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(54) **DISC BRAKE ACTUATOR**
SCHEIBENBREMSENBETÄTIGUNG
ACTIONNEUR POUR FREIN A DISQUES

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WO-A-97/01044 **WO-A-97/01045**
US-A- 3 489 251 **US-A- 5 664 646**

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Description

[0001] This invention relates to an actuator device for a disc brake, primarily for a motor vehicle, the device including a rotary actuator operable, via a force transmission device, to move a friction element of the brake, in use, into engagement with a rotary brake disc. The invention also embraces a disc brake incorporating such an actuator device.

[0002] Our earlier specification WO97/01045 discloses an arrangement in which a thrust member, through which in force is transmitted from the actuator to the force transmission device, is held against rotation by engagement with a plate extending between the thrust member and a further such member carried by an adjacent force transmission device associated with the actuator. This arrangement is satisfactory in very large brakes, but cannot easily be accommodated in smaller brakes in which there may be insufficient space in the region of the force transmission device for the convenient incorporation of the aforementioned ant-rotational arrangement.

[0003] US3489251 shows a disc brake having a lever rotatable about an axis to apply a brake. The lever engages a slot of a bolt head to prevent relative rotation therebetween.

[0004] According to the present invention there is provided an actuator device for a disc brake as defined in claim 1.

[0005] Conveniently, the thrust member is received within a recess of the actuator and a defining wall of the recess engages the thrust member to prevent rotation thereof.

[0006] Typically, the force transmission device includes a pair of threadedly interengaged elements forming part of an extensible adjuster strut, one of the elements being held against rotation by a non-circular formation carried by the thrust member, conveniently in the form of an elongate stem extending into a complementary bore of the element.

[0007] From another aspect of the invention, there is provided a disc brake incorporating the aforesaid actuator device.

[0008] The invention will now be described, by way of example, with reference to the accompanying drawings in which:-

Figure 1 is an end view of one form of the disc brake of the present invention;

Figure 2 is a view from above, partly in cross-section, of the brake of Figure 1;

Figure 3 is a side view, partly in cross-section, of the brake shown in Figures 1 and 2, and

Figure 4 is an enlarged view of a component of the brake of Figures 1 to 3.

[0009] The disc brake illustrated in the drawings has a fixed carrier 1 which carries a pair of friction elements, shown as pads 2, 3, disposed respectively at either side of a brake disc 4, the carrier serving to mount the brake on a vehicle and to absorb torque sustained by the pads during a braking operation. A clamp member or calliper 5 straddles the brake disc and is mounted on the carrier so as to be slidable axially of the brake disc relative to the carrier, by way of pins 6, in conventional manner. The calliper carries an integral housing 7 which is adapted to mount a conventional air or other power actuator (not shown) on an external face 8 thereof. The housing 7 defines a chamber 9 within which a pivotal brake actuating lever 10 may perform an angular reciprocal swinging movement, as indicated by the arrows, under the action of a thrust member of the power actuator which, with the latter mounted on the face 8, extends through an opening 11 of the housing into engagement with a recess 12 of the lever 10. The lever is integral with or attached to a rotary actuating member 13 which is rotatably supported within the calliper by way of a pair of needle bearing assemblies 14. The member 13 is recessed to house respective cylindrical rollers 15, 16, the axes of which are offset from the rotary axis of the actuating member 13 and form an eccentric actuating arrangement with the rollers 15 and 16 bearing against respective thrust members 17A, 18A of adjacent thrust assemblies shown as adjustable tappet assemblies indicated generally at 17 and 18. Rotation of the lever 10 and its connected member 13 causes actuating thrust to be applied via the tappet assemblies to the directly actuated friction element 2 and, by reaction via the calliper 5, to the indirectly actuated friction element 3.

