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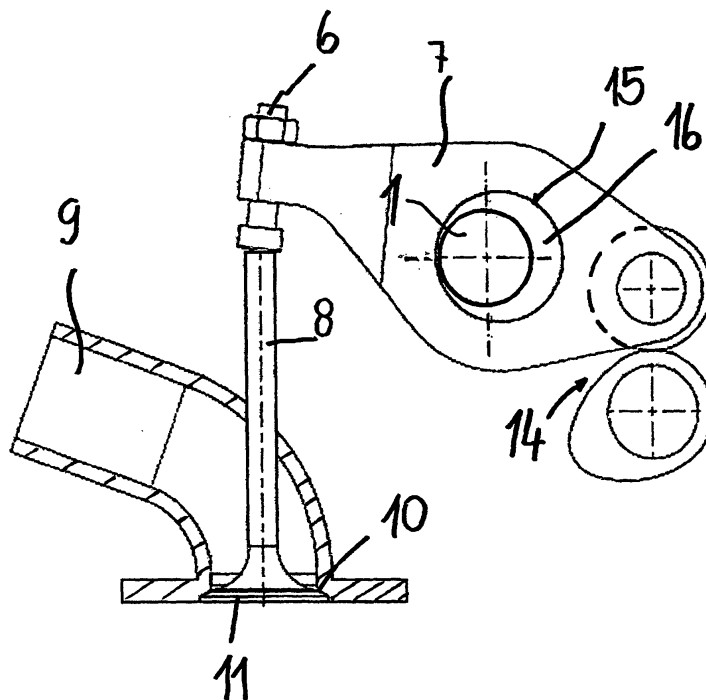
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(54) **A driving assembly for a motor vehicle engine brake**

(57) A driving assembly for a motor vehicle engine or exhaust brake comprises a driveshaft (1) supporting a plurality of rocking levers (7) which control, through rocking lever stems (6), exhaust valves (11), each rocking lever (7) comprising a recess (15) housing a disc el-

ement, each disc element (16) being eccentrically integral with the rocking lever supporting driveshaft (1) and each disc element operatively engaging the stem (8) of the exhaust valve (10) in an overlapping relationship with respect to the eccentric assembly (14) driven by the rotary driveshaft (1).



*Fig. 2*

## Description

### BACKGROUND OF THE INVENTION

[0001] The present invention relates to a driving assembly for driving the engine brake of a motor vehicle, in particular an industrial vehicle, a truck, a bus or an agricultural vehicle.

[0002] As is known, engine or exhaust brakes are used for slowing down a vehicle speed without directly operating the vehicle mechanical brakes which directly affect the motor vehicle wheels.

[0003] Document EP 11482131 discloses a braking assembly including, for each cylinder, individual actuators and eccentrically bush elements having a radial lug so extended as to engage a hydraulic actuator operated by the engine lubricating oil and relatively driving a bush element designed for throttling an exhaust seat of a corresponding exhaust valve. While the above system has been found as a reliable one, it has however a high cost since it comprises a number of structurally complex actuator and bush assemblies. Moreover, for operating the above prior actuators, it is necessary to remove, even for a very short time, oil from the lubricating circuit, which is very disadvantageous.

[0004] Document EP 1927735 discloses driving assemblies including a single pneumatic actuator and eccentric bush elements each including a radial lug provided with connection holes for connecting a coupling bar adapted to rigidly synchronize the eccentric bush elements and damping the output rocking levers operating with synchronized phases but with offset movements.

[0005] Thus, up to now, it was not possible to properly set the above drive assembly, even if could be made at a smaller cost. Finally, document EP 1151587 discloses driving means integral with the rocking lever assembly associated with each exhaust valve and using holes or borings in the output or exhaust rocking lever assembly to cause lubricating oil to be conveyed to and trapped in the lubricating system by unidirectional valves, thereby extending a small plunger directly controlling the exhaust valve to upward drive the latter to in turn throttling the latter to provide exhaust braking. However, since in the above prior construction it is necessary to provide valved plugs and related sealing gaskets and channels, the rocking lever size and driving inertia are disadvantageously increased.

