligger en defineret forudfastsat gearreduktionseffekt med henblik på automatisk påvirkning eller modellering af det nødvendige kraftbehov.

2. Friktionsbelægningsholdefjeder (1) ifølge krav 1, kendetegnet ved, at knæstykket (11,12) med henblik på udformningen af kurven for bremsestemplets indføringsbane i sig selv er flere gange afkrøppet afvinklet.

3. Friktionsbelægningsholdefjeder (1) ifølge krav 1 eller 2, kendetegnet ved, at knæstykket (11,12) med henblik på udformningen af kurven for bremsestemplets indføringsbane råder over i det mindste et bueafsnit.

4. Friktionsbelægningsholdefjeder (1) ifølge krav 3, kendetegnet ved, at bueafsnittet indeholder en del af en cirkelbue eller en del af en matematisk funktion, især af en højere art, såsom eksempelvis evolvente, ellipse, e-funktion eller lignende.

5. Friktionsbelægningsholdefjeder (1) ifølge et eller flere af kravene 1-4, kendetegnet ved, at der foreligger en segmenteret kurve for bremsestemplets indføringsbane, hvilken kurve er opbygget af flere afsnit af samme orden eller af flere afsnit af forskellig orden.

6. Friktionsbelægningsholdefjeder (1) ifølge et eller flere af de foregående krav 1-5, kendetegnet ved, at kurven for bremsestemplets indføringsbane inducerer en progressiv gearingseffekt.

7. Friktionsbelægningsholdefjeder (1) ifølge et eller flere af de foregående krav 1-6, kendetegnet ved, at hvert U-formet fjederben (9,10) henholdsvis knæstykke (11,12) med henblik på modelleringen af dets bøjningsmodstandsmoment råder over en ændret form.

8. Friktionsbelægningsholdefjeder (1) ifølge et eller flere af de foregående krav 1-7, kendetegnet ved, at hvert U-formet fjederben (9,10) henholdsvis knæstykke (11,12) med henblik på modelleringen af dets bøjningsmodstandsmoment råder over en materialemodifikation.

9. Friktionsbelægningsholdefjeder (1) ifølge et eller flere af de foregående krav 1-8, kendetegnet ved, at i det mindste et knæstykke (11,12) på et U-formet fjederben (9,10) er forsynet med en overfladebehandling.

10. Friktionsbelægningsholdefjeder (1) ifølge et eller flere af de foregående krav 1-9, kendetegnet ved, at en overfladebehandling indeholder en særlig belægning af friktionsbelægningsholdefjederen (1).

11. Friktionsbelægningsholdefjeder (1) ifølge krav 10, kendetegnet ved, at en korrosionsbeskyttelsesbelægning af friktionsbelægningsholdefjederen (1) integrerer friktionsreducerende bestanddele, eller at en

korrosionsbeskyttelsesbelægning er forsynet med en glidebelægning som separat dæklag.

12. Friktionsbelægningsholdefjeder (1) ifølge et eller flere af de foregående krav 1-11, kendetegnet ved, at friktionsbelægningsholdefjederen (1) i en kontaktzone på knæstykket (11,12) er udført i det væsentlige glattet såsom især børstet, slebet eller poleret samt med i forhold til hinanden parallelt ført rilleorientering ifølge DIN ISO EN 1302 samt med foretrukket parallelt med montage-indskydningsretningen M for friktionsbelægningsholdefjederen (1) orienteret rilleretning.

13. Motorkøretøjs delvis belagte skivebremsebelægning (3) med en friktionsbelægningsholdefjeder (1) ifølge et eller flere af kravene 1 - 12.