[0010] An adjuster assembly is indicated generally at 19 and may be of any appropriate conventional type needing no detailed description for the purpose of this invention. The adjuster responds to excessive movement of the friction elements 2, 3 and produces resultant rotation of an adjuster shaft 20 which, via an output gear 21 rotates a pair of input gears 22, 23 associated respectively with the adjustable tappet assemblies 17, 18.

[0011] The tappet assemblies are of identical construction and operation and only the assembly 17 will be described in sufficient detail for a full understanding of the invention. This assembly has an outer sleeve 24 which is internally threaded at 24A and receives a hollow internal shaft 25 having an externally threaded portion 25A extending over a part of its length for cooperation with the internal thread of the sleeve 24. The shaft and sleeve form between them an adjuster strut of variable length. The shaft 25 is provided, at its outer end, with a tappet head 26 which is releasably coupled to the shaft so as, conveniently, to be freely rotatable relative to the latter. Operation of the adjuster 19 causes rotation of the outer sleeve 24 by way of the gear 21 and, in order to cause the inner shaft 25 to move axially so as to extend the adjuster strut to compensate for wear of the friction elements, it is necessary to lock this shaft against rotary

movement. This is achieved, in the present embodiment, by providing the thrust member 17A, which is engaged over the adjacent end of the sleeve 24, with an elongate stem 27 of non-circular cross-section which extends within the hollow shaft 25, the internal surface of which forms a complementary bore. As best seen in Figure 4, the stem 27 is provided with opposed flat surfaces 27A for engagement with corresponding surfaces within the shaft 25.

[0012] As can be seen more clearly from Figure 4, the thrust member 17A is of generally rectangular form with four flat edges surfaces 17B. The thrust member is housed within a recess in the actuating member 13, which provides at least one planar surface 13A (of a wall 13B) which engages the adjacent planar surface 17B of the thrust member so as to hold the thrust member against rotation. This in turn, via the stem 26, prevents rotation of the inner shaft 25, so that when the outer sleeve 24 is rotated by the adjuster 19, the inner shaft performs an axial adjusting movement in a direction such as to extend the strut and thereby compensate for wear of the adjacent friction element. As can be seen from Figure 3, with the lever 10 in its illustrated rest position, a shaded area A, representing surface 13A of the actuating member, overlaps the surface 17B of the thrust member 17A to prevent rotation of the latter.

[0013] It will be seen that this arrangement for preventing rotation of the inner shaft 25 is accommodated within the normal dimensions of the actuating member 13 and is therefore compact and particularly suitable for use in a brake of relatively small dimensions.

[0014] Walls 13B include holes 13C for receiving an end of respective cylindrical roller 15 or 16.

Claims

1. An actuator device for a disc brake comprising a rotary actuator (13) operable, via a force transmission device (17, 18) to move a friction element (2, 3) of the brake, in use, into engagement with a rotary brake disc, and a thrust member (17A, 18A) arranged to transmit force from the actuator (13) to the force transmission device (17, 18) the actuator (13) being arranged to engage the thrust member (17A, 18A) in a manner such as to prevent rotation of the latter, wherein the force transmission device (17, 18) includes a pair of threadedly interengaged elements (24, 25) forming part of an extensible adjuster strut, one (25) of the elements being held against rotation by a non-circular formation carried by the thrust member (17A, 18A).
2. An actuator device as claimed in Claim 1, wherein the thrust member (17A, 18A) is received within a recess of the actuator (13) and a defining wall (13B) of the recess engages the thrust member (17A, 18A) to prevent rotation thereof.

3. An actuator device as defined in claim 2 in which the device includes cylindrical rollers (15, 16) acting between the rotary actuator (13) and the thrust member (17A, 18A), said cylindrical roller being received in said recess.
4. An actuator device as defined in claim 3 in which the said wall (13B) includes a hole (13C) for receiving an end of said cylindrical roller (15, 16).
5. An actuator device as claimed in any preceding claim, wherein the non-circular formation is an elongate stem (27) extending into a complementary bore of said one element (25).
6. An actuator device as claimed in Claim 5, wherein one end of the thrust member (17A, 18A) carries a head from which extends the elongate stem (27), the head providing a surface (17B) for engagement by the actuator (13) to prevent rotation of the thrust member (17A, 18A).
7. An actuator device as claimed in any preceding claim, wherein said one element (25) is a shaft having an external thread and the other element (24) is a sleeve having an internal thread engaged with said external thread.
8. A disc brake including an actuator device as claimed in any preceding claim.

