(12) UK Patent Application (19) GB (11) 2 373 828 (13) A

(43) Date of A Publication 02.10.2002

(21) Application No 0105278.6

(22) Date of Filing 05.03.2001

(71) Applicant(s)
Prodrive 2000 Limited
(Incorporated in the United Kingdom)
Acorn Way, BANBURY, Oxon, OX16 7XS,
United Kingdom

(72) Inventor(s)
Simon Bull

(74) Agent and/or Address for Service
Withers & Rogers
Goldings House, 2 Hays Lane, LONDON, SE1 2HW,
United Kingdom

(51) INT CL^7
F16D 65/54 // F16D 25/12

(52) UK CL (Edition T)
F1D DV4 D174 D180 D242 D246
F2E ELDJ E106 E114
U1S S2013 S2014

(56) Documents Cited
GB 2146716 A **GB 1393866 A**
EP 0864772 A **DE 002610651 A**

(58) Field of Search
UK CL (Edition T) **F1D DS1 DV4 , F2E ELDA ELDJ , F2L LK**
INT CL^7 **F16D 25/12 65/52 65/54 65/62 65/64**
Online: WPI EPODOC PAJ

(54) Abstract Title
Self-adjusting mechanism

(57) A self adjusting mechanism includes a fluid operated annular piston 18 with seals 20, 22 engaging a cavity 16 wall and operatively connected to an annular drive member 24 through a spring 32 and a friction member in the form of sleeve 28. The piston moves the drive member on contact of its face 26 with the drive member. The friction member is moveable against a frictional resistance relative to the drive member and said resistance is selected to be more than the resistence between the piston and its housing 14. The spring biases the piston away from the drive member when the piston is not operational and the piston is spaced from the drive member by a predetermined clearance or play. Application in brakes and clutches.

