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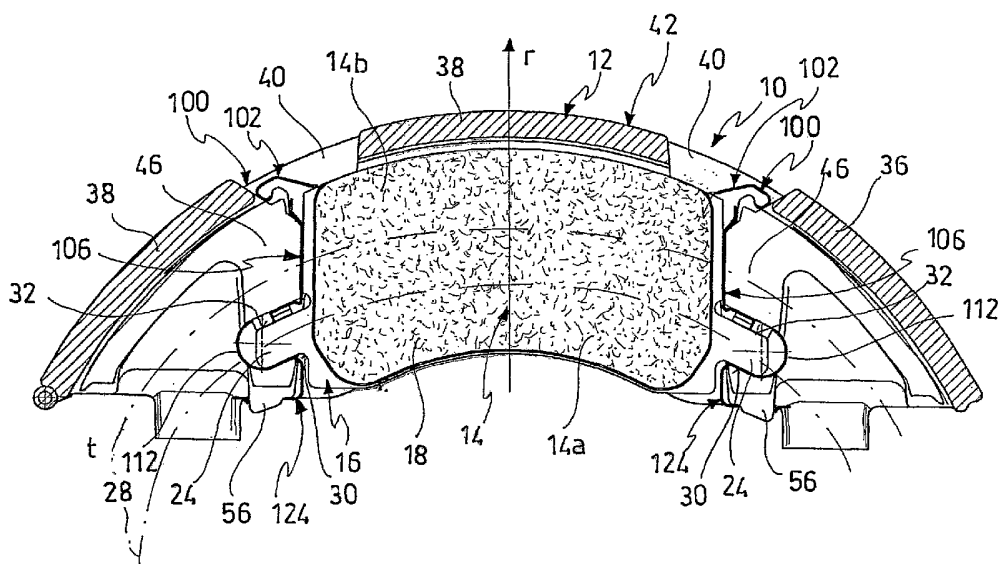
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(54) Title: PAD AND CAPILLAR BODY FOR A DISC BRAKE



(57) Abstract: A pad (14) for a disc brake comprises a supporting plate (16) to which is applied a layer of friction material (18). The supporting plate (16) has an extension in a tangential direction (t) which is greater than the tangential extension of the corresponding layer of friction material (18). The supporting plate (16) comprises extensions (20) which extend on both sides of the friction material (18) in a tangential direction (t), each of the two extensions defining a bearing surface (22) or a spring or resilient member (100). The supporting plate has a concave inner edge (16a), a convex outer edge (16b) and two opposite sides (16c) in which the extensions (20) cover the height of the plate or the extension of its sides (16c). The bearing surface (22) is designed to face towards the exterior of a body (12) of a calliper (10) in the assembled configuration of the disc brake.



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*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

## PAD, CALIPER BODY, AND ANTI-RATTLE SPRING FOR A DISC BRAKE

[0001] This invention relates to a pad and calliper body for a disc brake.

5 [0002] Pads of the known art are generally subjected to annoying vibrations, chattering and noise which occur in particular during the stage in which the pad comes into contact with the disc and light braking.

[0003] The problem underlying this invention is that  
10 of providing a pad for a disc brake which has structural and functional characteristics such as to overcome the aforesaid disadvantages relating to the known art.

[0004] This problem is resolved through a pad according to claim 1.

15 [0005] Other advantages and characteristics of the present invention will become clear from the following detailed description which is given with reference to the appended drawings which are provided purely by way of non-limiting example and in which:

20 [0006] Figure 1 shows a perspective view of a calliper body for a disc brake according to this invention,

[0007] Figure 2 illustrates a perspective view of a calliper for a disc brake according to this invention,

[0008] Figure 3 illustrates a perspective view of the body in Figure 2 from a different angle and fitted with pads,

[0009] Figure 4 illustrates a perspective view of the  
5 calliper in Figure 2 from a different angle,

[0010] Figure 5 illustrates the body in Figure 2 with a fitted pad in a cross-sectional view along a plane indicated by the line V-V on the body in Figure 2,

[0011] Figure 6 illustrates the calliper in Figure 5  
10 with two springs and one pad,

[0012] Figure 7 illustrates a perspective view of two pads facing each other with corresponding springs according to this invention,

[0013] Figure 8 illustrates a perspective view of one  
15 of the two pads in Figure 7 with corresponding springs according to this invention,

[0014] Figure 9 illustrates a perspective view of two pads facing each other according to this invention,

[0015] Figure 10 illustrates a perspective view of one  
20 of the two pads in Figure 9 according to this invention,

[0016] Figures 11-14 illustrate perspective views from different angles of a spring according to the invention,

[0017] Figure 15 illustrates a perspective view of an enlarged detail of a calliper for a disc brake according to this invention,

[0018] Figure 16 illustrates a perspective view of an enlarged detail of a body of a calliper for a disc brake according to this invention,

[0019] Figure 17 illustrates an enlarged detail of the cross-section in Figure 6,

[0020] Figure 18 illustrates a perspective view of an enlarged detail of a body of a calliper for a disc brake with a pad fitted, according to this invention,

[0021] Figure 19 illustrates a perspective view of an enlarged detail of a body of calliper for a disc brake with a spring fitted, according to this invention.

[0022] With reference to the abovementioned figures, 10 indicates a calliper of a disc brake as a whole. Conventionally a disc brake comprises a disc, not shown, mounted on the hub of the wheel of a vehicle and a calliper mounted on a non-rotating portion of the vehicle, for example a suspension, so as to straddle the disc when the disc brake is assembled on the vehicle.

[0023] Conventionally the disc and the vehicle wheel define an axis of rotation, not shown. The definitions of

the radial direction  $r$  and the circumferential or tangential direction  $t$  used below with reference to the assembled condition of the disc brake relate to the axis of rotation of the disc. Also, considering a radial  
5 vector  $r$  which has its origin at the axis of rotation of the disc and moves away from the axis of rotation of the disc, a portion of the brake is inner with respect to a reference if it is closer to the axis of rotation of the disc than the reference, and outer if it is further away  
10 from the axis of the rotation of the disc and the reference.

[0024] Calliper 10 comprises a body 12 which can be mounted on the vehicle in a fixed way, as in the situation illustrated in the figures, or in a floating  
15 way as is conventionally known in the art. This invention may apply to both of the circumstances indicated above.

[0025] Body 12 is suitable for receiving at least two pads 14 which are arranged facing each other and at a specific distance from each other in such a way that in  
20 the disc brake assembly the disc lies between the two pads and therefore the two pads face each other against opposite braking surfaces of the disc.

[0026] A pad 14 comprises a supporting plate 16 to which a layer of friction material 18 is applied. Figures

9 and 10 illustrate an embodiment of a pad according to this invention. With reference to the assembled configuration of the calliper and the disc brake, the supporting plate has an inner edge 16a, an outer edge 16b and two opposite sides 16c. With reference to supporting plate 16 which is mounted on the body of the calliper, inner edge 16a is substantially represented by the concave edge, outer edge 16b is substantially represented by the convex edge and opposite sides 16c connect the inner edge and the outer edge. The convex edge and the concave edge are preferably arcuate according to a portion of circumference which is substantially coaxial with the disc.

[0027] The characteristics of the pad will be described below with reference to the axis of rotation of the disc and therefore a radial direction  $r$  and a tangential direction  $t$  as defined above. The radial direction  $r$  and the tangential direction  $t$  also refer to the pad when not mounted on the body of the calliper, the radial direction  $r$  being regarded as being a line passing through a median point of inner edge 16a and outer edge 16b, or the arcuate edges of the pad, and the tangential direction  $t$  is regarded as being a portion of the circumference passing through the centre of gravity of the pad and substantially concentric with inner edge 16a

and outer edge 16b of the pad.

[0028] Advantageously supporting plate 16 has an extension in the tangential direction  $t$  which is greater than the tangential extension of the corresponding layer of friction material 18. In other words plate 16 has extensions 20 which extend on both sides of the friction material in a tangential direction. Again in other words, inner edge 16a and outer edge 16b of supporting plate 16 are larger than the corresponding edges of friction material 18.

[0029] Each of the two extensions defines a bearing surface 22 for a spring or resilient member as will be described below. This bearing surface 22 faces the outside of the body of the calliper when the pad is mounted thereon. In other words, bearing surface 22 comprises an end portion of the supporting plate defining outer edge 16b.

[0030] According to a possible embodiment, extensions 20 extend over the full height of the plate or all its extension in a substantially radial direction  $r$  or, again in other words, the extension of its opposite sides 16c.

[0031] According to a possible embodiment, supporting plate 16 advantageously comprises two wings 24 which

extend in a substantially tangential direction  $t$ . Each of the wings extends from one of the opposite sides 16c of supporting plate 16 away from friction material 18, from extensions 20 if provided.

5 [0032] 26 indicates a baricentric circumference of the pad, that is a circumference defined as above with reference to the reference system relating to the pad or defined as the circumference having its centre on the axis of rotation of the disc and passing approximately  
10 through the centre of gravity of pad 14. The baricentric circumference theoretically divides the pad into a first portion 14a, or inner portion, located on the side of the axis of rotation of the disc with respect to baricentric circumference 26, and a second portion 14b, or outer  
15 portion, located on the side opposite the axis of rotation of the disc with respect to the baricentric circumference 26 (as illustrated by way of example in Figure 5).

[0033] According to a possible embodiment, wings 24  
20 extend away from friction material 18 from first portion 14a, that is from the portion closest to the axis of rotation of the disc with respect to baricentric circumference 26. With reference to a reference system relating to the pad alone, wings 24 extend away from

friction material 18 from first portion 14a, that is from the portion of the pad comprising inner edge 16a.

[0034] According to a possible embodiment, wings 24 are inclined with respect to sides 16c of supporting plate 16 and preferably in such a way as to lie along a circumference 28 which has its centre on the axis of rotation of the disc and passes through a median line of wings 24. In other words, with reference to the pad when not assembled to the body of the calliper, wings 24 are inclined with respect to the opposite sides 16c of the supporting plate and preferably in such a way as to lie along a circumference 28 which is closer to inner concave edge 16a than baricentric circumference 26.

[0035] 30 and 32 indicate two bearing surfaces of wings 24, which are inner and outer respectively with respect to a radial direction  $r$  directed away from the axis of rotation of the disc.

[0036] According to a possible embodiment, between wings 24 and supporting plate 16, and in particular extensions 20, there is provided at least one discharge groove 34. In the situation where the wings are inclined, discharge groove 34 is preferably made at an obtuse angle between outer bearing surface 32 and the sides 16c of supporting plate 16.

[0037] Body 12 may be constructed as a single body or as assembled parts. According to a possible embodiment, body 12 has a configuration such as to substantially provide two side walls 36 located on opposite sides of the disc joined by connecting members 38 which extend substantially transversely to the disc and walls 36. According to a possible embodiment illustrated for example in the figures (in particular Figures 5 and 6), connecting members 38 comprise arcuate walls along a circumference coaxial with the disc spaced apart by opening 40. The radial extension of connecting members 38 is preferably small in comparison with the tangential or angular extension of the same.

[0038] Considering the definition of the radial and tangential directions indicated above, and also with reference to body 12, it is possible to identify inner or outer portions. By outer portions are meant portions which are designed to be located further from the axis of rotation of the disc than a median line passing tangentially through the body, for example with respect to the baricentric circumference defined above for the pads. Similarly by inner portions are meant portions which are designed to be located closer to the axis of rotation of the disc than a median line passing tangentially through the body, for example with respect

to the baricentric circumference defined above for the pads.

[0039] Body 12 comprises two portions 42 or halves located on opposite sides of the disc and bounded for example by the line of the plane indicated by V-V in Figure 1. The two portions 42 may be merely theoretical, where the body is constructed as a single piece, or may correspond to two separate components of the calliper body. For example Figure 5 illustrates one of such portions of a body constructed as a single part and cross-sectioned along the plane of the line V-V in Figure 1, that is along a plane parallel to the disc (or perpendicular to the axis of rotation of the disc) and which is a median plane with respect to the body of the calliper.

[0040] With reference to the appended figures, each portion of body 12 has at least one seat 44 to house at least one pad. In the situation illustrated in the figures one pad and one housing seat are provided for each portion of the body. Obviously several seats or several pads may be provided for each portion of the calliper body, for example two seats for two separate pads.

[0041] With reference for example to Figure 5 or 6,

housing seat 44 is bounded externally by a connecting member 38 and laterally by containment walls 46 which extend substantially in a perpendicular direction from side walls 36 of the calliper body towards the disc in the assembled configuration of the disc brake. 48 indicates contact surfaces of containment walls 46 which lie opposite lateral surfaces 17 of supporting plate 16.

[0042] According to a possible embodiment, advantageously provided in the situation where supporting plates 16 for pads 14 are provided with wings 24, a containment wall 46 has a housing 50 to receive a corresponding wing 24. Advantageously housings 50 have a shape which matches corresponding wing 24 in such a way that it can be received within them. Preferably housing 50 has larger dimensions than the corresponding dimensions of the corresponding wing. In particular housing 50 has dimensions in a substantially radial direction which are greater than the corresponding dimensions of the corresponding wing.

