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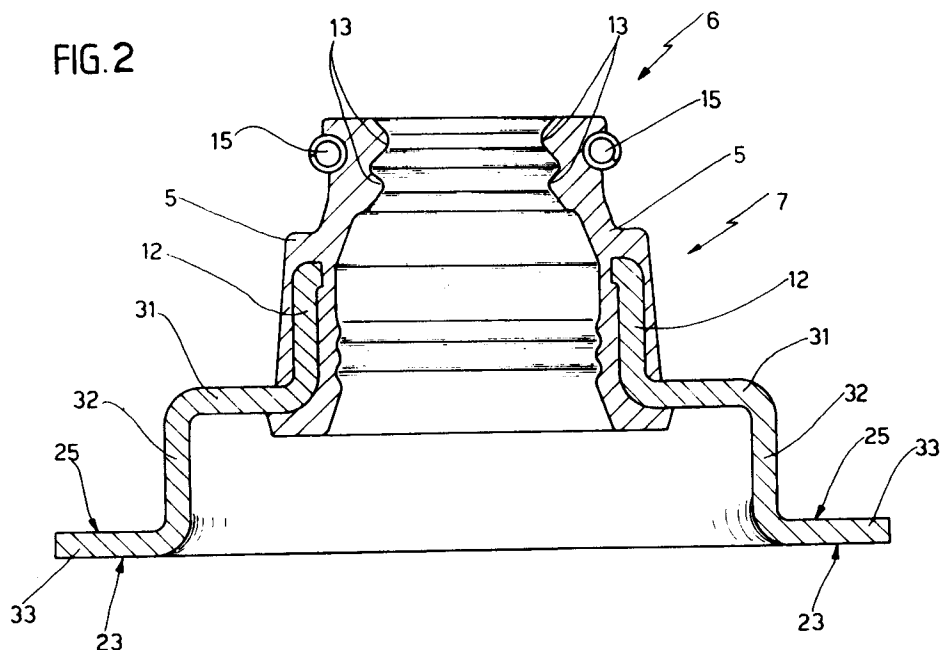
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I-10121 Torino (IT)(54) **Seal for a rod sliding against the action of elastic means, in particular an internal combustion engine valve stem.**

(57) A seal (1) for a rod (2) sliding against the action of elastic means (22), in particular the stem (2) of an internal combustion engine valve (3); the seal (1) presenting a sleeve-shaped elastomeric element (5) consisting of a sealing portion (6) cooperating with the stem (2), and an assembly portion (7); and a

stiffener (12) formed integral with the assembly portion (7); the stiffener (12) presenting a portion (21) for supporting and centering the elastic means (22) and extending radially and axially outwards of the elastomeric element (5) and on the opposite side in relation to the sealing portion (6).

FIG.2**EP 0 566 059 A1**

The present invention relates to a seal for a rod sliding against the action of elastic means, in particular an internal combustion engine valve stem.

Known elastomeric seals for preventing leakage of the supply system lubricating oil into the combustion chamber of the engine substantially consist of a substantially sleeve-shaped sealing portion, and a sleeve-shaped assembly portion fitted in a seat formed externally on the valve stem guide.

To reinforce the assembly portion and so ensure effective seating of the seal, the assembly portion normally presents a rigid metal stiffener, normally outside the co-molded assembly portion, and which provides for ensuring correct positioning of the seal.

To prevent wear on the cylinder head, the ends of the valve stem contrast springs facing the cylinder head normally rest on metal caps in turn resting directly on the cylinder head.

The above solutions are not without drawbacks. Due to vibration and/or particularly after prolonged use, the seal tends to work out of the seat, thus resulting in impaired sealing performance, while the metal caps, by virtue of not being fitted to the cylinder head, are a frequent cause of noise and vibration.

It is an object of the present invention to provide a seal designed to overcome the aforementioned drawbacks, and which provides for troublefree, low-cost, even automated, assembly. According to the present invention, there is provided a seal for a rod sliding against the action of elastic means, in particular the stem of an internal combustion engine valve; the seal comprising a substantially sleeve-shaped elastomeric element, in turn comprising a sealing portion cooperating with said stem, and an assembly portion designed to fit inside a seat on the guide element of said stem; and a stiffener formed integral with said assembly portion; characterized by the fact that said stiffener comprises a portion for supporting and centering said elastic means contrasting the movement of said stem; said supporting and centering portion extending radially and axially outwards in relation to said elastomeric element, and on the opposite side in relation to said sealing portion.

A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Fig.1 shows a front section of a sliding rod seal in accordance with the present invention;

Fig.2 shows an enlarged front section of a detail on the Fig.1 seal.