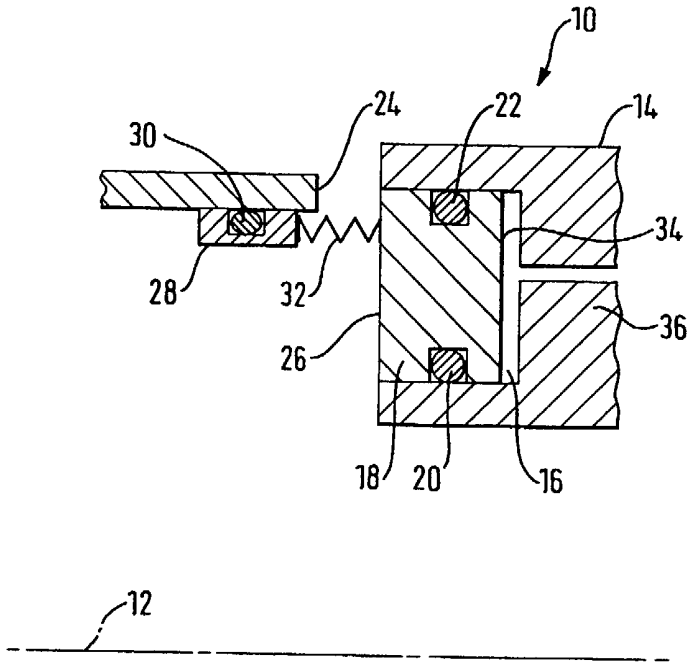

FIG. 1

GB 2 373 828 A

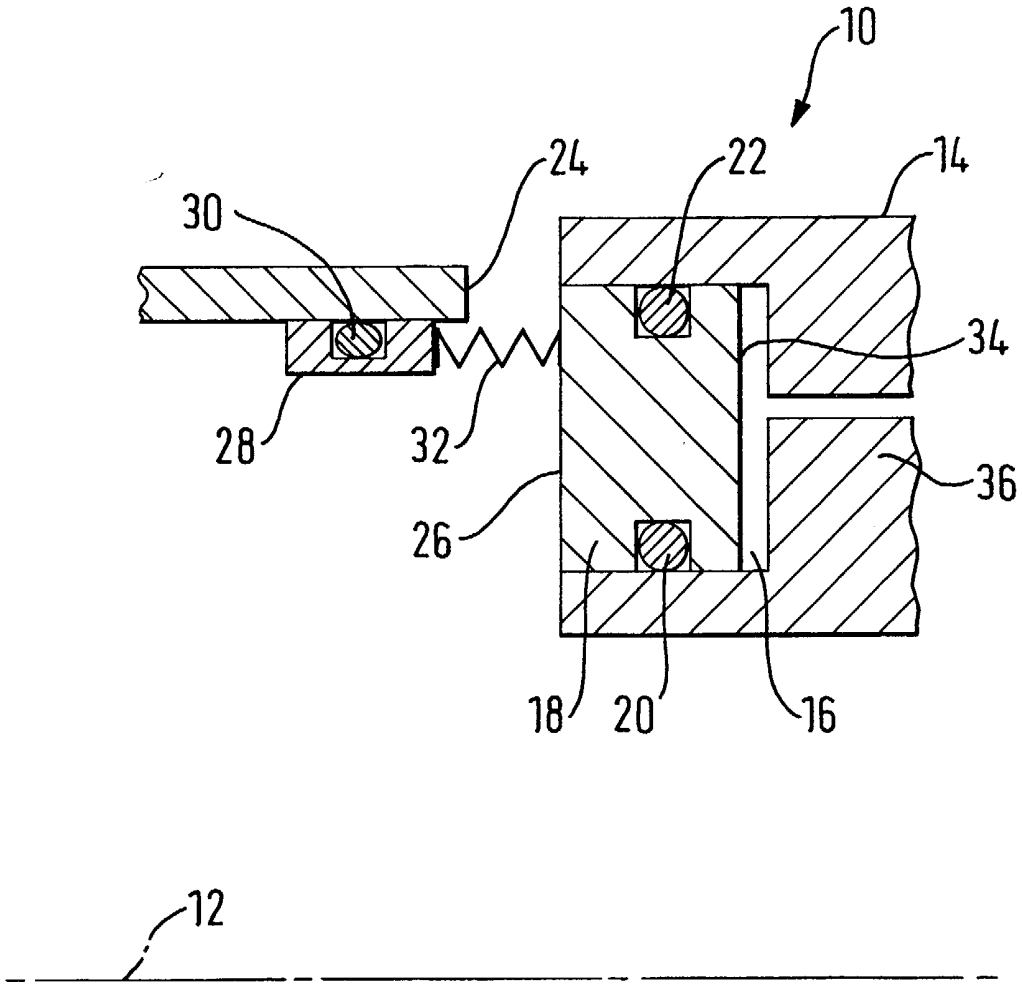

FIG. 1

2373828

Self-Adjusting Mechanism

The present invention relates to a self-adjusting mechanism and in particular to a mechanism for use in conjunction with a fluid operated actuator.

According to the present invention there is provided a mechanism to enable a predetermined off-load spacing between a fluid operated piston provided in a housing and a drive member adapted to, in use, be contacted and moved by said piston, the mechanism comprising a movable friction member and a spring, the friction member being provided on the drive member and the spring arranged between the friction member and piston, wherein the static frictional force between the friction member and the drive member is greater than the static frictional force between the piston and housing, and the spring is adapted to bias the piston from the drive member in the absence of fluid pressure being applied to the piston.

In a preferred embodiment the drive member and friction member are annular. In such an embodiment the friction member may be provided annularly within or, alternatively, outside the drive member. The friction member preferably includes an elastomeric circumferential seal.

An embodiment of the present invention will now be described with reference to the accompanying drawing (Figure 1) which shows a partial cross-sectional view of a fluid operated actuator system generally designated 10 It will be understood that the system is essentially cylindrical about the centreline 12. The system 10 comprises a housing 14 having a cavity 16 within which there is provided a piston 18. The piston includes inner and outer circumferential seals 20,22. Facing the piston 18 is an annular member 24 adapted to be moved by the piston 18 upon contact with a portion of the piston face 26. Provided on the inside of the annular member 24 is a friction member in the form of a close fitting sleeve 28. The sleeve 26 is provided with a circumferential seal 30. Extending between the sleeve 26 and the piston face 26 is a spring 32.