[0043] According to a possible embodiment each containment wall 46 has an outer surface 46a with reference to radial direction  $r$ , that is a surface which is substantially perpendicular to side walls 36 of the body and located in an outer portion of the body with

reference to the radial direction and the axis of rotation of the disc as previously defined.

[0044] Outer surface 46a is an extension of contact surface 48 and is preferably inclined with respect thereto towards the outside of the calliper body, away from housing seat 44 in both a radial direction and a tangential direction.

[0045] According to a possible embodiment, each containment wall 46 has an inner surface 46b, that is a surface substantially perpendicular to side walls 36 of the body and located in an inner portion of the body with reference to the radial direction and the axis of rotation of the disc as defined above.

[0046] Inner surface 46b is preferably located in a direction substantially perpendicular to contact wall 48.

[0047] According to a possible embodiment, body 12 comprises securing members for resilient members or springs located between body 12 and pad 14 as will be described below.

[0048] With reference to a portion 42 of body 12, illustrated for example in Figure 15, the securing members are preferably shaped in such a way as to prevent the springs from moving in a direction parallel to the

axis of rotation of the disc, in particular towards the other pad or towards the disc itself. In other words the securing members are advantageously shaped in such a way as to immobilise the springs between the side wall 36 of portion 42 of the calliper body and the securing members themselves. In addition to this the calliper body is configured in such a way as to immobilise the springs in radial direction  $r$  too, that is it is provided that outer surface 46a and inner surface 46b define contact surfaces for the springs in such a way as to secure them radially both away from and close to the axis of rotation of the disc. Furthermore, depending upon the conformation of the springs, the securing members are suitable for preventing movement by the springs in a circumferential or tangential direction.

[0049] As will be described below, the securing members are structured in such a way as to immobilise the two extremities of the resilient members corresponding to an inner portion and an outer portion respectively of the calliper body.

[0050] Advantageously the securing members comprise an outer tooth 54 which extends from the body in an outer portion with respect thereto and extends along the radial vector  $r$  as defined above. Outer tooth 54 is located at a

specific distance from side wall 36. Preferably outer tooth 54 extends from a containment wall 46 of housing seat 44 defining a seat to receive a portion of the spring between side wall 36 and the outer tooth. In the  
5 embodiment illustrated in the figures outer tooth 54 extends from outer surface 46a of containment surface 46 defining the seat to house the spring between side wall 36, outer surface 46a and outer tooth 54.

[0051] According to a possible embodiment, two outer  
10 teeth 54 are provided on opposite sides of pad 14, preferably corresponding to containment walls 46 which bound seat 44 housing the pad.

[0052] According to a possible embodiment, with reference to one of the portions of the calliper body,  
15 the securing members comprise an inner tooth 56 which extends from the body, in an inner portion thereof, and which extends in a direction opposite to the direction of radial vector  $r$  as defined above. Inner tooth 56 is located at a specific distance from side wall 36.  
20 Preferably inner tooth 56 extends from a containment wall 46 of housing seat 44 defining a seat to receive a portion of a spring between side wall 36 and the inner tooth itself. In the embodiment illustrated in the figures, inner tooth 56 extends from inner surface 46b of

containment surface 46 defining the seat for housing the spring between side wall 36, inner surface 46b and inner tooth 56.

[0053] According to a possible embodiment two inner  
5 teeth 56 are provided from opposite sides of pad 14, preferably corresponding to containment walls 46 which bound seat 44 housing the pad.

[0054] Body 12 is also suitable for receiving means to press the pad against the disc during the action of  
10 braking the vehicle. These means are not illustrated in detail but may comprise for example pistons which are activated hydraulically or by means of electric motors. Figure 1 shows a perspective view of body 12 of the calliper from an angle which shows an opening 58 for  
15 housing one of the pistons, not shown, which is suitable for interacting with the corresponding pad, which is also not shown in Figure 1.

[0055] A resilient member 100 or spring according to this invention which can be mounted on a calliper body  
20 for example as previously described between a side 16c of supporting plate 16 and the body itself is illustrated with particular reference to Figures 11-14.

[0056] According to a possible embodiment, spring 100

comprises a cut and bent strip which can be located between pad 14 and body 12 of the calliper to hold the pad compressed between two elastic members 100 and against the walls of body 12 of the calliper.

- 5 [0057] In particular spring 100 comprises at least two thrust portions suitable for interacting with supporting plate 16 for pad 14 transmitting a force thereto with components directed towards the axis of rotation of the disc and towards the opposite spring acting on the pad.
- 10 [0058] A first thrust portion 102 preferably corresponds to one extremity of the spring and in particular the outer extremity of the spring with reference to the spring assembled on the calliper body, and is suitable for acting on an outer bearing surface of  
15 the pad, for example bearing surface 22 of extensions 20. A second thrust portion 104 preferably corresponds to a central portion of the spring and is suitable for acting on outer bearing surface 32 of a wing 24 of supporting plate 16.
- 20 [0059] According to a possible embodiment a spring or resilient member 100 comprises a base portion 106 which can be located between one side 16c of the supporting plate and the corresponding containment wall 46 of seat 44 housing the pad.

[0060] According to a possible embodiment first thrust portion 102 and second thrust portion 104 obtained by bending the strip forming resilient member 100 diverge from opposite sides of base portion 106, preferably  
5 without any break in continuity.

[0061] Considering spring 100 assembled on the calliper body, first thrust portion 102 comprises an inclined wall 108 which is suitable for bearing on bearing surface 22 of supporting plate 16 and is  
10 connected to base portion 106 through a bent connecting portion 110 and which extends away from base portion 106 and the pad in a radial (outward) and tangential direction. According to a possible embodiment base portion 106, connecting portion 110 and inclined wall 108  
15 define a hook-shaped length which bears on the plate from above, in particular on bearing surface 22, exerting thereupon a force with components towards the axis of rotation of the disc and towards the other spring acting on the same pad. In other words, connecting portion 110  
20 is able to displace the point from which inclined wall 108 extends from connecting portion 110 to a more outer zone, radially and tangentially further from the pad with respect to base portion 106 in such a way as to form a resilient length which presses the pad inwards against  
25 the calliper body and tangentially between the two

springs acting on the pad.

[0062] According to a possible embodiment, first thrust portion 102 has a "C"-shaped length which extends substantially from one side of base portion 106, preferably from a flat length of the base portion. The free extremity of first thrust portion 102, that is the extremity suitable for interacting with supporting plate 16, is located opposite the remaining first thrust portion with respect to base portion 106.

10 [0063] Second thrust portion 104 extends from base portion 106 on the opposite side with respect to first thrust portion 102. According to a possible embodiment the second thrust portion corresponds to a central portion of spring 100 and is suitable for acting on a central length of side 16c of supporting plate 16. In the case where the plate comprises wings 24 which extend laterally therefrom, base portion 106 comprises a loop 112 which is suitable for enclosing a corresponding wing 24. In this case second thrust portion 104 is advantageously constructed from the length of the spring defining loop 112. Advantageously second thrust portion 104 is suitable for exerting a force on bearing surface 32 of corresponding wing 24.

[0064] According to a possible embodiment, loop 112 of

spring 100 has in the portion facing wing 24 at least one tang 114 which extends in a direction transverse to a line of curvilinear shape 116 defining the overall line of the spring. Preferably two tangs which extend from  
5 opposite sides of line 116 are provided and even more preferably they are offset along this overall line. The two tangs 114 are suitable for being bent through approximately  $180^\circ$  as illustrated in the appended figures. With reference to the assembled disc brake the  
10 two tangs are bent through approximately  $180^\circ$  towards the axis of rotation of the disc so as to bear and be compressed against supporting wall 32 of corresponding wing 24 pressing it inwards against containment wall 46 within housing 50. In other words tangs 114 are bent  
15 through approximately  $180^\circ$  with respect to base portion 106 towards the concave part of loop 112.

[0065] Loop 112 envelops corresponding wing 24 in such a way as to be inserted between bearing surface 30 and containment wall 46 in such a way that tangs 114 press  
20 wing 24 against the inner portion of loop 112.

[0066] According to a possible embodiment spring 100 comprises portions which hook on to the calliper body, preferably suitable for acting together with the members securing the calliper body as described above.

[0067] According to a possible embodiment, a first hooking portion 118 is formed from a length of first thrust portion 102 and in particular connecting portion 110. In other words connecting portion 110 can be inserted between outer tooth 54 and side wall 36 immobilising spring 100 in a direction parallel to the axis of rotation of the disc. Again in other words, connecting portion 110 lies parallel to outer surface 46a of containment wall 46 between side wall 36 and outer tooth 54. According to a possible embodiment, first hooking portion 118 is shaped in such a way as to envelop outer tooth 54 on three sides immobilising movement of the outer extremity of spring 100 in a tangential direction with respect to the calliper body. Preferably connecting portion 110 has dimensions similar to those of base portion 106 and inclined wall 108 in a direction parallel to the axis of rotation of the disc, that is transverse to the overall line 116 of the spring, and is cut in such a way as to form an opening 120 to house outer tooth 54. Even more preferably connecting portion 110 also comprises bent lengths 122 which at least partly bound opening 120 and can be located on the sides of outer tooth 54, preferably on the two opposite sides of outer tooth 54.

[0068] According to a possible embodiment, opening 120

has an extension which is smaller than the width of connecting portion 110 in a direction transverse to overall line 116 and is open on one side of connecting portion 110, for example that opposite the disc in the assembled configuration of the calliper.

[0069] In other words connecting portion 110 has a first line of cut 110a which extends parallel to an overall line 116 of the shape of spring 100 over a length such as to affect the extension of outer tooth 54. In this way connecting portion 110 is divided into two lengths, preferably of equal width, of which that which is intended to be located closer to the disc has a further line of cut 110b perpendicular to line of cut 110a and overall line 116 which affects the full width of that length. The other line of cut 100b is located approximately in a median position with respect to first line of cut 110a with the result that line of cut 110a and the other line of cut 110b define a "T"-shaped cut in connecting portion 110 which bounds bent lengths 122.

[0070] According to a possible embodiment, a second hooking portion 124 is defined by a portion of the inner extremity of spring 100 which extends from base portion 106 and in particular from loop 112, if present. In other words second hooking portion 124 is suitable for being

inserted between inner tooth 56 and side wall 36 of the calliper body immobilising the inner extremity of spring 100 in a direction parallel to the axis of rotation of the disc. According to a possible embodiment, second  
5 hooking portion 124 extends with continuity from base portion 106 or loop 112, if present, bending substantially into an "L"-shape to lie parallel to the inner surface 46b of containment wall 46. According to a possible embodiment, second hooking portion 124 has  
10 smaller dimensions than that of base portion 106 in a direction parallel to the axis of rotation of the disc, that is transverse to the overall line 116 of the spring, being cut in such a way as to form an opening 126 to house inner tooth 56 immobilising movements of the inner  
15 extremity of spring 100 in a tangential direction. Preferably second hooking portion 124 is cut in an "L" shape with a first limb 128a of the "L" being suitable for being located between inner tooth 56 and side wall 36 of the calliper body, and a second limb 128b of the "L"  
20 being suitable for enveloping one side of inner tooth 56. In other words the first limb of the "L" is parallel to overall line 116 while the second limb of the "L" is transverse to the overall line 116 of the spring.

[0071] Second hooking portion 124 also comprises bent  
25 lengths 130 which at least partly bound opening 126

corresponding to inner tooth 56. Bent sections 130 are suitable for being located on the sides of inner tooth 56. Preferably two bent lengths 130 suitable for being located on the two adjacent sides of inner tooth 56 are  
5 provided.

[0072] With reference to Figures 6 and 11-14, spring 100 extends predominantly along overall line 116. Considering as a reference the flat length of base portion 106, the outer hook-shaped portion and loop 112  
10 extend from the same side while the free extremities of the spring are located on opposite sides.

[0073] According to a possible embodiment, spring 100 has a width, that is a dimension in a direction transverse to overall line 116, which is substantially  
15 constant along that overall line except for the two hooking portions whose dimensions are suitable for inserting the length of spring between side wall 36 of body 12 and the corresponding securing members.

[0074] Considering base portion 106 and in particular  
20 its flat length, spring 100 has free extremities which lie on opposite sides of the free length of base portion 106.

[0075] A calliper for a disc brake according to this

invention will be described below with particular reference to the assembled configuration of the body, the pads and the springs as described above.

[0076] With reference for example to Figure 19,  
5 springs 100 are inserted in body 12. In the case where spring 100 is provided with a loop 112 and hooking portions as previously described, loop 112 is inserted into housing 50, preferably in such a way as to come into contact with the walls bounding it. Base portion 106 of  
10 spring 100 is located parallel to contact surface 48 of containment wall 46, preferably bearing against it. Connecting portion 110 follows outer surface 46a of containment wall 46, as a result of which outer tooth 54 is inserted in opening 120 of connecting portion 110 and  
15 bent lengths 122 deform on the two opposite sides of outer tooth 54.