### SUMMARY OF THE INVENTION

[0006] Thus, the aim of the present invention is to overcome the above mentioned drawbacks of the prior art by providing a driving device or assembly for driving a motor vehicle engine or exhaust brake which has a simpler and lighter construction and an improved and efficient operation.

[0007] According to one aspect of the present invention, the above aim is achieved by a driving assembly for

a motor vehicle engine or exhaust brake, comprising a driveshaft supporting a plurality of rocking levers which control, through rocking lever stems, exhaust valves, **characterized in that** each rocking lever comprises a recess housing a disc element, each disc element being eccentrically integral with said rocking lever supporting driveshaft and that each said disc element operatively engages the stem of the exhaust valve in an overlapping relationship with respect to an eccentric assembly driven by the rotary driveshaft.

### BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The invention will be hereinafter disclosed and illustrated in a more detailed manner by an exemplary embodiment thereof, with reference to the accompanying drawings, where:

Figure 1 shows a shaft including rocking lever assemblies for controlling a suction stroke and further rocking lever assemblies for controlling an exhaust stroke;

Figure 2 schematically shows a closed exhaust valve and related driving or control rocking lever assembly; Figure 3 schematically shows a partially opened exhaust valve and related driving or control lever assembly;

Figure 4 schematically shows a fully opened exhaust valve and related driving or control lever assembly; and

Figure 5 is a perspective view showing the shaft supporting elements with a related driving means.

### DESCRIPTION OF THE PREFERRED EMBODIMENT

[0009] As shown in Figure 1, a rocking lever bearing driveshaft 1 is coupled to an engine head, schematically indicated by 2, by supporting elements 3 connected to said head by connecting screws 4, thereby said driveshaft 1 may freely rotate about its longitudinal axis.

[0010] The driveshaft 1 supports a plurality of rocking levers 5 which control, through rocking lever stems 6, suction valves and a further plurality of rocking levers 7 controlling, through rocking lever stems 8, exhaust valves.

[0011] Figures 2, 3 and 4 show an exhaust duct 9 including a valve seat or recess 10 engageable by a plate 11 of a valve stem 8 controlled by corresponding rocking lever 7 which may be driven, in a per se known manner, by an eccentric assembly generally indicated by 14.

[0012] Approximately at a central portion of each rocking lever 7 a seat or recess 15 rotatably engaging therein a disc element 16 is provided.

[0013] Said disc element 16 being eccentrically integral with the rocking lever 7 supporting drive shaft 1.

[0014] The engine or exhaust brake device is controlled by an actuator 17 or a central driving mechanism shown in Figure 5. Said actuator 17 may be a pneumatic,

hydraulic, mechanic or electronic actuator and is driven or controlled by a remote control device coupled to the vehicle braking system, said actuator 17 or central mechanism being driven with a fixed and preset driving stroke to cause the rocking lever supporting driveshaft 1 to turn through a preset angle. 5