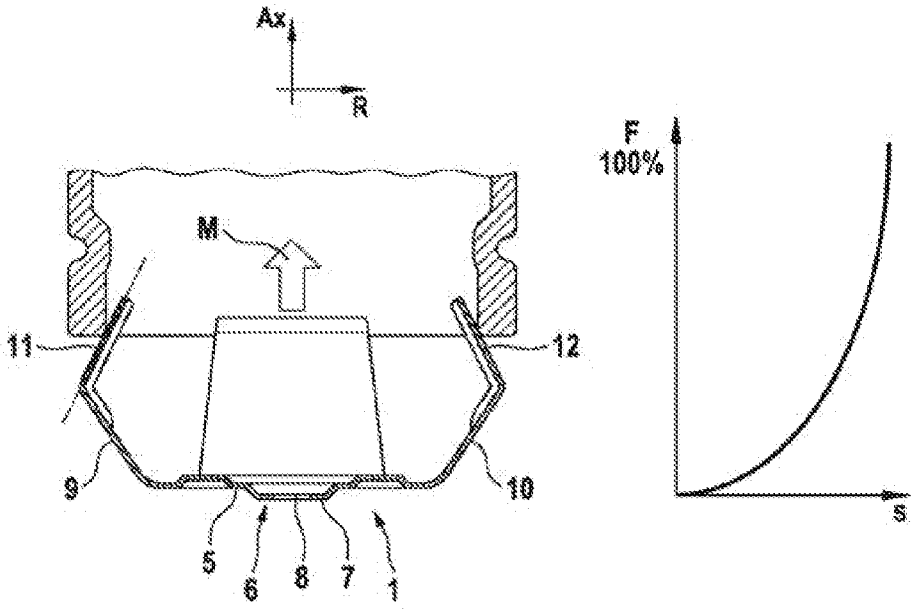


Fig. 1

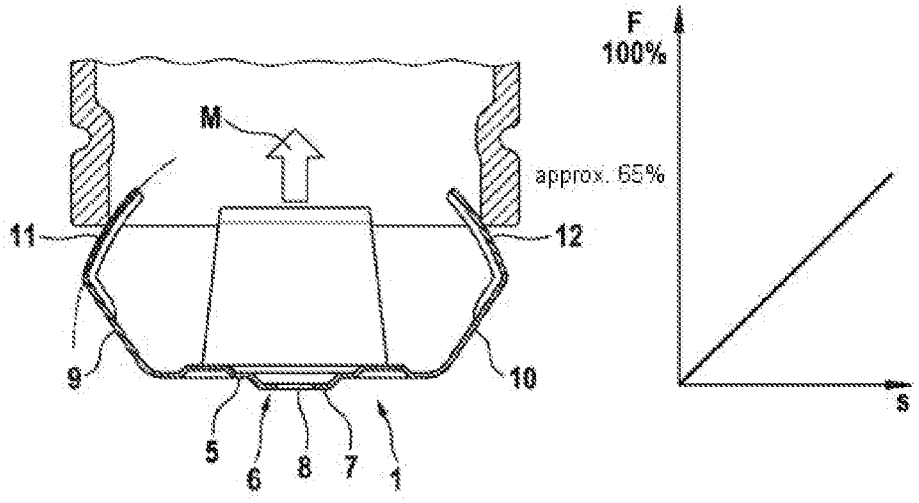


Fig. 2

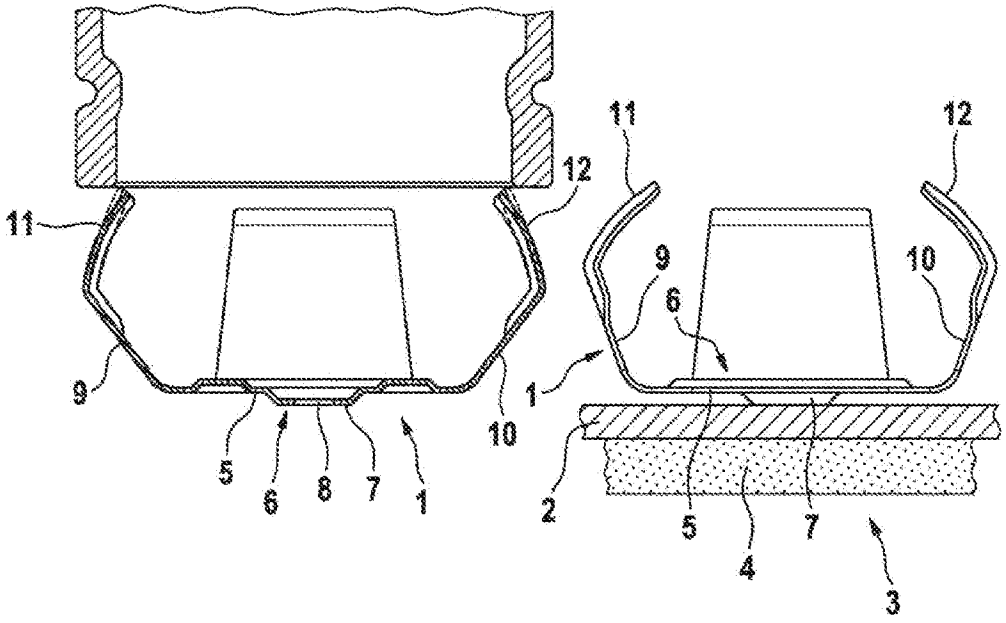