[0077] Second hooking portion 124 envelops the inner extremity of containment wall 46 and in particular follows the inner surface 46b of containment wall 46.  
20 Inner tooth 56 is inserted into opening 126 or, in other words, between the two limbs 128a, 128b of the length bent into an "L" shape. Bent lengths 130 deform elastically against the adjacent sides of inner tooth 56 immobilising the inner extremity of the spring.

[0078] Inclined walls 108 and tangs 114 are in a configuration which is not elastically deformed because pad 14 is absent.

[0079] With reference for example to Figure 15, the  
5 pad is inserted in the space defined by body 12 in a radial direction and on the opposite side with respect to connecting members 38. Subsequently the pad is inserted into housing seat 44 between the two springs 100 in a direction parallel to the axis of rotation of the disc.

10 [0080] Bearing surface 22 of supporting plate 16 interacts with inclined wall 108 of spring 100 deforming it elastically outwards in such a way that first thrust portion 102 generates a force against the pad having a component directed towards the axis of rotation of the  
15 disc and a component directed towards the other spring.

[0081] Similarly walls 24 of supporting plate 16, if provided, are inserted into housing 50 of the body and into loop 112 of spring 100 elastically deforming tangs 114 in such a way that second thrust portion 104  
20 generates a force on the pad having a component directed towards the axis of rotation of the disc and a component directed towards the other spring.

[0082] Inner bearing surface 30 of wing 24 is thrust

against the walls bounding housing 50, with spring 100 in between, by the action of both inclined wall 108 and tongues 114.

[0083] What is described above, as for example  
5 illustrated in Figure 6, corresponds to the assembled configuration of the calliper at a stage during which no braking force is applied.

[0084] It will be appreciated from the above that the provision of a pad and a body according to this invention  
10 makes it possible to stabilise the pad avoiding vibration and noise in the course of the stage during which no braking force is applied. This invention is however suitable for stabilising the pad in its seat in the braking stage too, in which one of the springs undergoes  
15 greater compression through the tangential drag effect exerted by the disc on the pad.

[0085] It is clear that variants and/or additions to what has been described and illustrated above may be provided.

20 [0086] Naturally, in order to implement the invention described above a person skilled in the art could make many modifications, adaptations and replacements of components with others that are functionally equivalent

in order to satisfy specific contingent requirements without thereby going beyond the scope of the following claims.

## CLAIMS

1. Pad (14) for a disc brake comprising a supporting plate (16) to which is applied a layer of friction material (18) in which the supporting plate (16) has  
5 an extension in a tangential direction (t) which is greater than the tangential extension of the corresponding layer of friction material (18).
2. Pad according to claim 1, in which the supporting plate (16) comprises extensions (20) which extend on  
10 both sides of the friction material (18) in a tangential direction (t), each of the two extensions defining a bearing surface (22) for a spring or resilient member (100).
3. Pad according to claim 2, in which the supporting  
15 plate has a concave inner edge (16a), a convex outer edge (16b) and two opposite sides (16c), in which the extensions (20) extend over the height of the plate or the extension of its sides (16c).
4. Pad according to claim 2 or 3, in which the bearing  
20 surface (22) is suitable for facing the exterior of a body (12) of a calliper (10) in an assembled configuration of the disc brake.
5. Pad according to one of the preceding claims in which

the supporting plate (16) comprises two wings (24) which extend in a substantially tangential direction (t) with respect to the opposite sides of the supporting plate (16).

- 5 6. Pad according to claims 2 and 5, in which each of the wings (24) extends from one of the extensions (20) of the opposite sides (16c) of the supporting plate (16) away from the friction material (18).
7. Pad according to claim 5 or 6, in which the wings (24)  
10 extend away from the friction material (18) of the supporting plate (16) from a first portion (14a) of the pad, the said portion (14a) being on the side of the inner concave edge (16a) of the pad with respect to a baricentric circumference (26) of the pad itself.
- 15 8. Pad according to claim 5 or 6, in which the wings (24) extend away from the friction material (18) of the supporting plate (16) from a first portion (14a) of the pad, the said first portion (14a) being suitable for being located closer to the axis of rotation of  
20 the disc than a baricentric circumference (26) of the pad in the assembled configuration of the disc brake.
9. Pad according to one of claims 5 to 8, in which the wings (24) are inclined with respect to the opposite

sides (16c) of the supporting plate (16).

10. Pad according to claim 9 when dependent upon claim 7,  
in which the wings (24) are inclined with respect to  
the opposite sides (16c) of the supporting plate (16)  
5 in such a way as to lie along a circumference (28)  
closer to the inner concave edge (16a) than the  
baricentric circumference (26).
11. Pad according to claim 9 when dependent upon claim 8,  
in which the wings (24) are inclined with respect to  
10 the opposite sides (16c) of the supporting plate (16)  
in such a way as to lie along a circumference (28)  
which has its centre at the axis of rotation of the  
disc and passes through a median line of the wings  
(24) in the assembled configuration of the disc brake.
- 15 12. Pad according to claim 9, in which at least one  
discharge groove (34) constructed at an obtuse angle  
between an outer bearing surface (32) of the wing (24)  
and a lateral surface of the supporting plate (16) is  
provided between a wing (24) and the side of the  
20 supporting plate (16).
13. Body (12) of a calliper (10) of a disc brake  
comprising at least one seat (44) housing at least one  
pad (14) according to one of claims from 1 to 12.

14. Body according to claim 13, comprising two side walls (36) suitable for being located on opposite sides of the disc in the assembled configuration of the brake, the said side walls (36) being joined by connecting members (38) which extend substantially transversely to the walls (36), the said connecting members (38) comprising walls arched along a circumference designed to be coaxial with the disc in the assembled configuration of the disc brake, the said arched walls being broken up by openings (40).
15. Body according to claim 14, in which the radial extension of the connecting members (38) is small in comparison with the tangential or angular extension of the same.
- 15 16. Body according to one of claims 13 to 15, in which the housing seat (44) is bounded externally by a connecting member (38) and laterally by containment walls (46) which extend substantially in a direction perpendicular to the side walls (36) of the calliper body.
- 20 17. Body according to claim 6, in which the containment wall (46) has a housing (50) suitable for receiving a corresponding wing (24) of the pad (14).

18. Body according to claim 17, in which the housing (50) has larger dimensions than the corresponding dimensions of the wing (24) which it is suitable for receiving.
- 5 19. Body according to claim 16, in which the containment wall (46) has a contact surface (48) lying opposite to a side surface (17) of the supporting plate (16) and an outer surface (46a) which is inclined with respect to the contact surface (48) in such a way as to extend  
10 towards the exterior of the calliper body away from the housing seat (44).
20. Body according to one of claims 13 to 19, in which securing members (54, 56) are provided for resilient members or springs (100) which can be located between  
15 the body (12) and the pad (14).
21. Body according to claim 20, in which the securing members (54, 56) are preferably shaped so as to prevent movements by the spring (100) towards the disc in the assembled configuration of the disc brake.
- 20 22. Body according to claim 20 or 21, in which the securing members (54, 56) are shaped in such a way as to immobilise the springs (100) between a side wall (36) of the body (12) and the securing members

themselves, in the assembled configuration of the disc brake.

23. Body according to claim 22, in which the securing members (54, 56) are suitable for cooperating with  
5 hooking portions (118, 124) of the springs (100) to prevent movement by the springs in a circumferential or tangential direction (t).

24. Body according to one of claims 20 to 23, in which the securing members (54, 56) are suitable for  
10 immobilising two extremities of a spring (100), in an inner portion and an outer portion of the calliper body respectively.

25. Body according to one of claims 20 to 24, in which the securing members comprise an external tooth (54) which  
15 extends from an outer portion of the body (12) along a radial vector (r) to a specific distance from a side wall (36) of the body.

26. Body according to claim 25, in which the outer tooth (54) extends from a containment wall (46) of the seat  
20 (44) housing the pad (14) defining a seat suitable for receiving a portion of a spring (100) between a side wall (36) of the body (12) and the outer tooth.

27. Body according to claim 25 or 26, in which two outer

teeth (54) are provided from opposite sides of the seat (44) housing the pad (14) in a portion (42) of the body (12) suitable for respectively acting together with a spring (100).

5 28. Body according to claim 27, in which the two outer teeth (54) extend from the body (12) alongside the containment walls (46) which bound the seat (44) housing the pad.

10 29. Body according to one of claims 20 to 28, in which the securing members comprise an inner tooth (56) extending from an inner portion of the body (12) towards the axis of rotation of the disc, in the assembled configuration of the brake, to a specific distance from a side wall (36) of the body.

15 30. Body according to claim 29, in which the inner tooth (56) extends from a containment wall (46) of the seat (44) housing the pad defining a seat suitable for receiving a portion of a spring (100) between a side wall (36) and the inner tooth.

20 31. Body according to claim 30, in which the inner tooth (56) extends from an inner surface (46b) of the containment surface (46) defining the seat housing the portion of the spring (100) between the side wall (36)

of the body, the inner surface (46b) and the inner tooth (56).

32. Body according to one of claims from 29 to 31, in which two inner teeth (56) from opposite sides of the seat (44) housing the pad (14) are provided in a portion (42) of the body (12) and are capable respectively of cooperating with a spring (100).

33. Body according to claim 32, in which the two inner teeth (56) extend along the containment walls (46) bounding the seat (44) housing the pad.

34. Spring (100) for a calliper (10) of a disc brake, the said spring comprising a cut and bent strip which extends along an overall curvilinear line (116), the said spring being suitable for being located between one side (16c) of a supporting plate (16) for a pad (14) according to one of claims 1 to 12 and walls of a body (12) according to one of claims 13 to 33 in order to hold the pad compressed between two springs and against walls of the calliper body.

35. Spring according to claim 34, in which the said cut and bent strip comprises at least two portions (102, 104) suitable for interacting with the supporting plate (16) for the pad (14) to transmit a force with

components directed towards the axis of rotation of the disc and towards the opposite spring acting on the same pad in the assembled configuration of the disc brake.

- 5 36. Spring according to claim 35, comprising a base portion (106), from opposite sides of which there depart without any break in continuity a first thrust portion (102) and a second thrust portion (104) obtained by bending the strip comprising the spring.
- 10 37. Spring according to claim 36, in which the first thrust portion (102) corresponds to an outer extremity of the spring, with reference to the spring assembled in the calliper body, and is suitable for acting on an outer bearing surface (22) of the extensions (20) of
- 15 the supporting plate (16).
38. Spring according to claim 36 or 37, in which the first thrust portion (102) comprises an inclined wall (108) suitable for bearing against the bearing surface (22) of the supporting plate (16) and connected to the base
- 20 portion (106) through a bent connecting portion (110) and which in the assembled configuration of the spring on the calliper (10) is suitable for moving away from both the base portion (106) and the pad (14) in a radial and tangential direction towards the exterior

of the body (12).

39. Spring according to one of claims 36 to 38 in which the base portion (106) and the first thrust portion (102) define a hook-shaped length suitable for bearing  
5 from above on the supporting plate (16) of the pad (14).

40. Spring according to claim 38, in which the assembled configuration of the spring (100) on the calliper (10) the connecting portion (110) can displace the point at  
10 which the inclined wall (108) extends from the connecting portion (110) to a more outer zone which is radially and tangentially further away from the pad (14) than the base portion (106) to form a resilient length which presses the pad (14) inwards against the  
15 body (12) of the calliper and tangentially between the two springs acting on the same pad.

41. Spring according to one of claims 36 to 40, in which the first thrust portion (102) has a "C"-shaped length which extends substantially from one part of the base  
20 portion (106), one extremity of the first thrust portion (102) being located opposite the remaining thrust portion with respect to the base portion (106).

42. Spring according to one of claims 36 to 40, in which

the second thrust portion (104) corresponds to a central portion of the spring (100) and is suitable for acting on a central length of the side (16c) of the supporting plate (16).

5 43. Spring according to claim 42, in which the second thrust portion (104) is suitable for acting on an outer bearing surface (32) of a wing (24) of the supporting plate (16).

44. Spring according to claim 42 or 43, in which the  
10 second thrust portion (104) extends from the base portion (106) from the side opposite the first thrust portion (102).

45. Spring according to claim 44, in which the base  
15 portion (106) comprises a loop (112) suitable for enclosing a corresponding wing (24) of the pad (14), the said second thrust portion (104) being constructed in the length of the spring defining the loop (112).

46. Spring according to claim 44, in which the base  
20 portion (106) comprises a flat length and a loop (112) which extends from the same side of the flat length of the base portion (106) with respect to the first thrust portion (102), the said second thrust portion (104) being provided in the length of the spring

defining the loop (112).