Patentansprüche

1. Betätigungsvorrichtung für eine Scheibenbremse mit einem rotierenden Aktuator (13), der über eine Kraftübertragungsvorrichtung (17, 18) betrieben werden kann, um im Gebrauch ein Reibelement (2, 3) der Bremse mit einer rotierenden Bremsscheibe in Eingriff zu bringen, und mit einem Druckstück (17A, 18A), das dazu ausgelegt ist, Kraft von dem Aktuator (13) zu der Kraftübertragungsvorrichtung (17, 18) zu übertragen, wobei der Aktuator (13) dazu ausgelegt ist, an dem Druckstück (17A, 18A) so anzugreifen, dass die Drehung des letzteren verhindert wird, wobei die Kraftübertragungsvorrichtung (17, 18) zwei miteinander in Gewindeeingriff stehende Elemente (24, 25) umfasst, die Bestandteil eines ausfahrbaren Einstelldruckstabes sind, wobei eines (25) der Elemente durch ein von dem Druckstück (17A, 18A) getragenes nicht kreisrundes Gebilde drehfest gehalten wird.
2. Betätigungsvorrichtung nach Anspruch 1, wobei das Druckstück (17A, 18A) in einer Ausnehmung des Aktuators (13) aufgenommen ist und eine Begrenzungswand (13B) der Ausnehmung an dem Druckstück (17A, 18A) angreift, um die Drehung

desselben zu verhindern.