Number 1 in the accompanying drawings indicates a seal for a sliding rod 2, and particularly in the example shown for the stem 2 of an intake or exhaust valve 3 (shown only partially in Fig.1) of an

internal combustion engine of which the cylinder head 4 is shown partially.

Seal 1 comprises a substantially sleeve-shaped elastomeric element 5, in turn comprising a sealing portion 6 cooperating with stem 2 of valve 3, and an assembly portion 7 designed to fit inside a substantially cylindrical seat 8 on the guide element 11 of stem 2. A stiffener 12 is provided inside and formed integral with assembly portion 7.

Sealing portion 6 presents two inner projecting sealing lips 13 cooperating in sliding manner with the outer surface 14 of stem 2 of valve 3, for preventing oil from leaking towards cylinder head 4 and into the engine through guide element 11 of stem 2.

To improve sealing between lips 13 and surface 14 of stem 2, sealing portion 6 presents an outer annular pressure element, e.g. an annular spring 15, for exerting predetermined radial pressure on sealing lips 13 between which an oil collecting chamber 16 is formed.

According to the present invention, stiffener 12 is co-molded with elastomeric element 5, and comprises, outside element 5, a portion 21 for supporting and centering a spring 22 contrasting axial movement of stem 2 of valve 3. Supporting and centering portion 21 extends radially and axially outwards in relation to elastomeric element 5, and on the opposite side in relation to sealing portion 6.

According to the present invention, supporting and centering portion 21 in turn presents a first substantially flat supporting surface 23 designed to rest on a corresponding flat surface 24 of cylinder head 4; while a second surface 25, opposite surface 23, supports end 26 of contrast spring 22. In use (Fig.2), supporting and centering portion 21 is thus gripped between cylinder head 4 and end 26 of spring 22, and, via stiffener 12, provides for maintaining assembly portion 7 in the design position inside seat 8 and, consequently, for maintaining sealing portion 6 contacting surface 14 of stem 2.

In particular, supporting and centering portion 21 presents a substantially S-shaped radial section, and comprises a first portion 31 blending with stiffener 12 and projecting radially from elastomeric element 5, a second cylindrical portion 32 for centering spring 22 and substantially coaxial with sealing portion 7, and a peripheral supporting portion 33 substantially perpendicular to cylindrical centering portion 32 and having surfaces 23 and 25 on either side.

The advantages of the present invention will be clear from the foregoing description. In particular, the portion of the seal for supporting and centering the coil spring is fixed directly to the assembly portion stiffener and co-molded directly with the elastomeric element, thus enabling the seal (which