47. Spring according to one of claims 42 to 46, in which the second thrust portion (104) comprises at least one tang (114) extending in a direction transverse to the overall curvilinear line (116) defining the line of the spring.
48. Spring according to claim 47, in which two tangs (114) are provided which are suitable for being bent through approximately 180° with respect to the base portion (106) and which extend from opposite sides of the overall line (116).
49. Spring according to claim 48, in which the two tangs (114) are offset along the overall line (116).
50. Spring according to one of claims 34 to 49, comprising portions (118, 124) hooking onto the body (12) of the calliper and suitable for acting together with securing members (54, 56) of the calliper body (12).
51. Spring according to claim 50 when dependent upon claim 38, in which a first hooking portion (118) comprises a length of the portion (110) connecting the first thrust portion (102) suitable for being inserted between an outer tooth (54) and a side wall (36) of the body (12) to immobilise the spring (100) in a

direction parallel to the axis of rotation of the disc in the assembled configuration of the brake.

52. Spring according to claim 51, in which the connecting portion (110) has dimensions transverse to the overall line (116) of the spring which are similar to those of the base portion (106) and the inclined wall (108) and is cut in such a way as to define an opening (120) suitable for housing the outer tooth (54).

53. Spring according to claim 52, in which the said opening (120) has a lesser extent than the width of the connecting portion (110) in a direction transverse to the overall line (116) and is open on one side of the connecting portion (110).

54. Spring according to claim 52 or 53, in which the connecting portion (110) comprises bent lengths (122) which at least partly bound the opening (120), the said bent lengths being suitable for being located on the sides of the outer tooth (54).

55. Spring according to claim 54, in which the connecting portion (110) has a first line of cut (110a) which extends parallel to an overall line (116) of the spring (100) and a further line of cut (110b) perpendicular to the first line of cut (110a) and the

overall line (116) and which opens out at the edge of the connecting portion (110), the first line of cut (110a) and the other line of cut (110b) defining a "T"-shaped cut in the connecting portion (110) which  
5 bounds the bent lengths (122).

56. Spring according to one of claims 50 to 55, in which a second hooking portion (124) comprises an inner extremity portion of the spring (100) which extends from a base portion (106) and is suitable for being  
10 inserted between an inner tooth (56) and a side wall (36) of the body (12) of the calliper immobilising the inner extremity of the spring (100) in a direction parallel to the axis of rotation of the disc in the assembled configuration of the brake.

15 57. Spring according to claim 56, in which the second hooking portion (124) extends with continuity from the base portion (106), being bent substantially into an "L"-shape in order to enclose one extremity of a containment wall (46) of the seat (44) housing a pad  
20 (14).

58. Spring according to claim 56 or 57, in which the second hooking portion (124) has dimensions transversely to the overall line (116) of the spring which are smaller than those of the base portion (106)

and is cut in such a way as to define an opening (126) suitable for housing an inner tooth (56) of the body (12) to immobilise movements by the inner extremity of the spring (100) in a tangential direction (t).

5 59. Spring according to claim 58, in which the second hooking portion (124) is cut into an "L"-shape, a first limb (128a) of the "L" being designed to be located between the inner tooth (56) and a side wall (36) of the calliper body (12) and a second limb  
10 (128b) of the "L" being suitable for enclosing one side of the inner tooth (56).

60. Spring according to claim 58, in which the second hooking portion (124) is cut into an "L"-shape, a first limb (128a) of the "L" being parallel to the  
15 overall line (116) and a second limb (128b) of the "L" being transverse to the overall line (116).

61. Spring according to claim 59 or 60, in which the second hooking portion (124) has bent lengths (130) which at least partly bound the opening (126)  
20 corresponding to the inner tooth (56), the said bent lengths (128) being suitable for being located on the sides of the inner tooth (56).

62. Spring according to one of claims 50 to 61, in which

the spring (100) has a width, that is a dimension in a direction transverse to the overall line (116), which is substantially constant along the overall line with the exception of the two hooking portions whose dimensions are suitable for inserting the length of the spring between the side wall (36) of the body (12) and the corresponding securing members.

63. Spring according to one of claims 36 to 62, in which the free extremities of the spring are located on opposite sides of a flat length of the base portion (106).

64. Calliper for a disc brake comprising at least one pad (14) according to one of claims 1 to 12, a body (12) according to one of claims 13 to 33 and at least one spring according to one of claims 34 to 63.

65. Body (12) of a calliper (10) of a disc brake comprising at least one housing seat (44) for at least one pad (14) in which securing members (54, 56) are provided for resilient members or springs (100) suitable for being located between the body (12) and the pad (14).