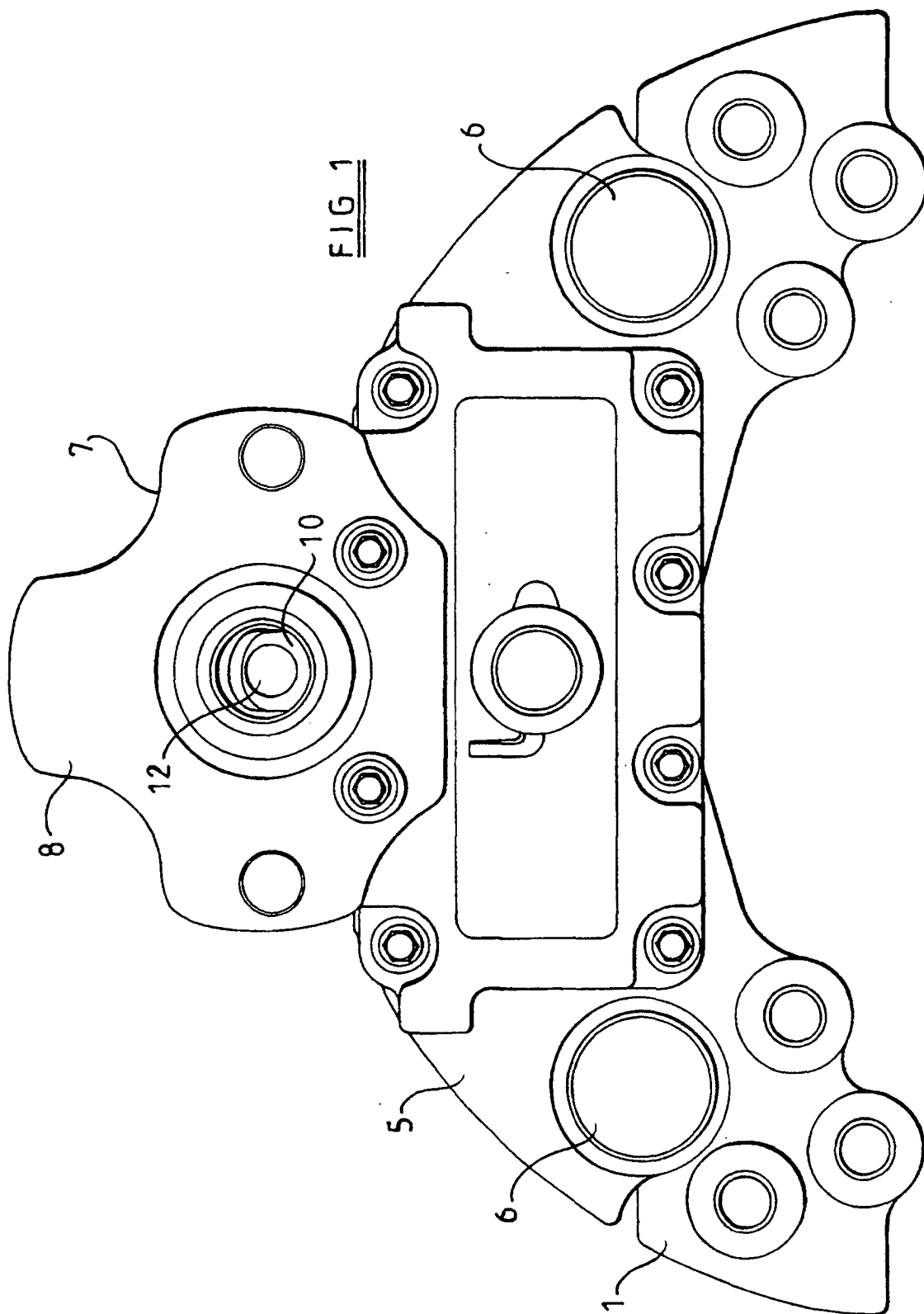
3. Betätigungsvorrichtung nach Anspruch 2, wobei die Vorrichtung zylindrische Rollen (15, 16) umfasst, die zwischen dem rotierenden Aktuator (13) und dem Druckstück (17A, 18A) wirken, wobei die zylindrische Rolle in der Ausnehmung aufgenommen ist. 5
4. Betätigungsvorrichtung nach Anspruch 3, wobei die Wand (13B) ein Loch (13C) zur Aufnahme eines Endes der zylindrischen Rolle (15, 16) umfasst. 10
5. Betätigungsvorrichtung nach einem der vorhergehenden Ansprüche, wobei das nicht kreisrunde Gebilde ein lang gestreckter Schaft (27) ist, der sich in eine komplementäre Bohrung des einen Elements (25) erstreckt. 15
6. Betätigungsvorrichtung nach Anspruch 5, wobei ein Ende des Druckstücks (17A, 18A) einen Kopf trägt, aus dem der lang gestreckte Schaft (27) ragt, wobei der Kopf eine Fläche (17B) bietet, an welcher der Aktuator (13) angreifen kann, um die Drehung des Druckstücks (17A, 18A) zu verhindern. 20 25
7. Betätigungsvorrichtung nach einem der vorhergehenden Ansprüche, wobei das eine Element (25) ein Schaft mit einem Außengewinde ist und das andere Element (24) eine Hülse mit einem in das Außengewinde eingreifenden Innengewinde ist. 30
8. Scheibenbremse mit einer Betätigungsvorrichtung nach einem der vorhergehenden Ansprüche. 35