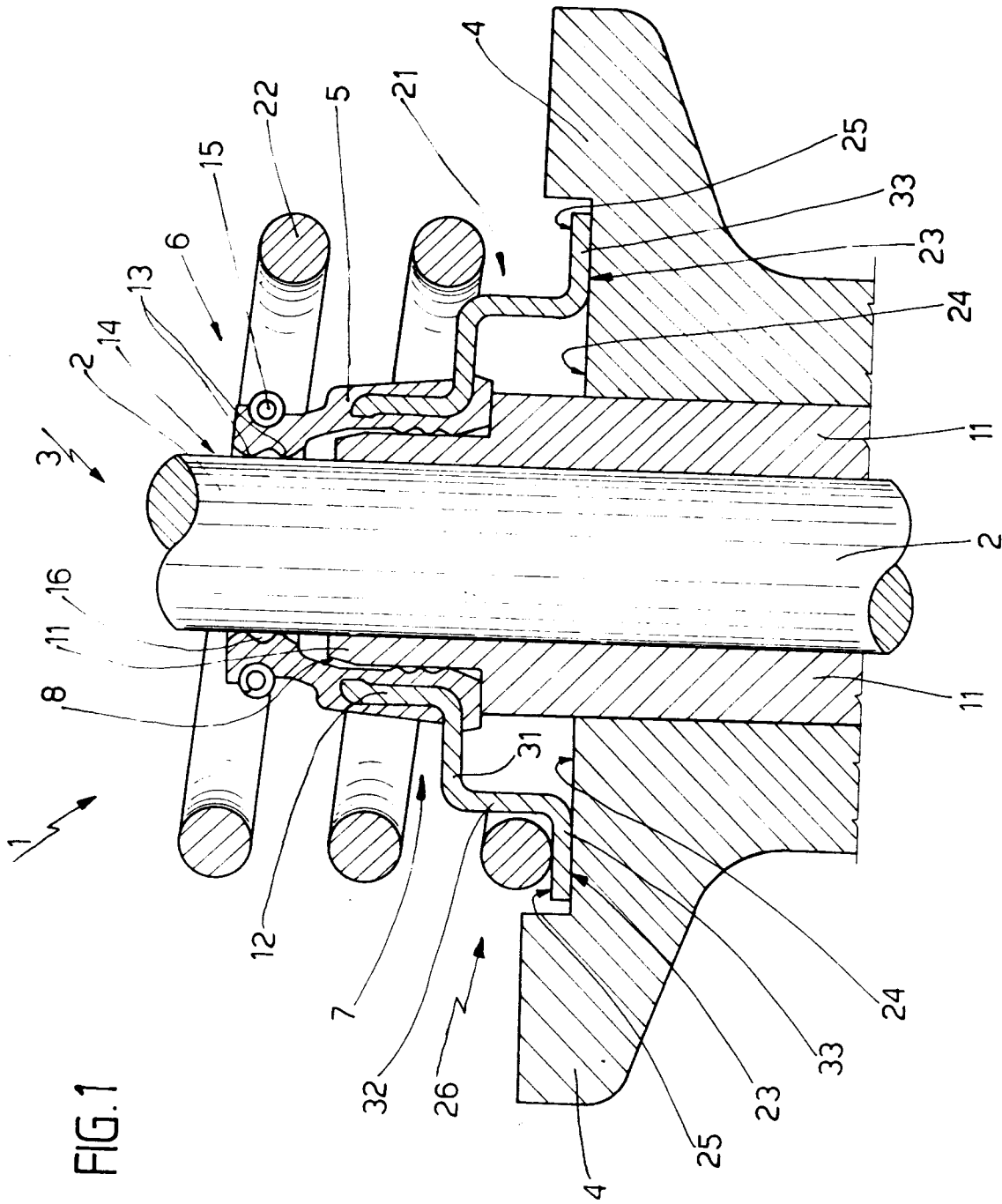
is gripped inside the seat by the spring) to be maintained in the required position, and automatic centering of the coil spring. The supporting portion also provides for dispensing with the spring caps, thus enabling low-cost automated assembly of the seal, and overcoming the noise problem typically associated with spring caps.