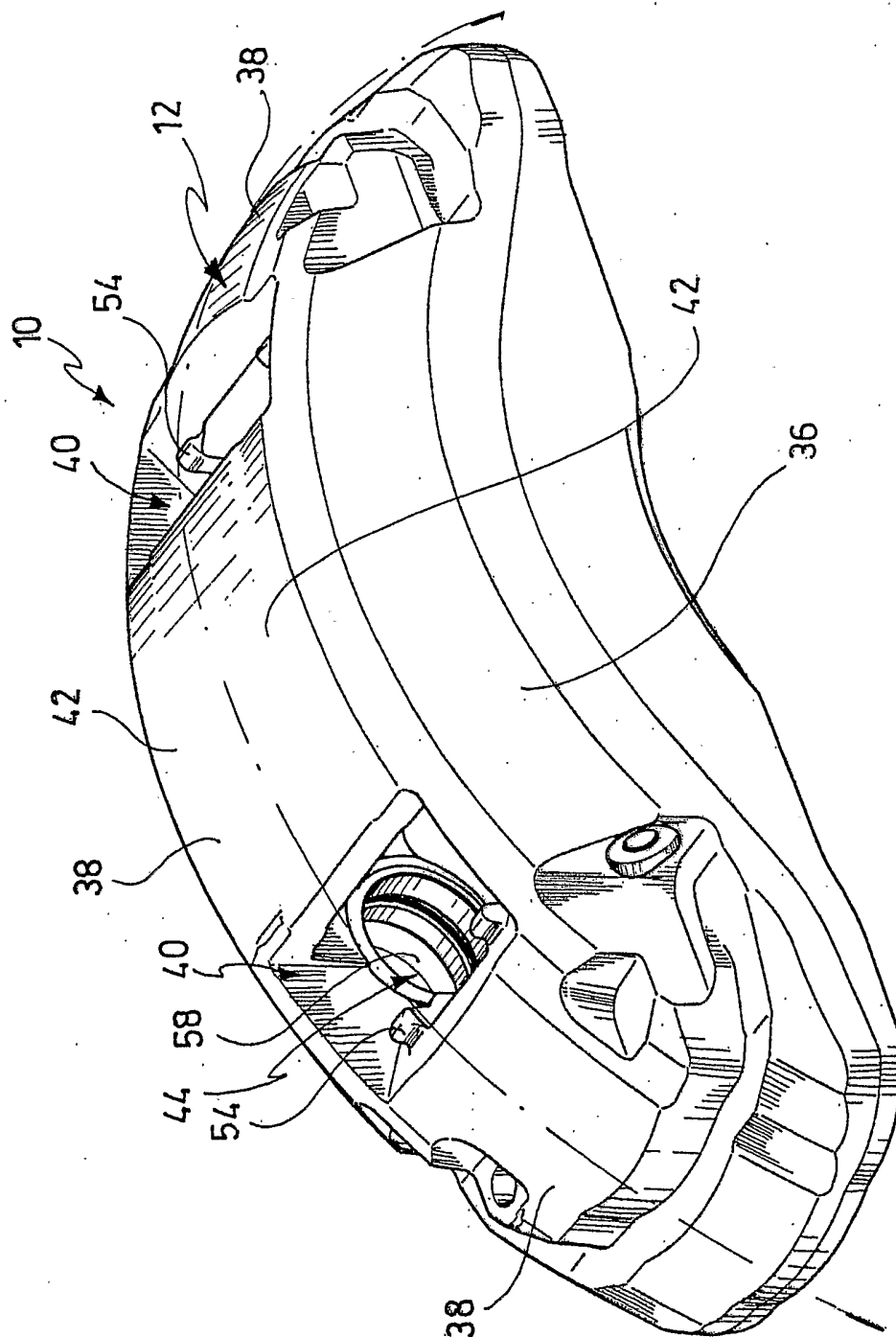


FIG.1

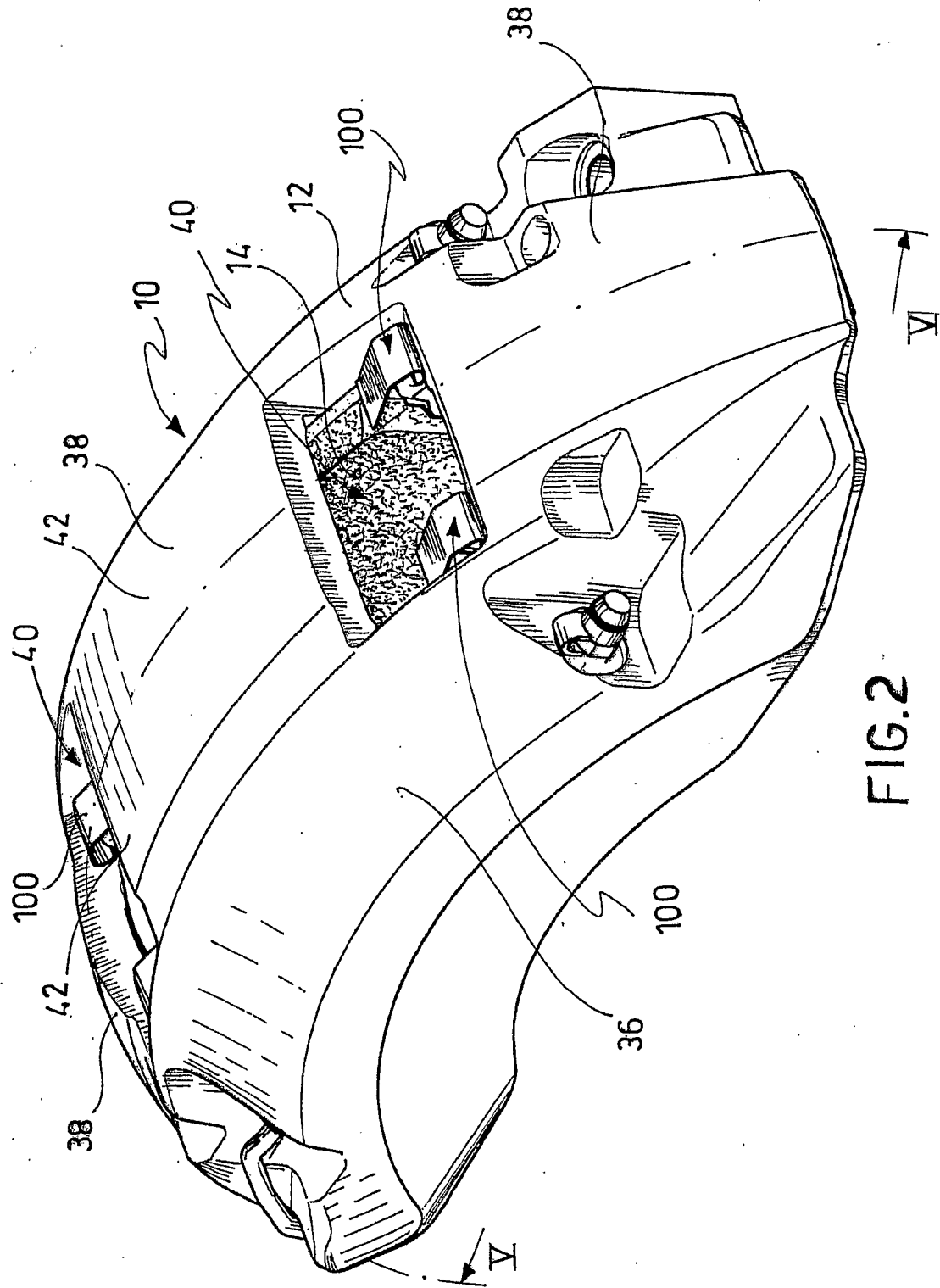


FIG. 2

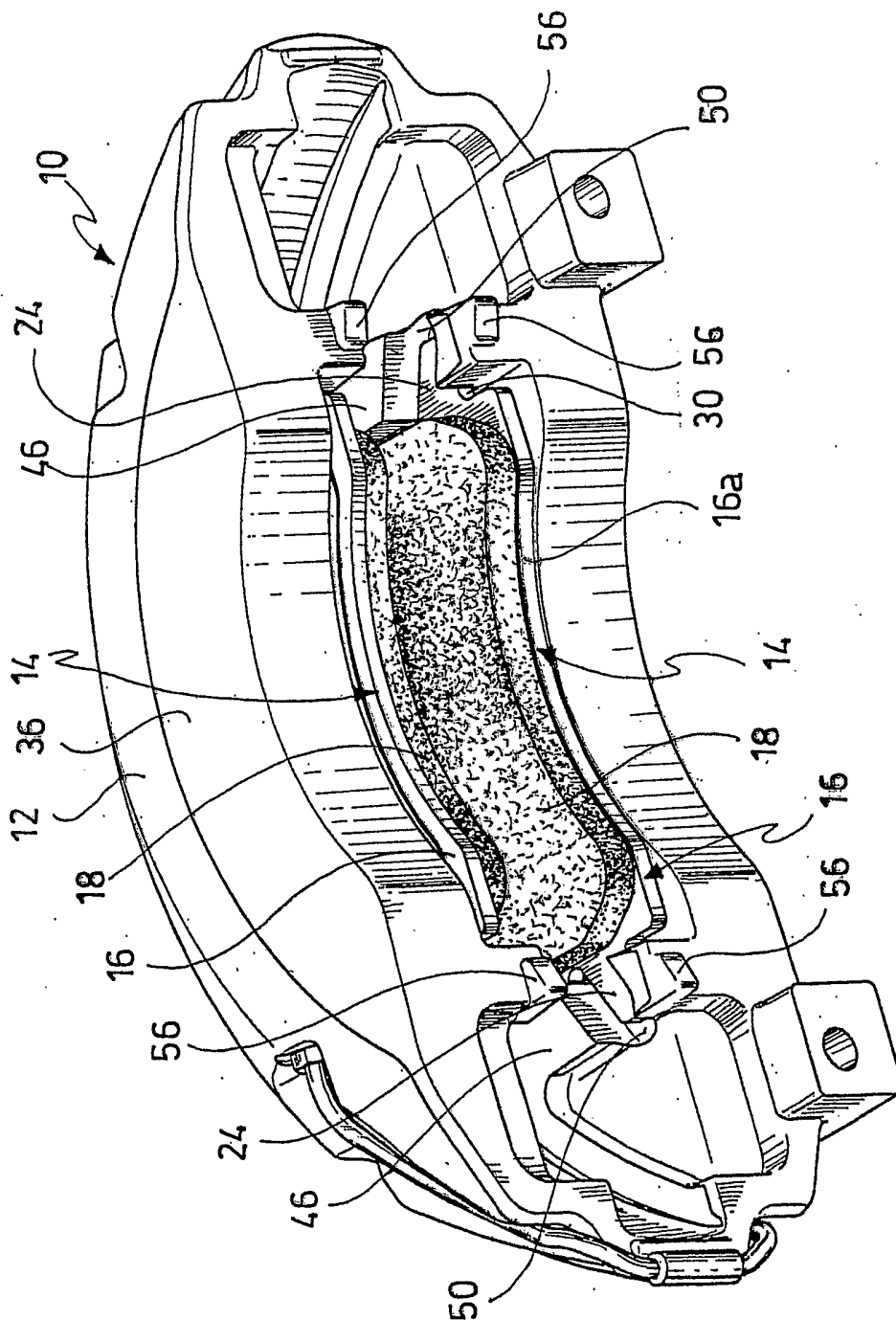
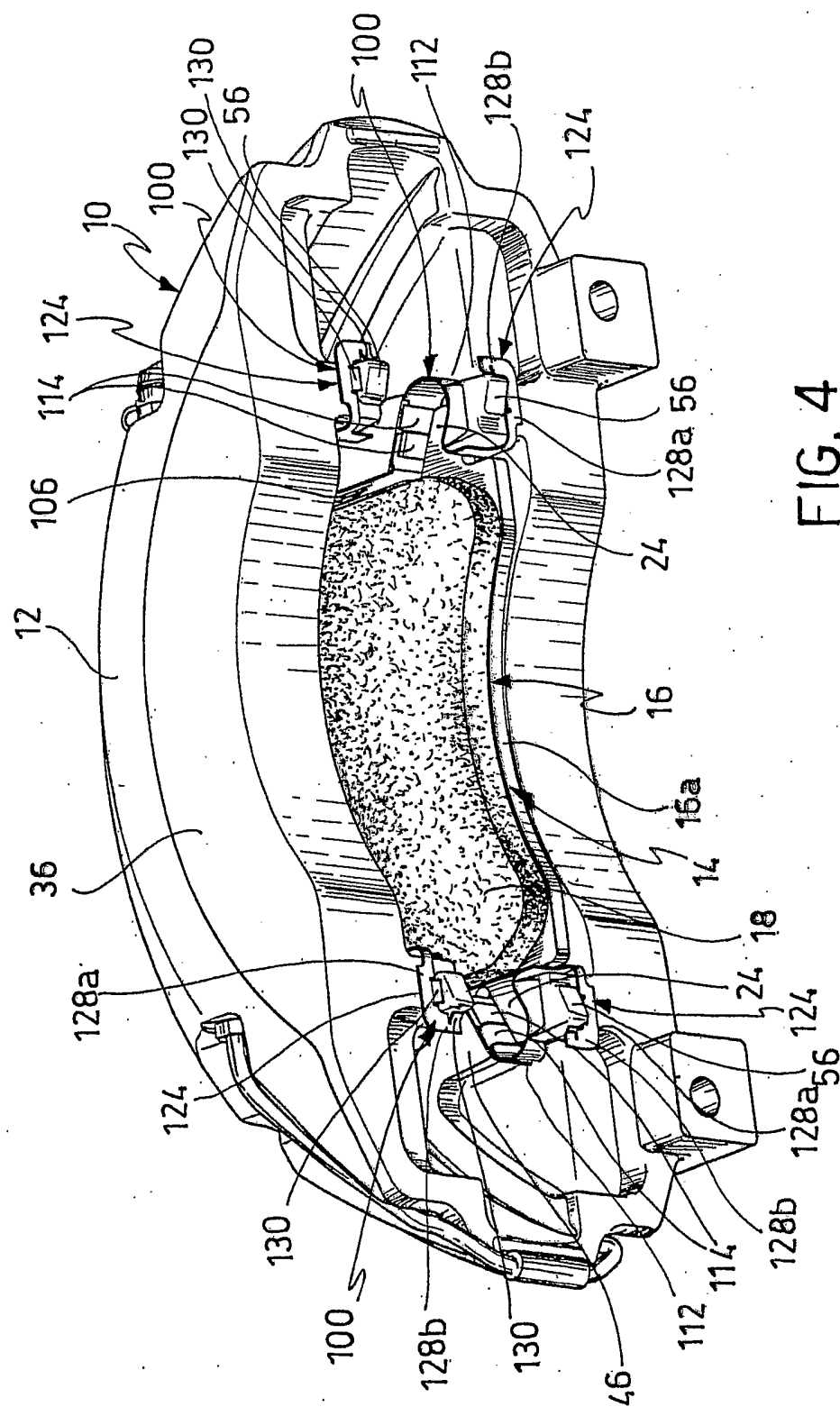