Fig. 3

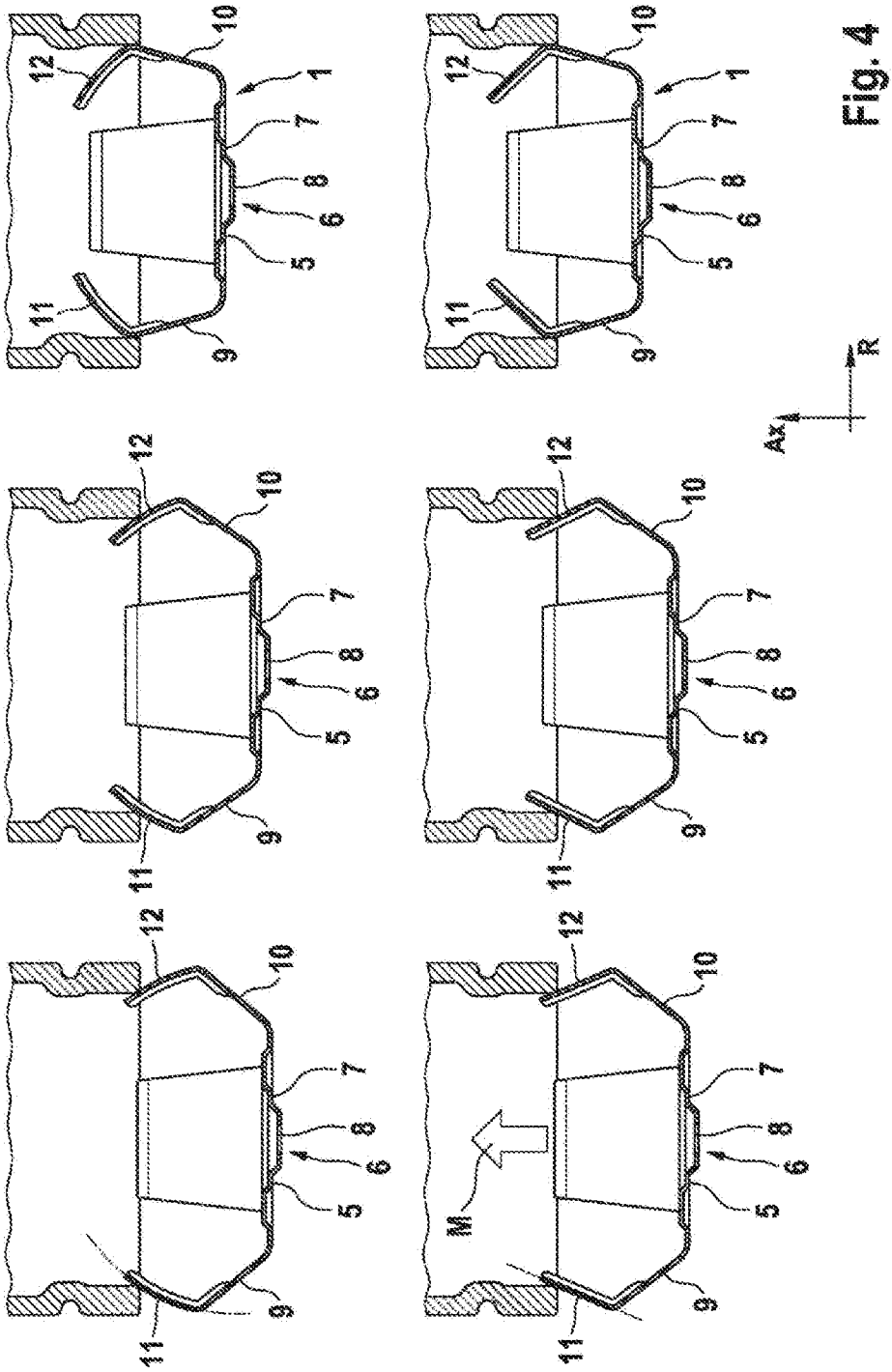


Fig. 4

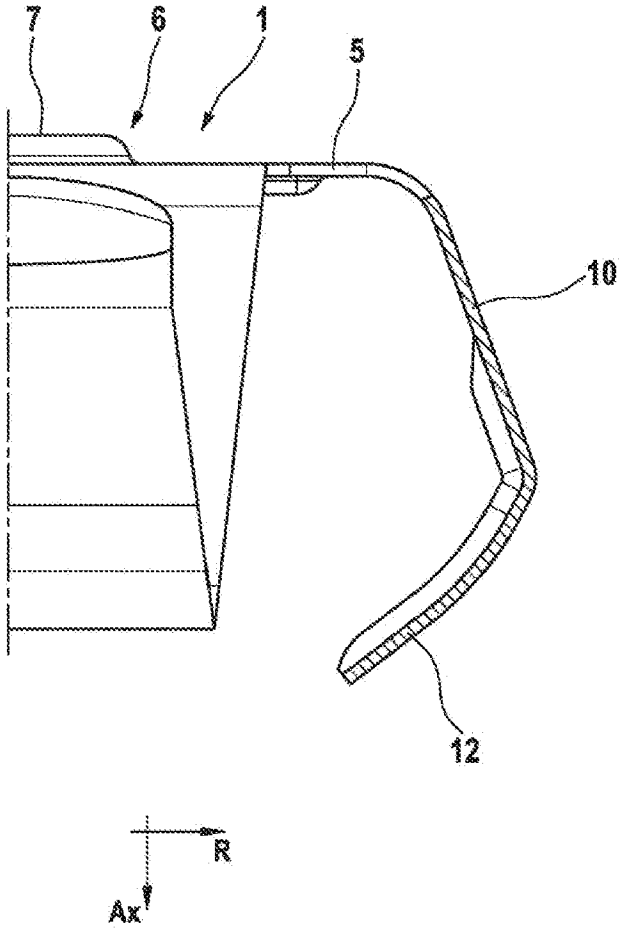


Fig. 5