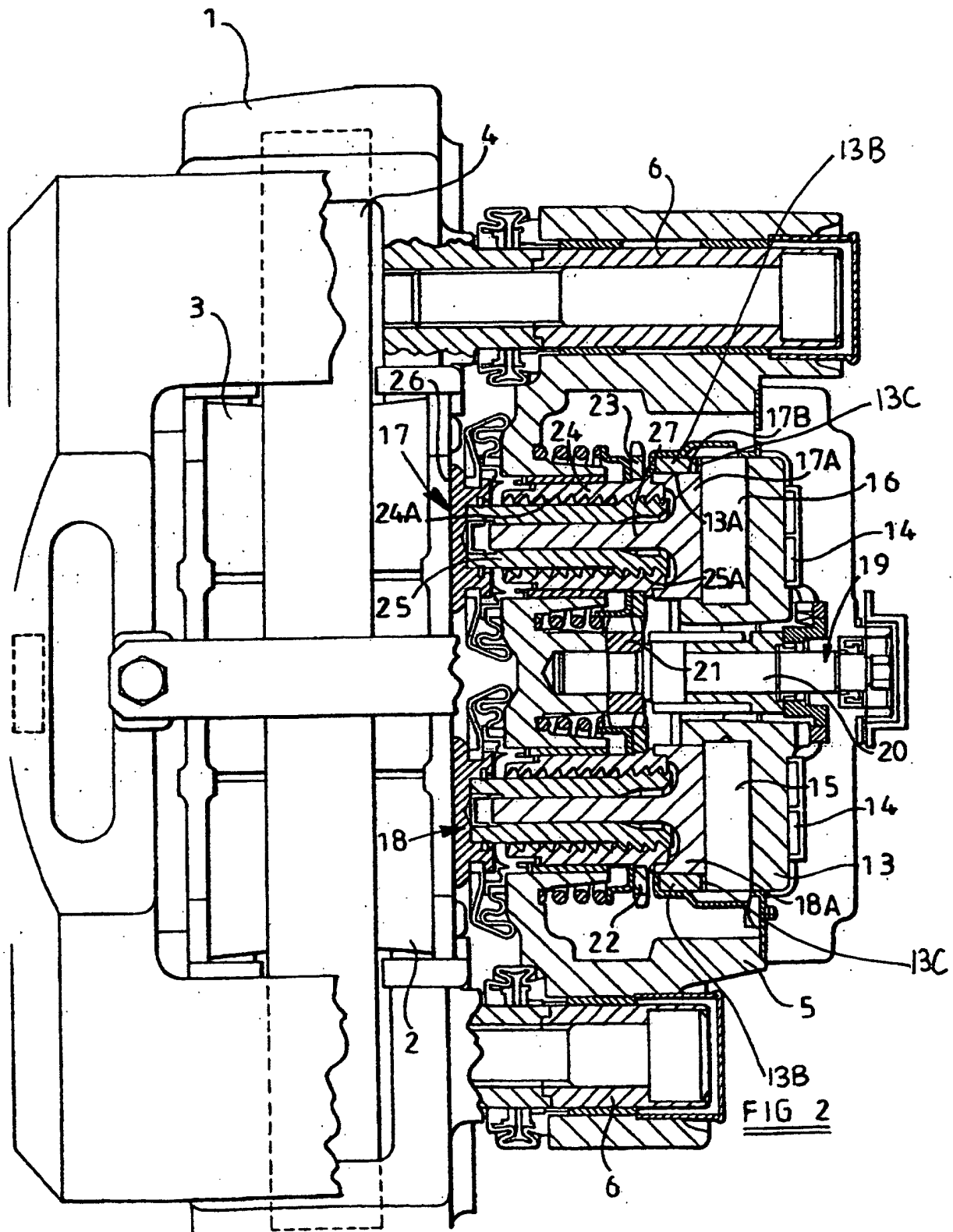
Revendications

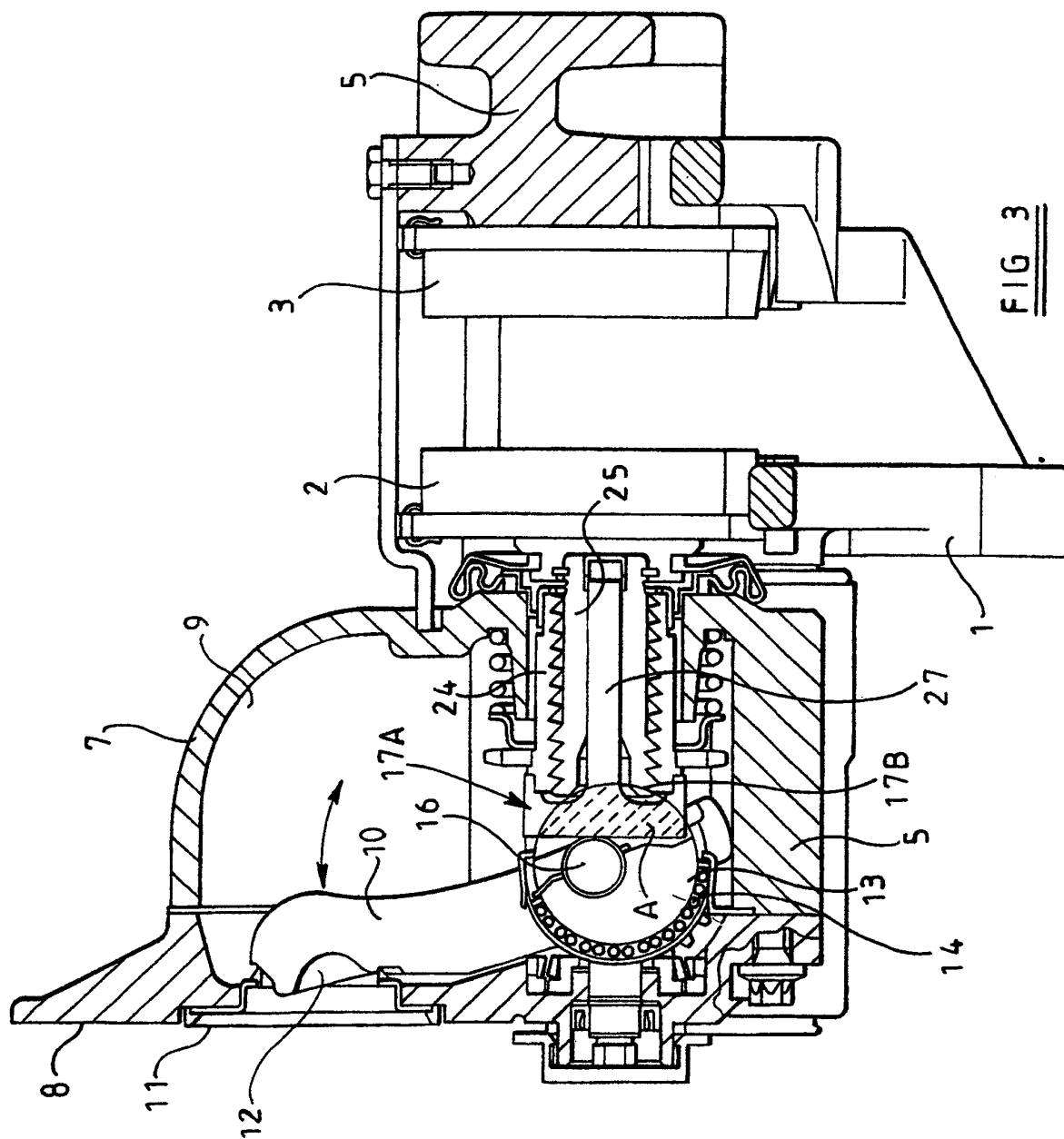
1. Dispositif actionneur pour un frein à disques, comprenant un actionneur rotatif (13), susceptible de fonctionner, via un dispositif de transmission de force (17, 18), pour déplacer un élément de friction (2, 3) du frein, en utilisation, afin de le mettre en contact avec un disque de frein rotatif, et un organe de poussée (17A, 18A), agencé pour transmettre une force depuis l'actionneur (13) au dispositif de transmission de force (17, 18), l'actionneur (13) étant agencé pour venir en contact avec l'organe de poussée (17A, 18A), de manière à empêcher toute rotation de ce dernier, dans lequel le dispositif de transmission de force (17, 18) comprend une paire d'éléments (24, 25), mise en prise mutuelle par filetage, faisant partie d'une jambe d'ajusteur extensible, l'un (25) des éléments étant maintenu bloqué en rotation par une formation non circulaire, portée par l'organe de poussée (17A, 18A). 40 45 50 55
2. Dispositif actionneur selon la revendication 1, dans