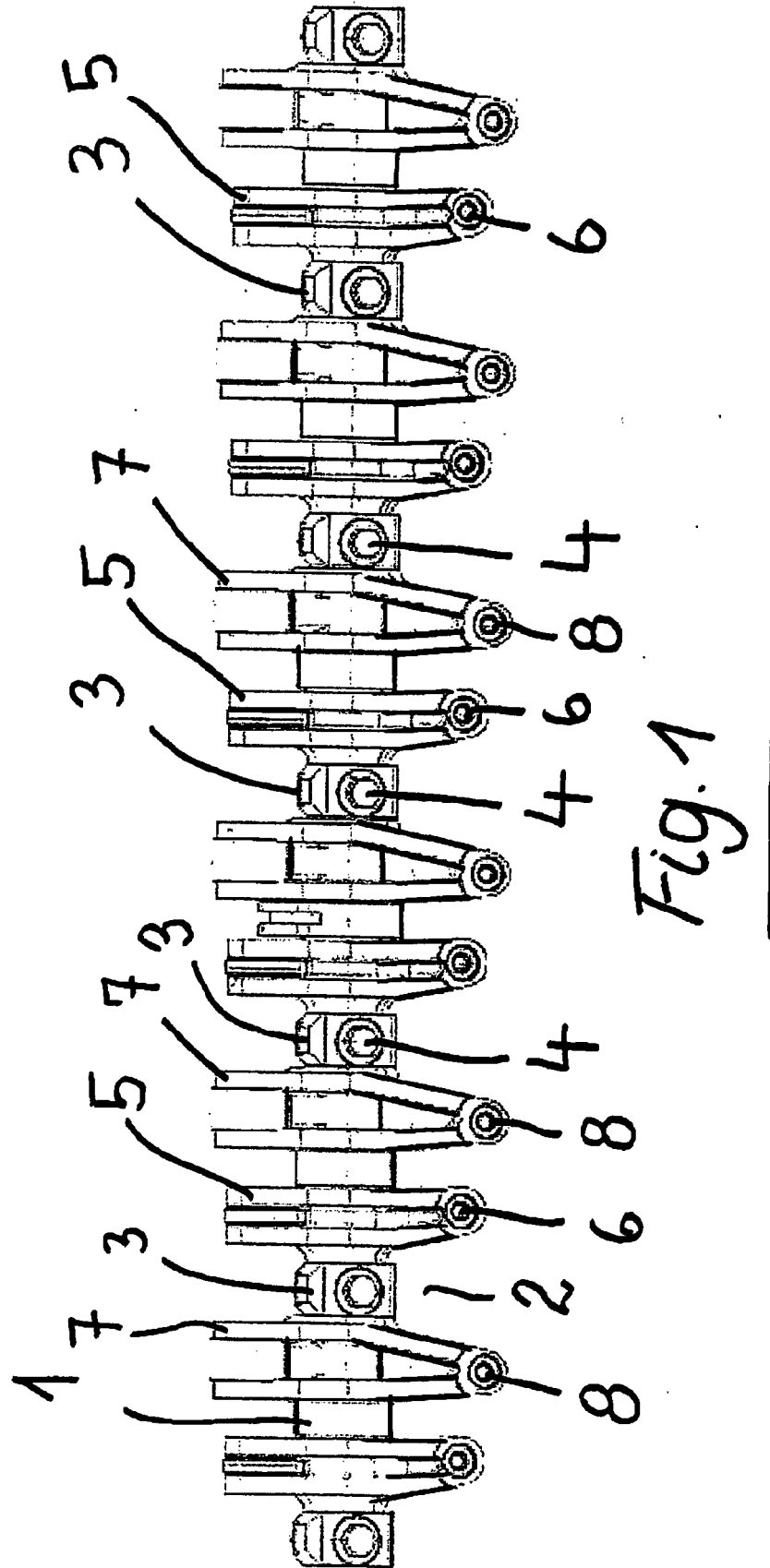
[0015] Since said driveshaft 1 is eccentrically arranged to change the exhaust rocking lever 7 driving axis, this turning will involve a variation of the contact points of the exhaust valves 10, 11 and related rocking levers 7, thereby providing the desired engine brake or exhaust mode of operation. 10

[0016] As the rocking levers 7 are downward driven in an actuated exhaust brake condition, said exhaust valves 11 are prevented from being fully closed during the engine compression, expansion and explosion strokes and may be freely opened during the exhaust stroke thereby providing a throttled or narrowing path allowing cylinder air to leak therethrough during the piston compression stroke. 15 20

[0017] Thus, just in the pressure or compression strokes, an engine exhaust braking is achieved, and a substantial part of the vehicle inertia is used to eject air from the cylinder. Since no pressurized air is available to return power to the engine during the expansion strokes, additional working power must be expended for sucking air through the narrowed portion of each exhaust valve, thereby providing an extended exhaust braking operation, without affecting the suction rocking levers which are controllably driven by the cam assembly. 25 30

## Claims

1. A driving assembly for a motor vehicle engine or exhaust brake, comprising a driveshaft (1) supporting a plurality of rocking levers (7) which control, through rocking levers stems (6), exhaust valves (11), **characterized in that** each rocking lever (7) comprises a recess (15) housing a disc element, each disc element (16) being eccentrically integral with said rocking lever supporting driveshaft (1) and that each said disc element operatively engages the stem (8) of the exhaust valve (10, 11) in an overlapping relationship with respect to an eccentric assembly (14) driven by the rotary driveshaft (1). 35 40 45
2. A driving assembly, according to claim 1, **characterized in that** said rocking lever supporting driveshaft (1) is operatively coupled to an actuator (17) or to a central driving mechanism. 50
3. A driving assembly, according to claim 1, **characterized in that** said rocking lever supporting driveshaft (1) is rotatively supported about its longitudinal axes. 55