FIG. 3



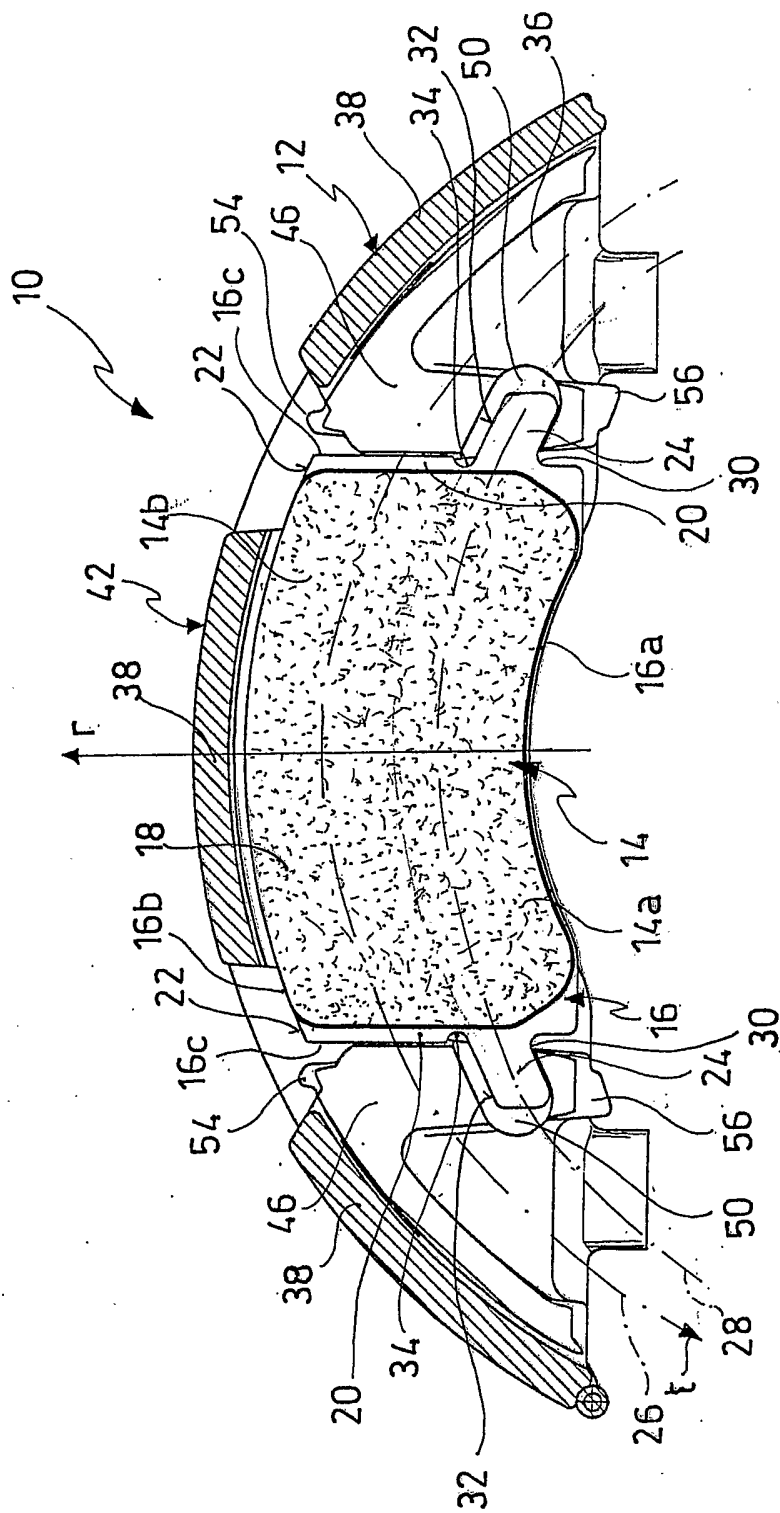


FIG. 5

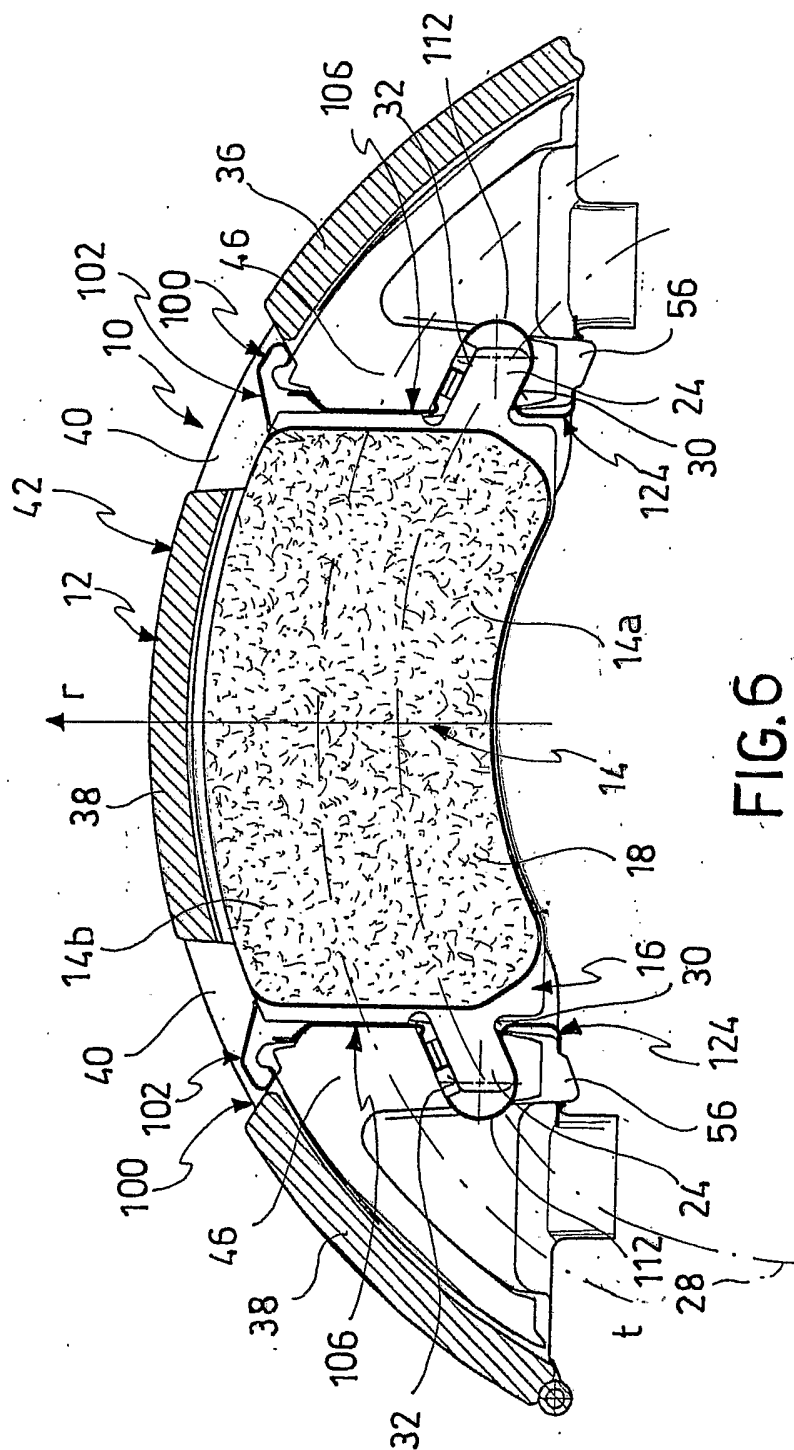


FIG. 6

FIG. 7

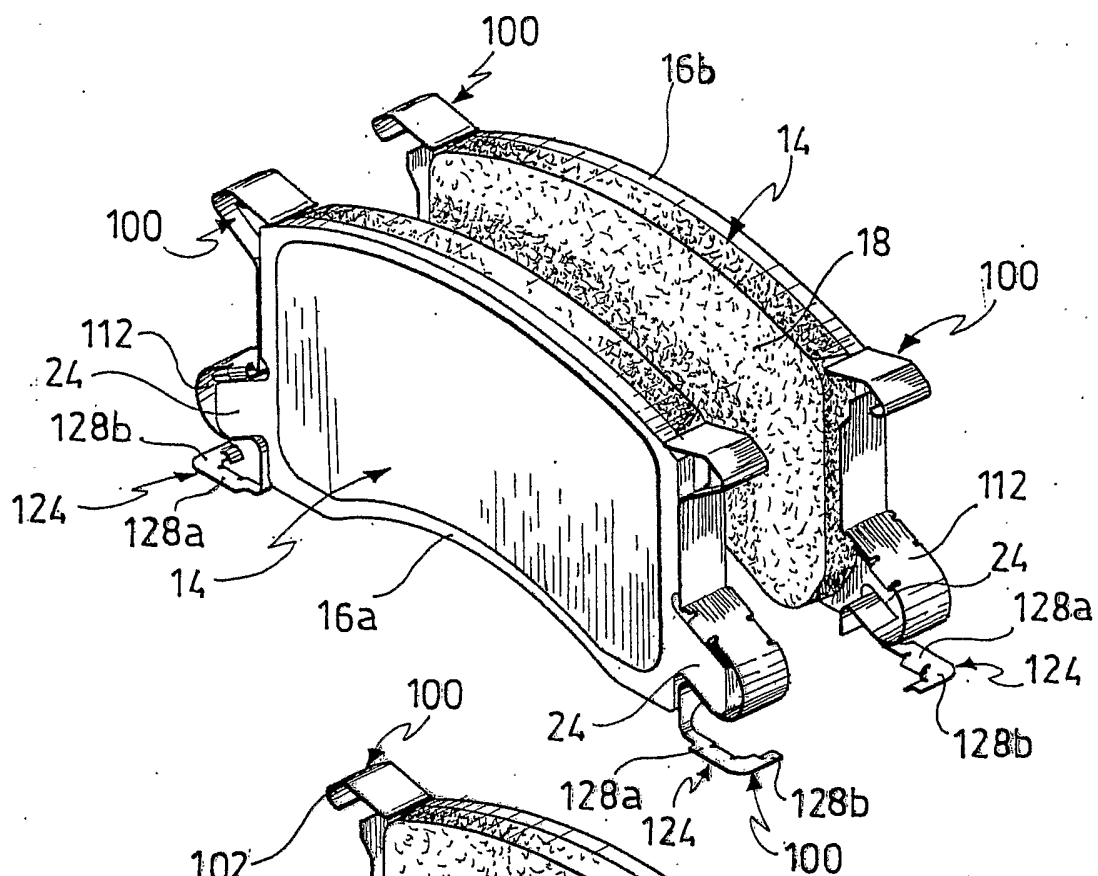


FIG. 8

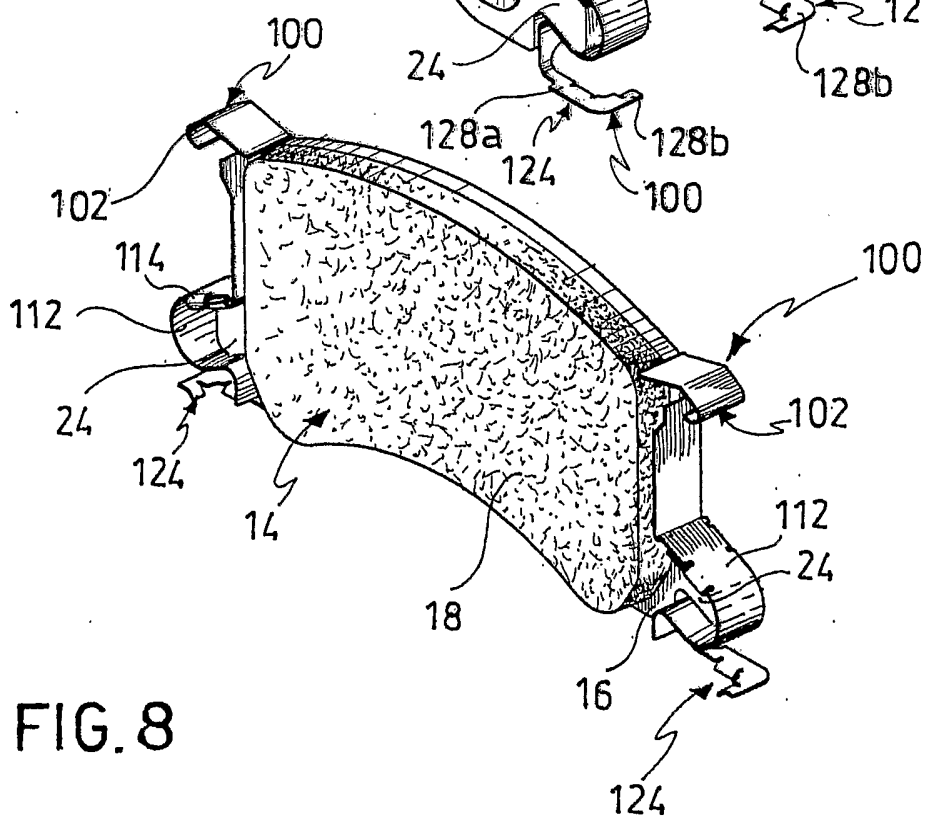


FIG.9

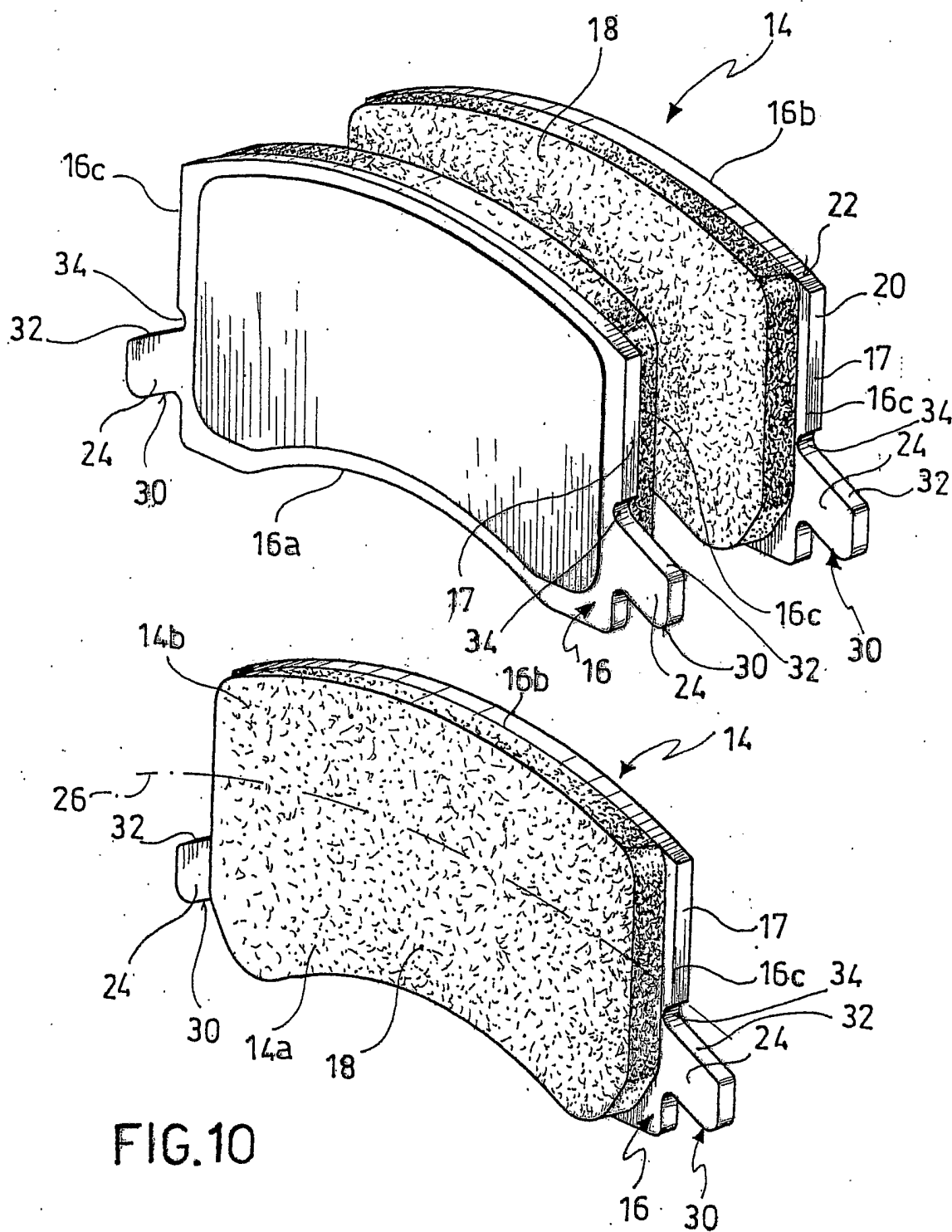
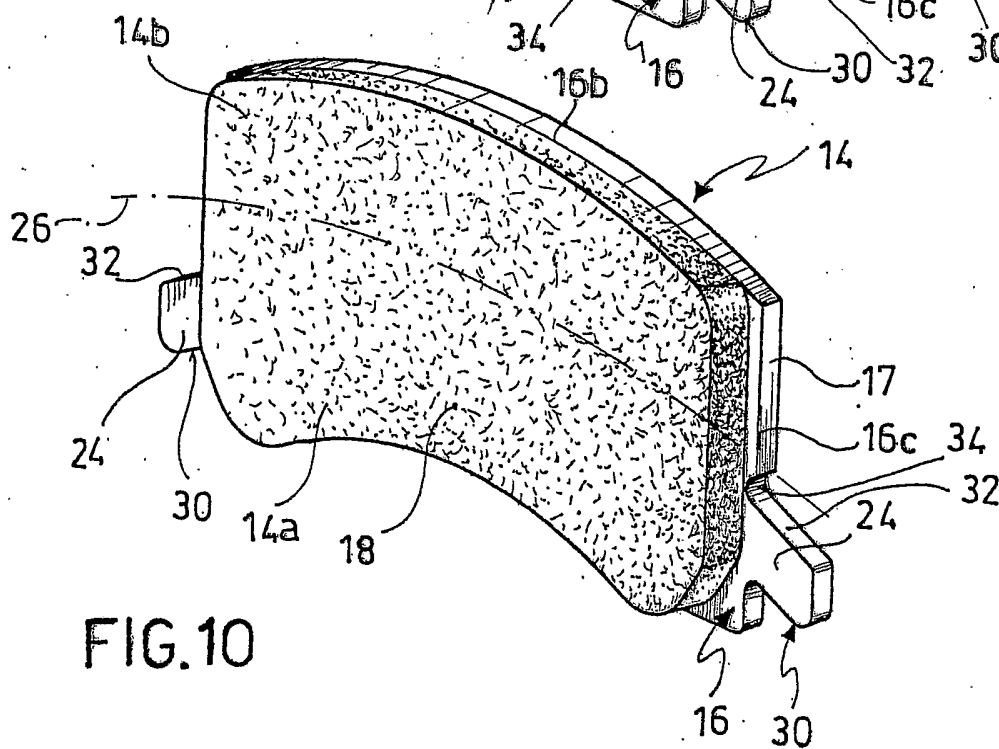