lequel l'organe de poussée (17A, 18A) est logé à l'intérieur d'une cavité de l'actionneur (13), et une paroi de définition (13B) de la cavité vient en prise avec l'organe de poussée (17A, 18A) pour empêcher sa rotation.

3. Dispositif actionneur selon la revendication 2, dans lequel le dispositif comprend des galets (15, 16) cylindriques, agissant entre l'actionneur rotatif (13) et l'organe de poussée (17A, 18A), lesdits galets cylindriques étant logés dans ladite cavité.
4. Dispositif actionneur selon la revendication 3, dans lequel ladite paroi (13B) comprend un trou (13C) pour recevoir une extrémité dudit galet cylindrique (15, 16).
5. Dispositif actionneur selon l'une quelconque des revendications précédentes, dans lequel la formation non circulaire est une tige (27) allongée, s'étendant dans un perçage complémentaire ménagé dans ledit premier élément (25).
6. Dispositif actionneur selon la revendication 5, dans lequel une extrémité de l'organe de poussée (17A, 18A) porte une tête d'où s'étend la tige allongée (27), la tête fournissant une surface (17B) pour la mise en prise par l'actionneur (13), pour empêcher toute rotation de l'organe de poussée (17A, 18A).
7. Dispositif actionneur selon l'une quelconque des revendications précédentes, dans lequel ledit premier élément (25) est un arbre ayant un filetage externe, et l'autre élément (24) est une douille, présentant un filetage interne mis en prise avec ledit filetage externe.
8. Frein à disques, comprenant un dispositif actionneur, tel qu'indiqué selon l'une quelconque des revendications précédentes.







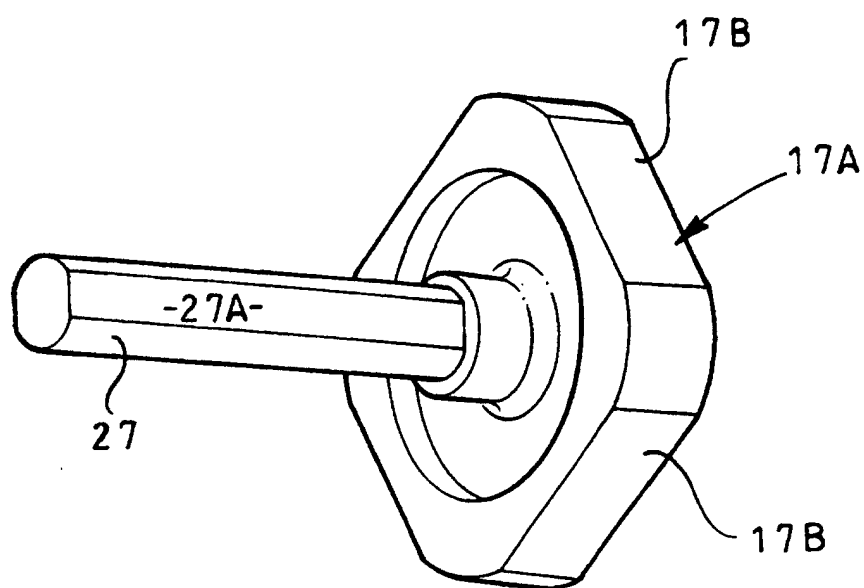


FIG 4