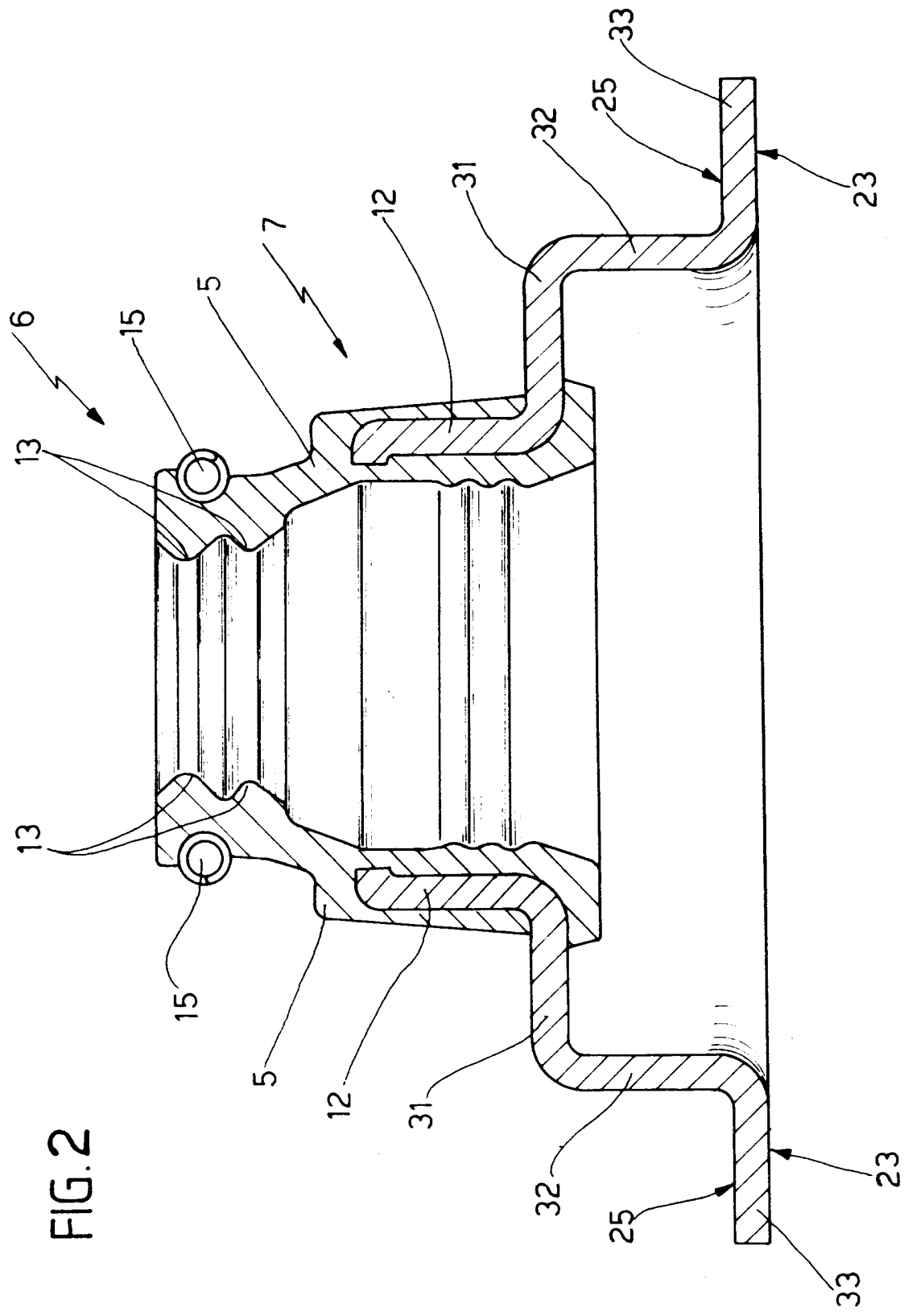
Claims

1. A seal (1) for a rod (2) sliding against the action of elastic means (22), in particular the stem (2) of an internal combustion engine valve (3); the seal (1) comprising a substantially sleeve-shaped elastomeric element (5), in turn comprising a sealing portion (6) cooperating with said stem (2), and an assembly portion (7) designed to fit inside a seat (8) on the guide element (11) of said stem (2); and a stiffener (12) formed integral with said assembly portion (7); characterized by the fact that said stiffener (12) comprises a portion (21) for supporting and centering said elastic means (22) contrasting the movement of said stem (2); said supporting and centering portion (21) extending radially and axially outwards in relation to said elastomeric element (5), and on the opposite side in relation to said sealing portion (6).
2. A seal (1) as claimed in Claim 1, characterized by the fact that said supporting and centering portion (21) comprises a first supporting surface (23) designed to rest on a corresponding surface (24) of an element (4) integral with said guide (11) of said stem (2); and a second surface (25), opposite said first surface (23), for supporting said elastic means (22), so that said supporting and centering portion (21) is gripped, in use, between said elastic means (22) and said element (4) integral with said guide (11) of said stem (2).
3. A seal (1) as claimed in Claim 2, characterized by the fact that said stiffener (12) is co-molded with said elastomeric element (5) and embedded inside the same; said supporting and centering portion (21) extending outwards of said elastomeric element (5).
4. A seal (1) as claimed in Claim 3, characterized by the fact that said supporting and centering portion (21) presents a substantially S-shaped radial section, and comprises a blending portion (31) with said stiffener (12) projecting radially from said elastomeric element (5), a cylindrical centering portion (32) substantially coaxial with said sealing portion (6), and a pe-

ripheral supporting portion (33) substantially perpendicular to said cylindrical centering portion (32); said supporting portion (33) presenting said first (23) and second (25) surfaces on either side.

5. A sealing system (1) for the stem (2) of an internal combustion engine valve (3), wherein the stem (2) slides inside a guide element (11) fitted integrally inside the cylinder head (4) of the engine, and against the action of a coil spring (22) resting on said cylinder head (4) and coaxial with said stem (2) and with said guide element (11); said sealing system (1) comprising a seal (1) consisting of an elastomeric sealing element (5) and a stiffener (12) for reinforcing said elastomeric element (5); characterized by the fact that said stiffener (12) comprises a supporting and centering portion (21) extending outwards of said elastomeric element (5) and towards said cylinder head (4); said supporting and centering portion (21) being gripped between said cylinder head (4) of said engine and said coil spring (22).







European Patent
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EUROPEAN SEARCH REPORT

Application Number

EP 93 10 5970

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	PATENT ABSTRACTS OF JAPAN vol. 9, no. 29 (M-356)(1752) 7 February 1985 & JP-A-59 173 510 (HONDA GIKEN KOGYO KK) 1 October 1984 * abstract *	1,2	F01L3/08
A	GB-A-2 210 956 (DANA CORPORATION) * abstract * * figures 1-4 *	1,2	
A	FR-A-1 375 628 (GOETZWERKE FRIEDRICH GOETZE A.G.) * The whole document *	1	
A	EP-A-0 459 022 (GOETZE AG)		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			F01L
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 25 MAY 1993	Examiner KLINGER T.G.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			