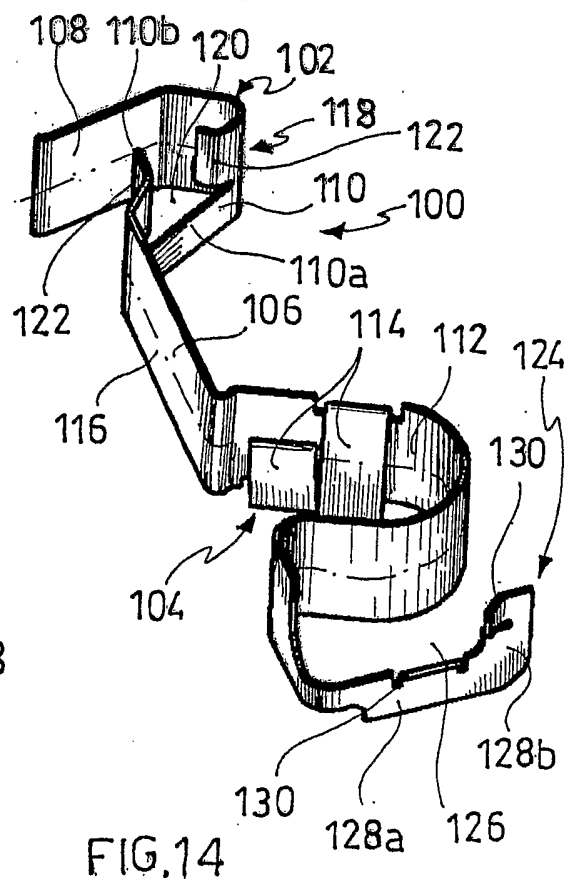
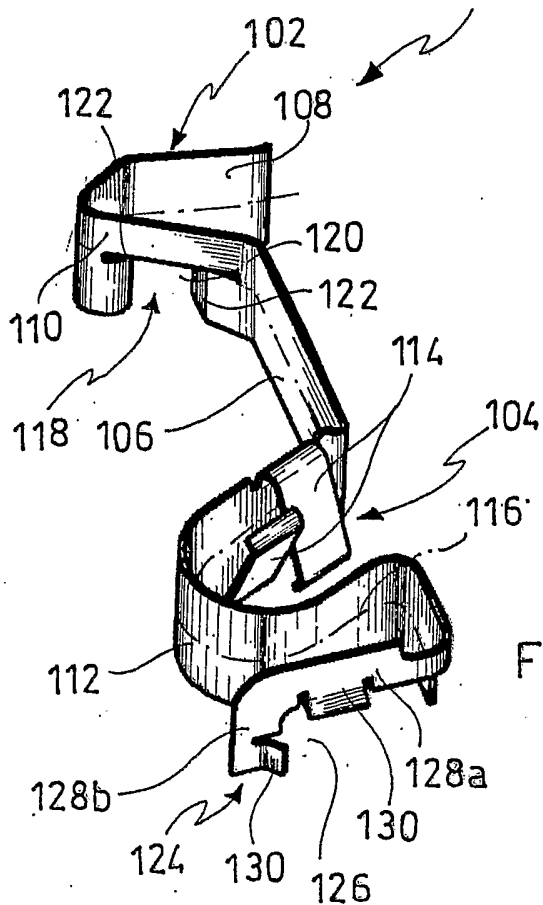
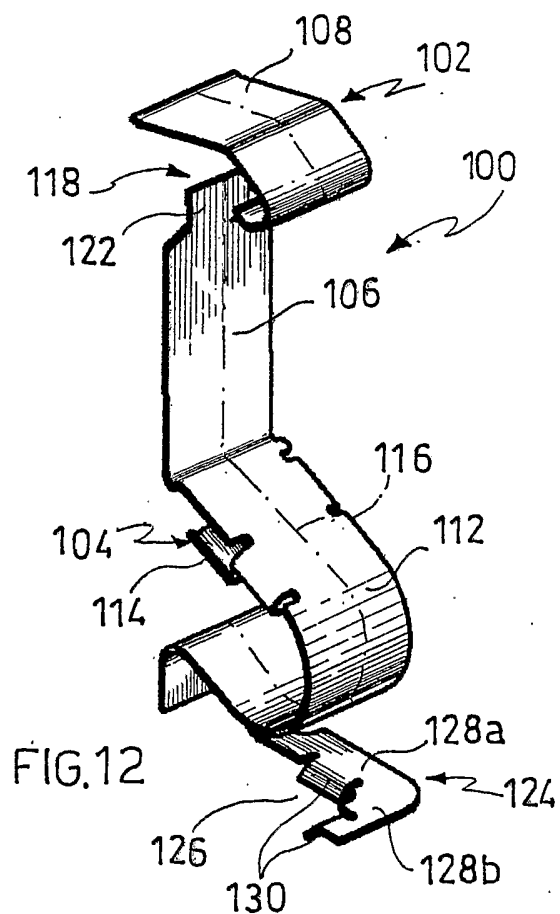
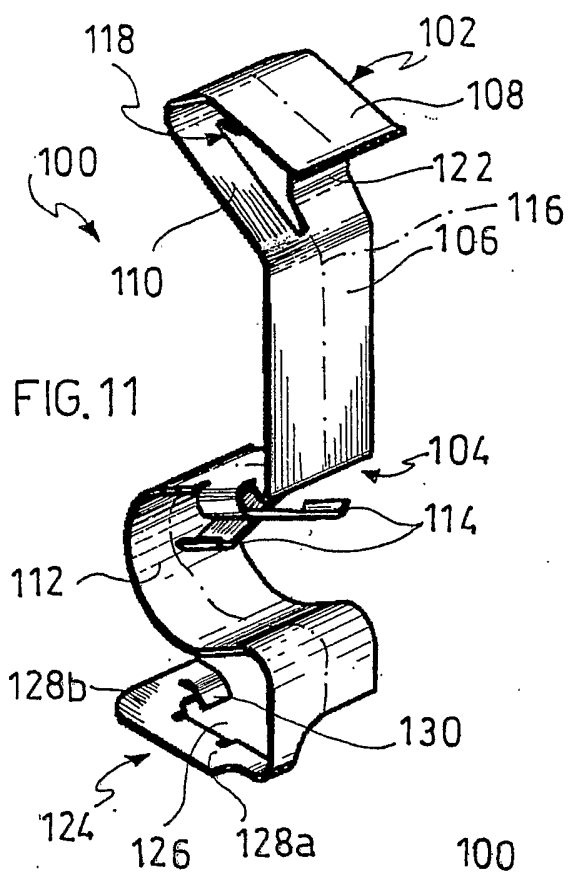


FIG.10



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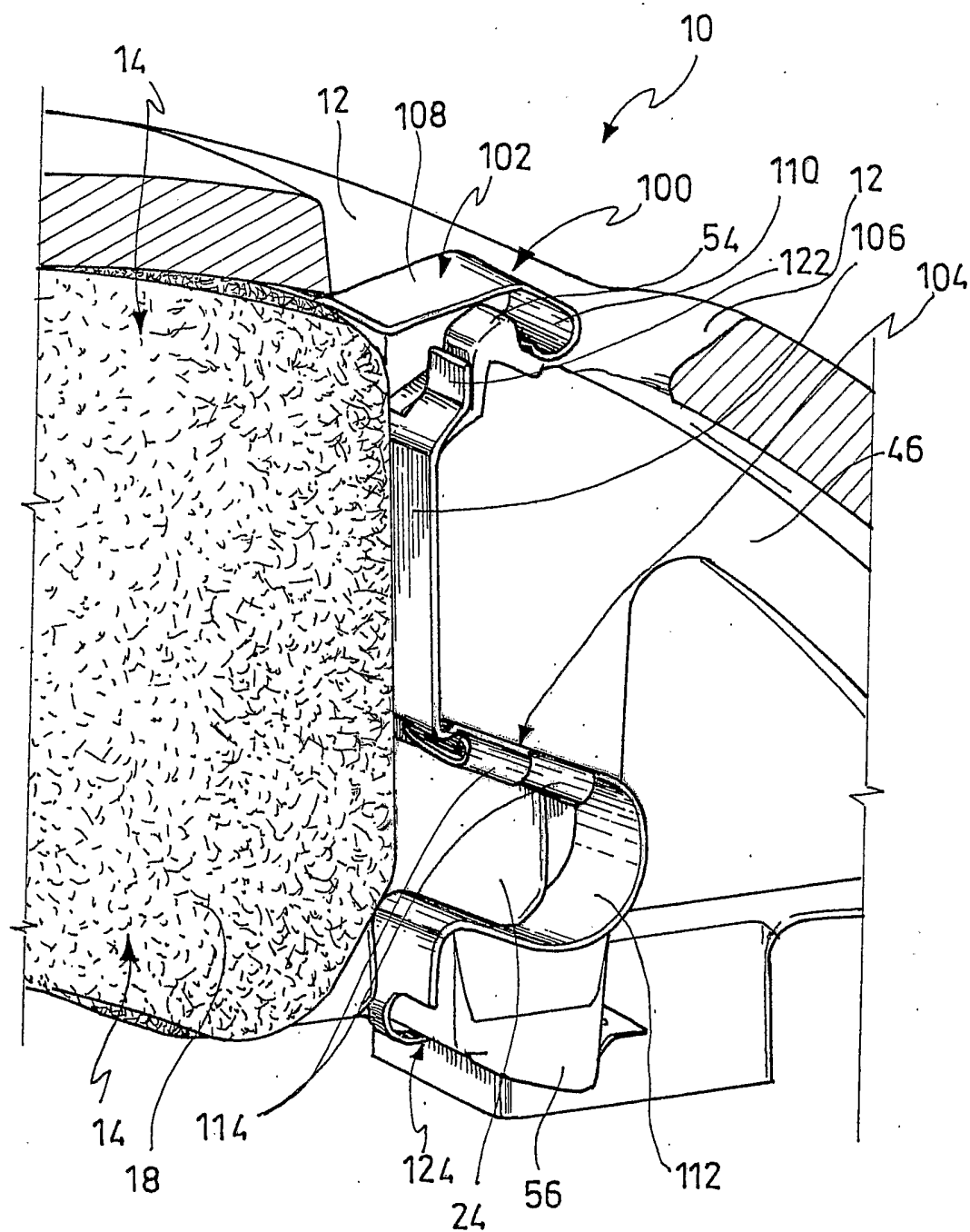