In use, the piston 18 is movable towards the annular member 24 by the application of fluid pressure to the rear face 34 thereof via a conduit 36 of the housing 14. Movement of the piston 18 towards the annular member 24 is resisted by a combination of the static friction between the seals 20,22 and the cavity 16, and the reactive force of the spring 32 acting on the piston face 26. As the fluid pressure increases the force applied to the piston 18 is sufficient to overcome the static friction of the seals 20,22 and the resistive force of the spring 32 and hence the piston 18 is moved towards the annular member 24.

Movement of the piston 18 compresses the spring 32 against the friction member 28 until the force applied by the compressed spring 32 is greater than the static friction force between the sleeve seal 30 and the annular member 24. Further movement of the piston 18 towards the annular member 24 results in movement of the friction member 28 relative to the annular member 24.

Continued movement of the piston 18 results in the contact of the piston face 26 with the annular member 24 and hence the transmission of force applied by the piston 18 through the annular member 24. In use, the annular member 24 may be arranged so as to move a brake pad into contact with a brake disc.

Removal of the fluid pressure applied to the rear face 34 of the piston 18 results in reverse movement of the piston 18 by a distance equal to the extension of the spring 32 the force stored in the spring 32 being sufficient to overcome the static friction between the seals 20,22 and the cavity 16.

The present invention ensures that, upon the removal of fluid pressure to the piston 18 the piston is moved from annular member 24 by a predetermined distance irrespective of the spacing between the annular member 24 and the housing 14. Taking the example of the annular member 24 being adapted to contact a brake pad, the present invention ensures that a predetermined amount of free play exists between the piston 18 and annular member 24 under all brake pad wear conditions. The present invention is equally applicable to a fluid operated clutch actuator system.

Claims

1. Self-adjusting mechanism comprising:

a fluid operated piston,

a housing for the piston,

a drive member arranged to be moved by the piston when the piston is operated,

a friction member located on the drive member, and

a spring which extends between the piston and the friction member,

the mechanism being arranged such that the frictional resistance between the friction member and the driven member is greater than the frictional resistance between the piston and its housing, the spring being arranged to bias the piston for movement away from the drive member when the piston is not under fluid pressure,

whereby the mechanism enables the piston to be spaced from the drive member when non-operational.

2. A mechanism according to claim 1 wherein the piston is annularly arranged and the drive member is correspondingly shaped.

3. A mechanism according to claim 1 or 2 wherein the friction member comprises an elastomeric seal.

4. A mechanism according to any one of the preceding claims wherein the friction member is moveable relative to the drive member when the force applied to the friction member exceeds the frictional resistance between the friction member and the drive member.

5. A mechanism according to any one of the preceding claims wherein the piston causes the drive member to move when the piston engages the drive member.

6. A mechanism according to any one of the preceding claims wherein the spring allows relative movement between the piston and the drive member, such movement being of the piston towards the drive member in an operational movement of the piston, and away from the drive member under spring action when the piston is non-operational.

7. A mechanism according to any one of the preceding claims wherein the drive member is arranged to be moveable to operate a brake including a wearable brake pad.

8. A mechanism according to any one of the preceding claims wherein the drive member is arranged to be operable to operate a clutch.

9. A self-adjusting mechanism substantially as described with reference to the drawing.

INVESTOR IN PEOPLE

Application No: GB 0105278.6 **Examiner:** J. C. Barnes-Paddock
Claims searched: 1-9 **Date of search:** 25 July 2002

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.T): F1D (DV4 DS1); F2E (ELDA ELDJ); F2L (LK)

Int Cl (Ed.7): F16D 25/12, 65/52, 54, 62, 64

Other: Online: WPI EPODOC PAJ

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
A	GB2146716 A	(FORD) See the Figure. Brake caliper piston clearance adjustment by spring and friction engagement with caliper body.	
A	GB1393866	(GM) See Figure 1. Gripping ring on piston post controls piston clearance.	
A	DE2610651 A	(KNORR-BREMSE) See Figure 1 and WPI abstract accession No: 1977-H7904Y [38]. Piston return adjustment by spring and friction engagement with cylinder body.	
A	EP0864772 A	(SUMITOMO) See Figure 3. Spring reacting against brake piston and pad for pad control when piston deactivated.	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.