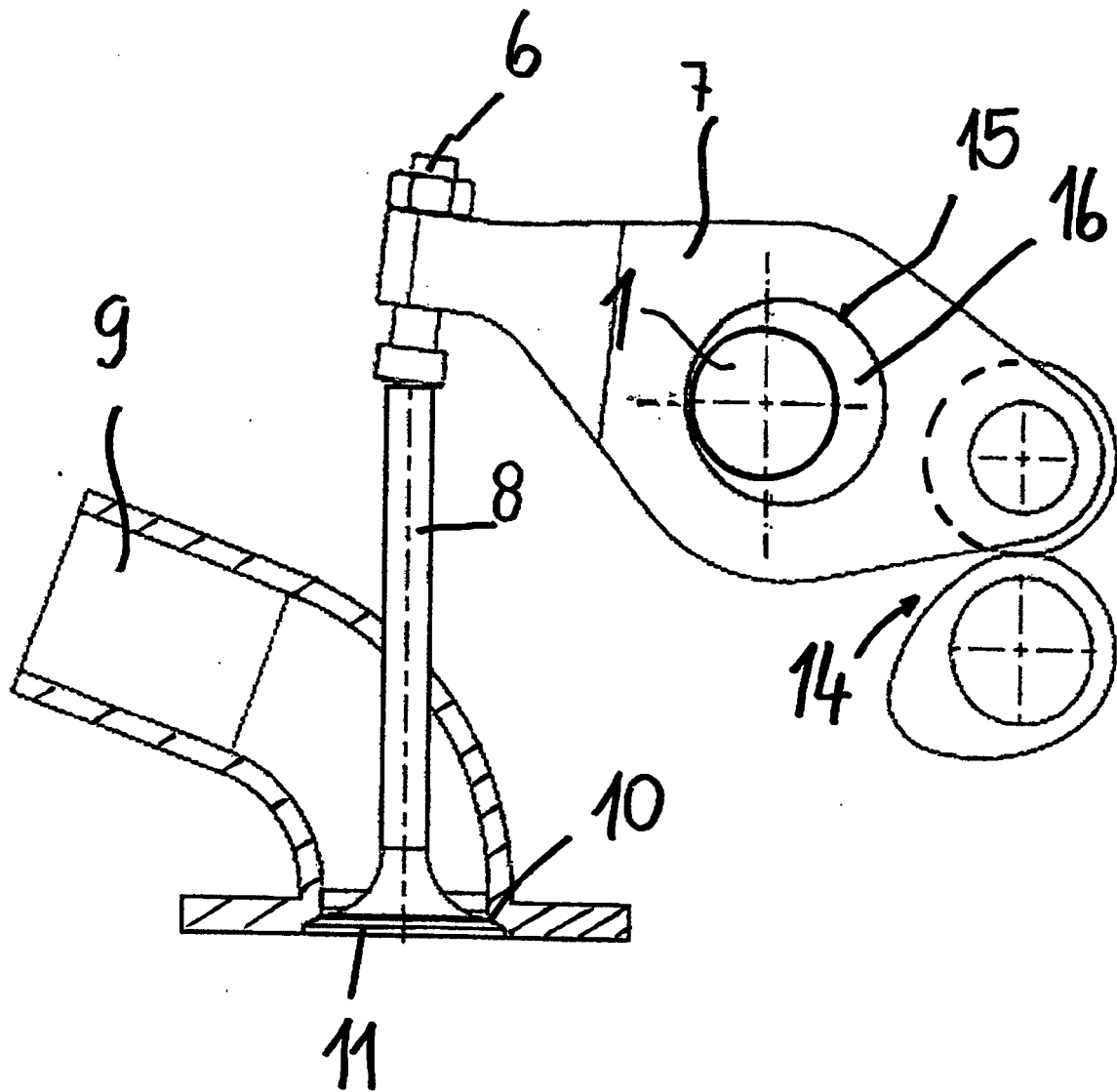


Fig. 2

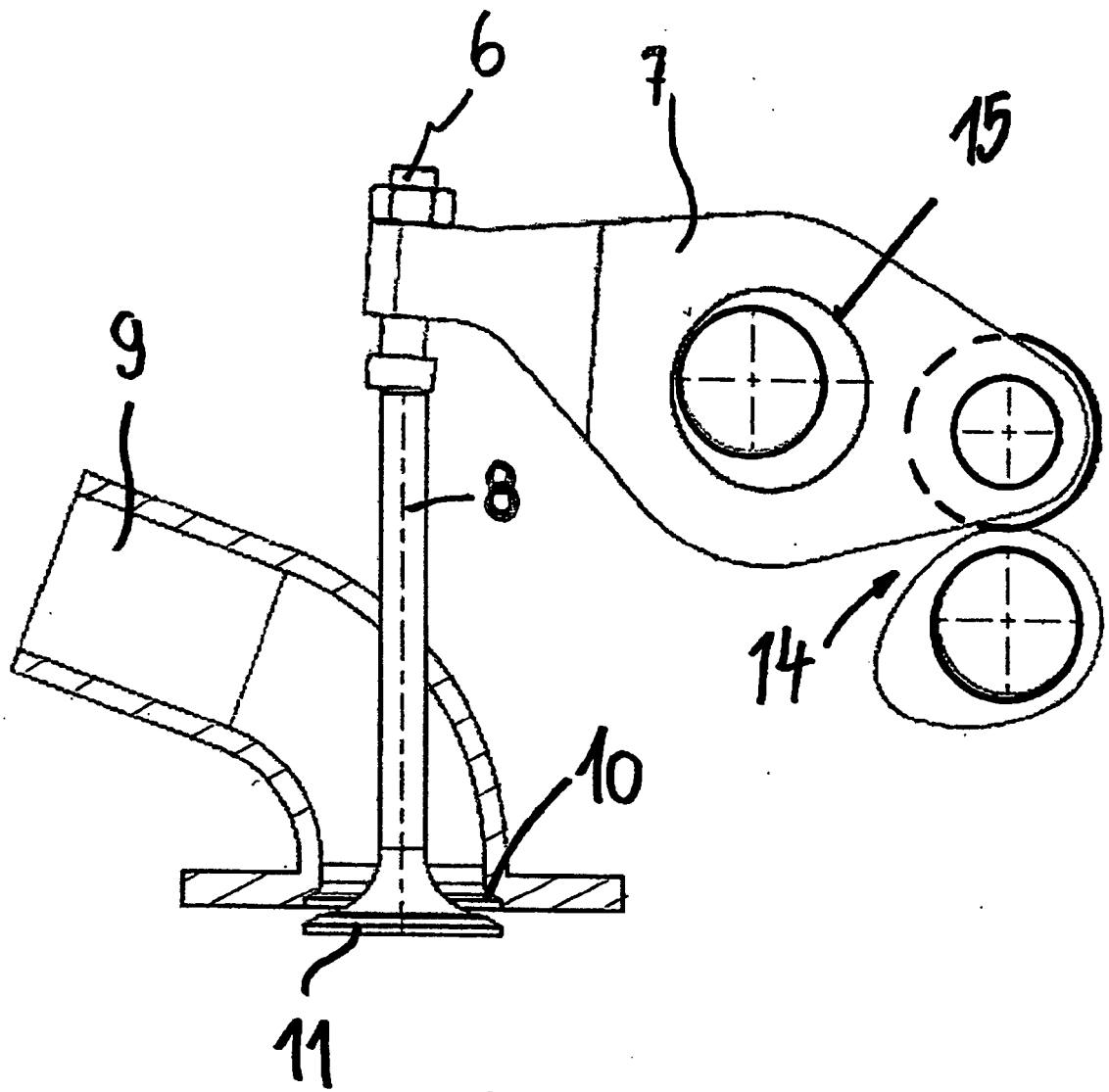


Fig. 3

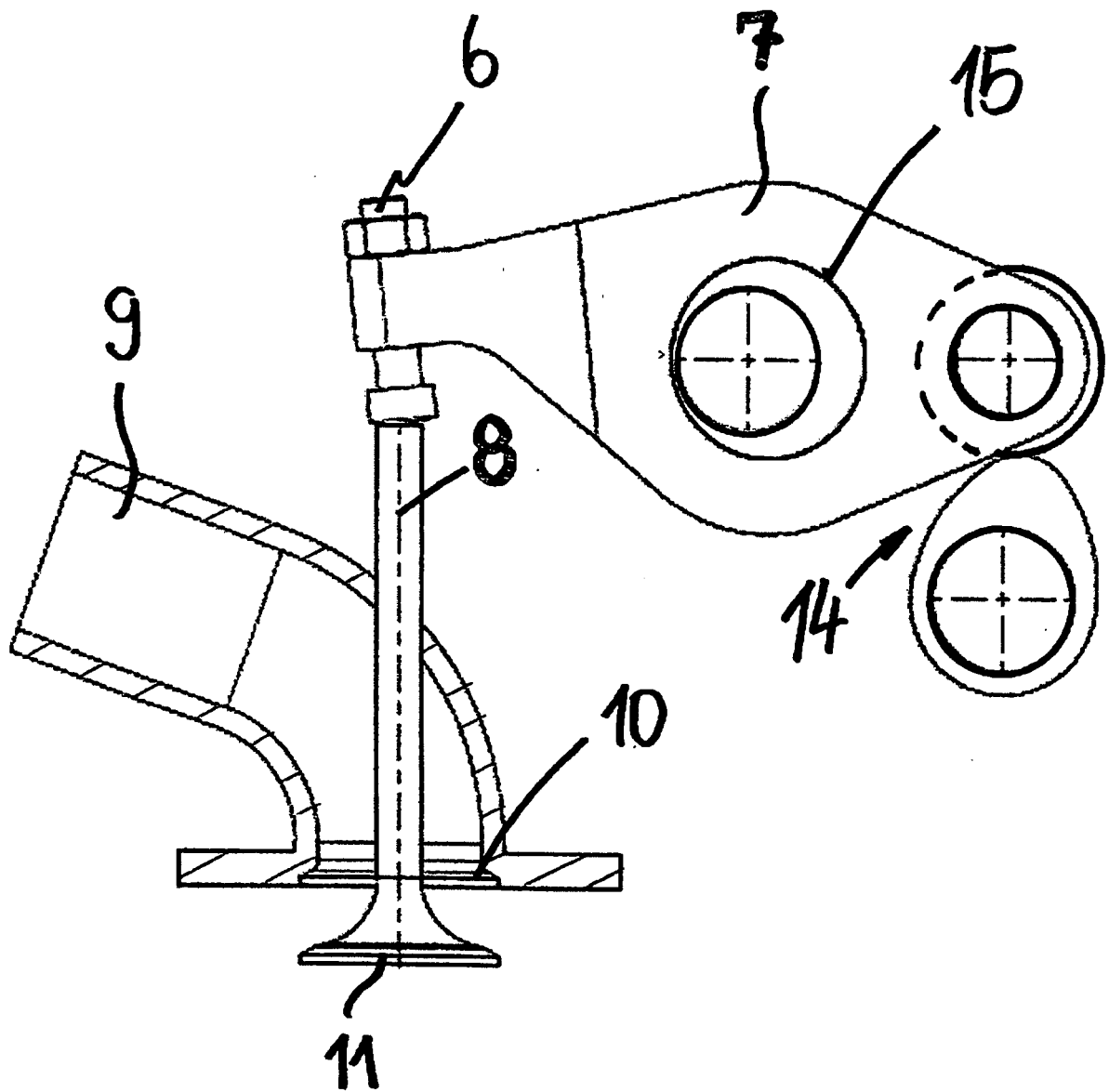


Fig. 4

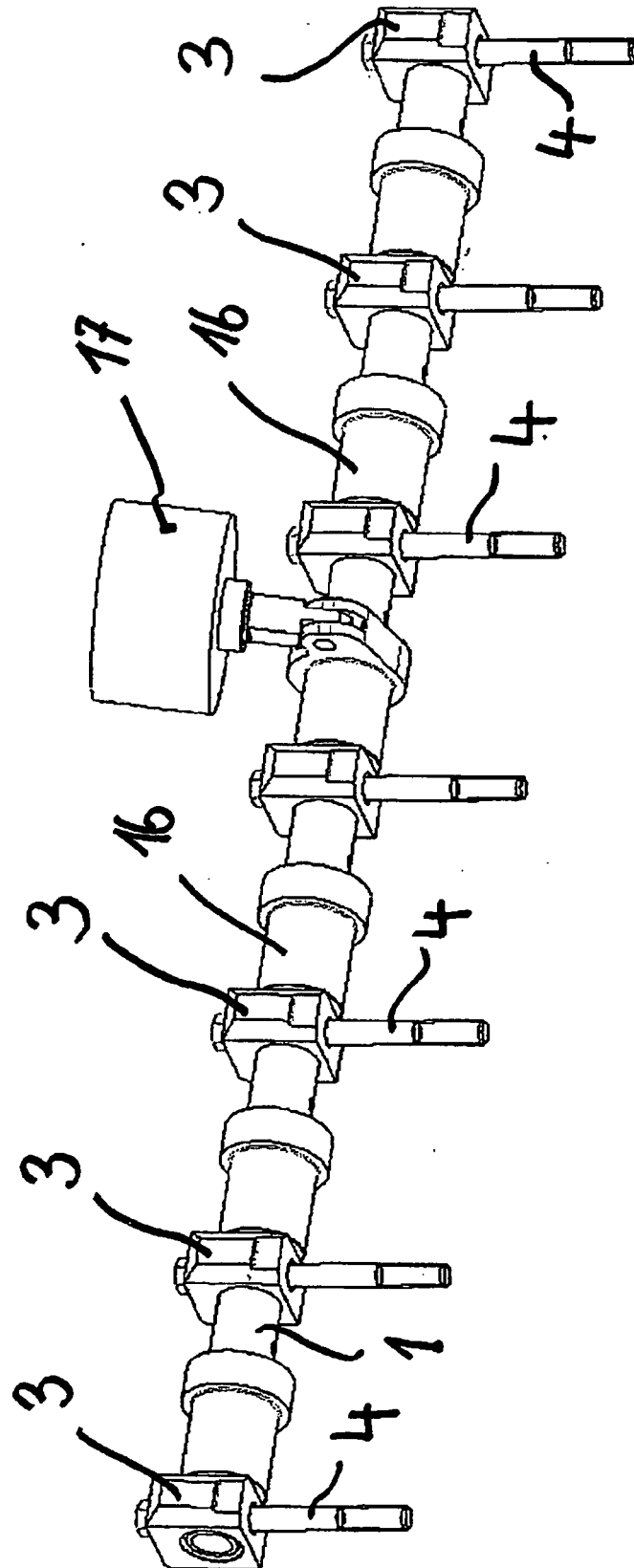


Fig. 5



## EUROPEAN SEARCH REPORT

Application Number  
EP 10 00 6002

| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                      |                                                       |                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|--------------------------------------------|
| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Citation of document with indication, where appropriate, of relevant passages                                                                                                                                        | Relevant to claim                                     | CLASSIFICATION OF THE APPLICATION (IPC)    |
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| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | US 3 367 312 A (EINAR JONSSON)<br>6 February 1968 (1968-02-06)<br>* column 1, lines 8-19 *<br>* column 3, line 41 - line 67 *<br>* column 4, line 48 - line 68 *<br>* figures 1,2 *                                  | 1-3                                                   |                                            |
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| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | EP 1 927 734 A2 (IVECO SPA [IT])<br>4 June 2008 (2008-06-04)<br>* paragraph [0001] *<br>* column 3, line 18 - line 26 *<br>* column 5, line 21 - line 25 *<br>* figures *                                            | 1-3                                                   | TECHNICAL FIELDS<br>SEARCHED (IPC)<br>F01L |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                      |                                                       |                                            |
| Place of search<br>The Hague                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                      | Date of completion of the search<br>13 September 2010 | Examiner<br>Paquay, Jeannot                |
| CATEGORY OF CITED DOCUMENTS<br>X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document<br>T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>& : member of the same patent family, corresponding document |                                                                                                                                                                                                                      |                                                       |                                            |

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
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EP 10 00 6002

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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13-09-2010

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