FIG. 15

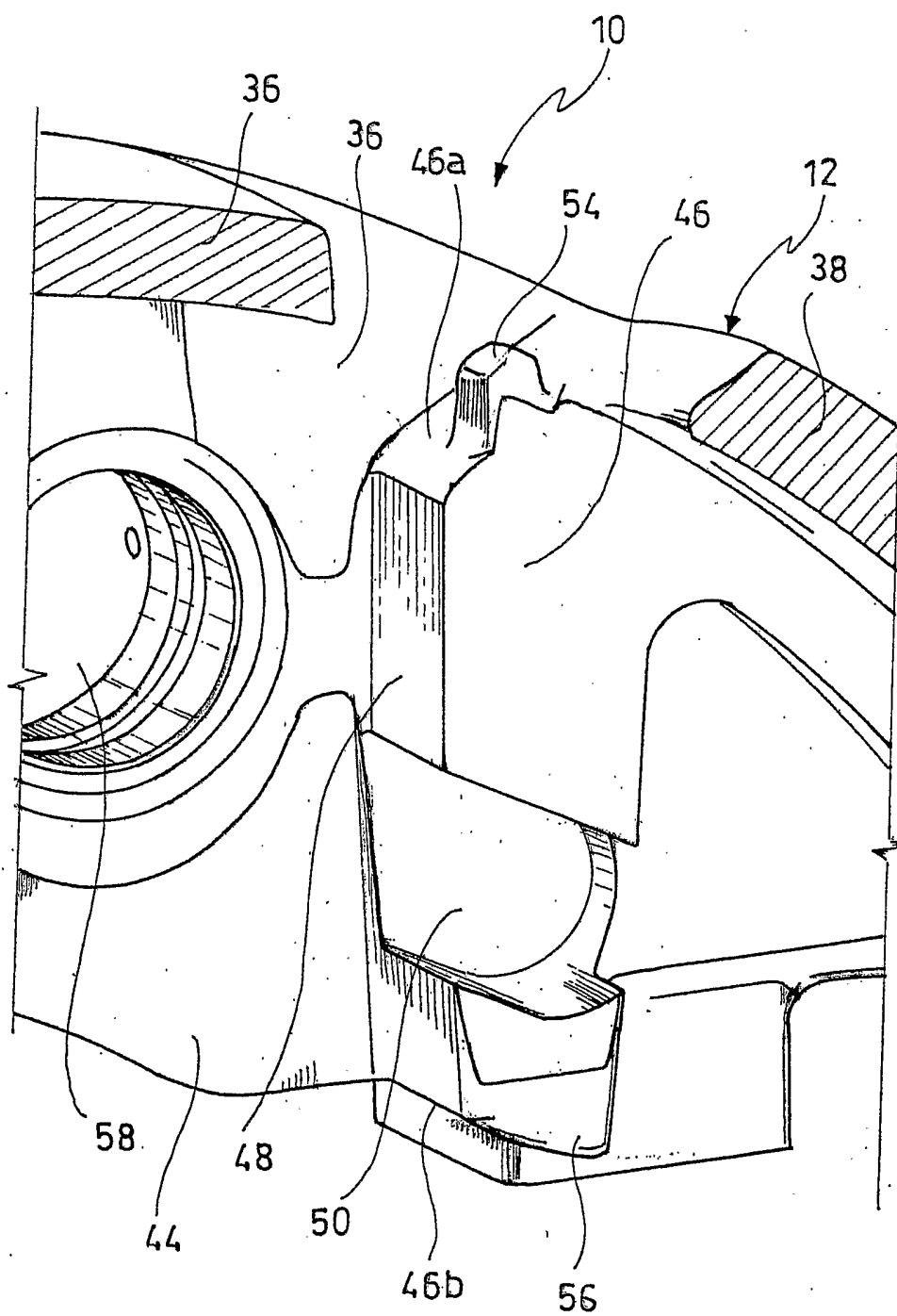


FIG. 16

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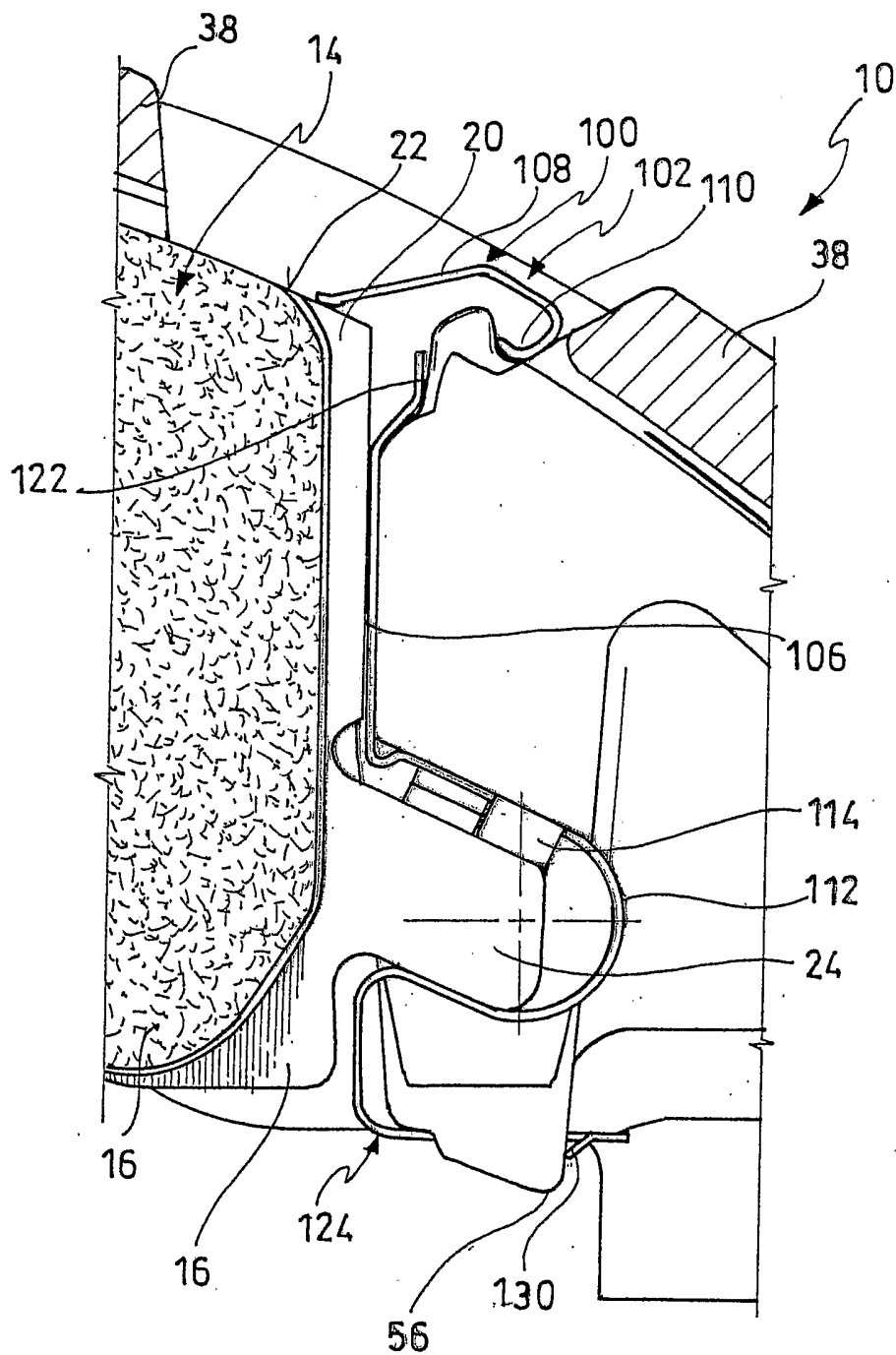


FIG. 17

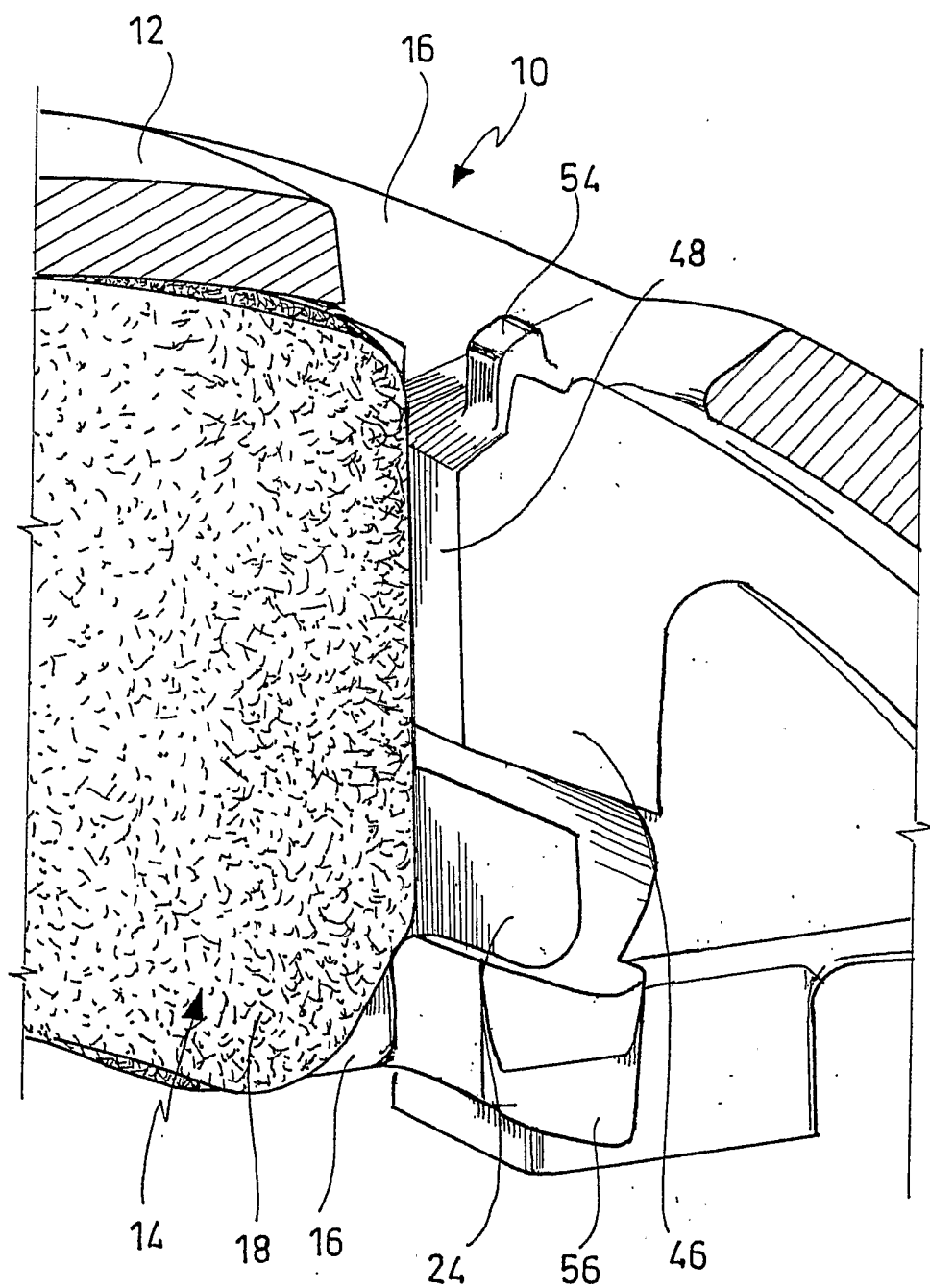


FIG. 18

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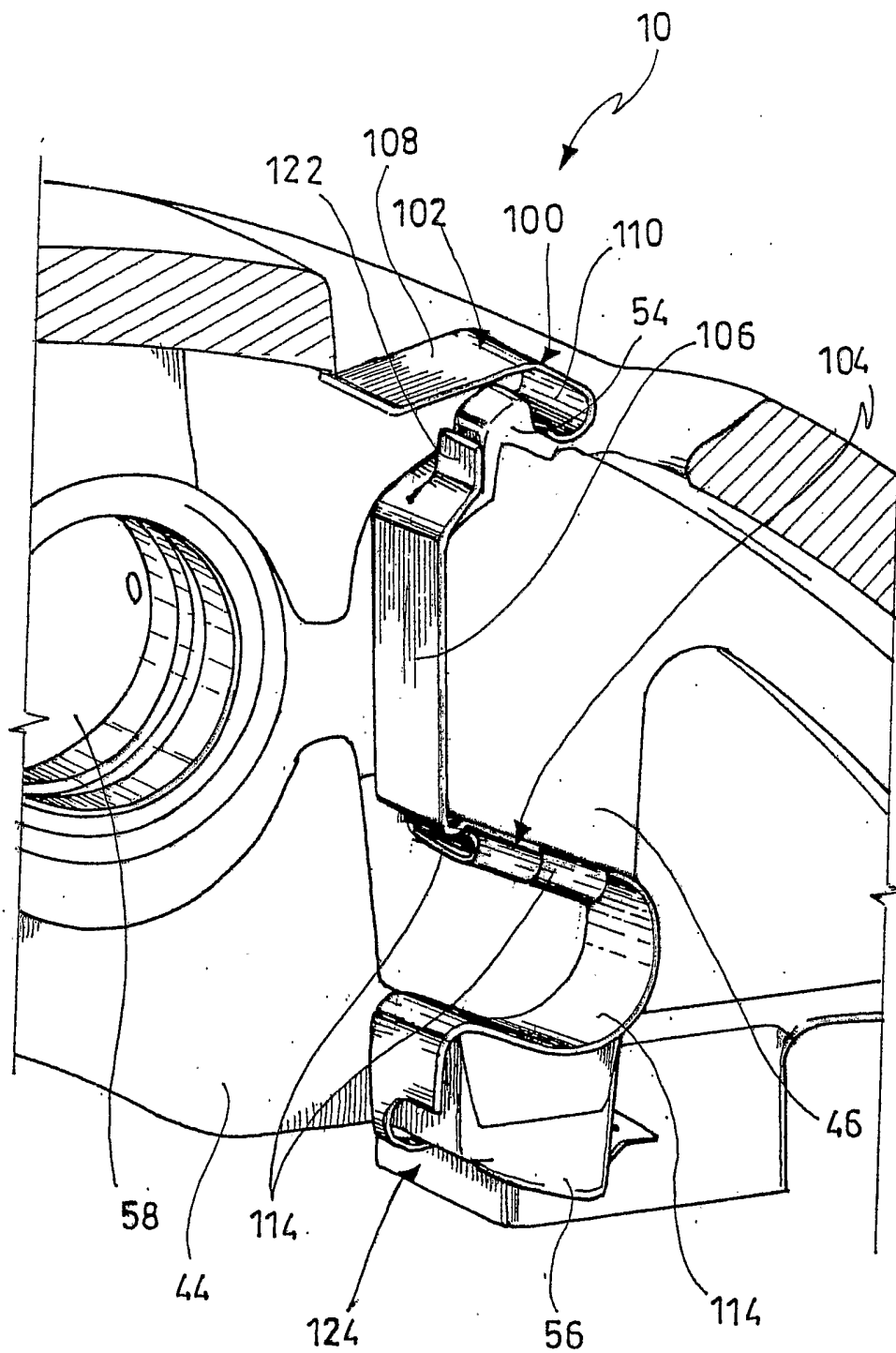


FIG. 19

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/IT 03/00871

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International Application No  
PCT/IT 03/00871

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