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54 **Motor-vehicle internal combustion engine with differentially opened valves.**

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Description

The present invention relates to motor-vehicle internal combustion engines having at least one cylinder with an associated pair of intake and/or exhaust valves and a camshaft for controlling the opening and closing of both valves of the pair by means of two respective pivoted rocker fingers.

In this type of engine, in order to obtain optimum performance, it is desirable to effect the sequential cycle of the opening/closing of the two valves in a differentiated manner so that the full opening of one of the two valves follows the full opening of the other valve after a predetermined delay.

Conventionally this is achieved, as illustrated in the European patent publication EP-A-319956, with the aid of two separate cams with different profiles for controlling the two valves and/or with different shaped cam-follower profiles for the rockers of one valve and the other.

Both solutions are structurally complex in that they require the manufacture of different components.

The object of the present invention is to avoid this disadvantage by providing an internal combustion engine of the type defined above in which the differentiated opening of the two valves is achieved without the need to provide two separate cams or two rockers with different profiles.

According to the invention, this object is achieved by virtue of the fact the rockers of the two valves are identical to each other and have respective centres of pivoting disposed on opposite sides of the camshaft, and in that the two rockers are operated by a single common cam.

By virtue of this arrangement, the common cam operates the two valves differently due to the different interactions of the two rockers resulting exclusively from their opposed positioning. This effect is achieved with a number of essential components (a single cam and two identical rockers) which eliminates almost all structural complication in the engine.

The invention will now be described in detail with reference to the appended drawings, provided purely by way of non-limiting example, in which:

Figure 1 is a partially-sectioned, schematic, vertical view of a motor-vehicle internal combustion engine according to the invention,

Figure 2 is a perspective view of the distributor group of the engine shown in Figure 1, and

Figure 3 is a graph showing the opening/closing of the two valves of the unit shown in Figure 2.

With reference to the drawings, part of the head of a multi-cylinder internal combustion engine for motor vehicles is generally indicated 1 and is provided in correspondence with each cylinder with a pair of intake (or exhaust) valves 2, 3 controlled by a distributor shaft 4 supported for rotation by the head 1. Each

valve 2, 3 has a rod 5, 6 the top of which is operatively associated with a respective rocker 7, 8. The two rods 5, 6 also have respective associated biasing springs 9, 10, in conventional manner.

The two rockers 7, 8 are of the finger type and are formed with respective cam-follower surfaces 11, 12 which, according to the invention, cooperate with a single, common cam 13 of the distributor shaft 4. This cam 13 has an axial extent such as to ensure contact between its own outer profile and the two cam-follower surfaces 11, 12.

The two rocker fingers 7, 8 are pivotably supported at respective ends opposite the rods 2, 3 by means of articulation heads 14, 15 supported at the tops of respective hydraulic tappets 16, 17 of known type with automatic play recovery.

In accordance with the invention, the two rocker fingers 7, 8 are identical to each other and are disposed symmetrically, in mutually opposite positions with respect to the distributor shaft 4: the fulcra 14, 15 with the respective hydraulic tappets 16, 17 are in fact situated on opposite sides of the shaft 4.

Thanks to this arrangement, the interaction between the cam 13 and the two cam-follower surfaces 11, 12 of the two rockers 7, 8 effects a differentiated opening/closing cycle for the two valves 2, 3, in use. This cycle is shown schematically in the graph of Figure 3 as a function of time and of the angular position of the cam 13 during one complete revolution. The curve A represents the opening/closing graph of the valve 2 while the curve B represents the valve 3: as can be seen, the opening/closing cycle of the second is delayed relative to that of the first so that, when the valve 2 starts its reclosure travel, the valve 3 has yet to reach its fully-open position. The condition in which both valves are completely closed, is, however, reached at the same instant.

Claims

1. A motor vehicle internal combustion engine having at least one cylinder with an associated pair of intake and/or exhaust valves (2,3) and a camshaft (4) for controlling the opening and closing of both valves (2,3) of the pair by means of two respective pivoted rocker fingers (7,8), and in which means are provided for effecting the differentiated opening of the two valves, characterised in that the rocker FINGERS (7, 8) of the two valves (2, 3) are identical to each other and have respective fulcra (14, 15) disposed on opposite sides of the camshaft (4), and in that the two rockers (7, 8) are operated by a single common cam (13).

Patentansprüche

1. Kraftfahrzeugbrennkraftmaschine mit wenigstens einem Zylinder mit einem zugehörigen Paar von Einlaß- und/oder Auslaßventilen (2, 3) und einer Nockenwelle (4) zum Steuern des Öffnens und Schließens der beiden Ventile (2, 3) des Paares mittels zweier jeweils drehbar gelagerter Kipphebel (7, 8), und bei welcher Mittel zum Bewirken eines unterschiedlichen Öffnens der beiden Ventile vorgesehen sind, **dadurch gekennzeichnet**, daß die Kipphebel (7, 8) der beiden Ventile (2, 3) zueinander identisch sind, und jeweilige Drehpunkte (14, 15) aufweisen, welche an gegenüberliegenden Seiten der Nockenwelle (4) angeordnet sind, und daß die beiden Kipphebel (7, 8) durch eine einzige, gemeinsame Nocke (13) betätigt sind.

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Revendications

1. Moteur à combustion interne de véhicule automobile possédant au moins un cylindre équipé d'une paire de soupapes d'admission et/ou d'une paire de soupapes d'échappement (2, 3) et d'un arbre à cames (4) destiné à commander l'ouverture et la fermeture des deux soupapes (2, 3) de la paire au moyen de deux culbuteurs linguets pivotants respectifs (7, 8) et dans lequel des moyens sont prévus pour provoquer l'ouverture différenciée des deux soupapes, caractérisé en ce que les culbuteurs linguets (7, 8) des deux soupapes (2, 3) sont identiques entre eux et ont leurs points d'appui respectifs (14, 15) disposés de part et d'autre de l'arbre à cames (4), et en ce que les deux culbuteurs (7, 8) sont actionnés par une unique came commune (13).

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FIG. 1

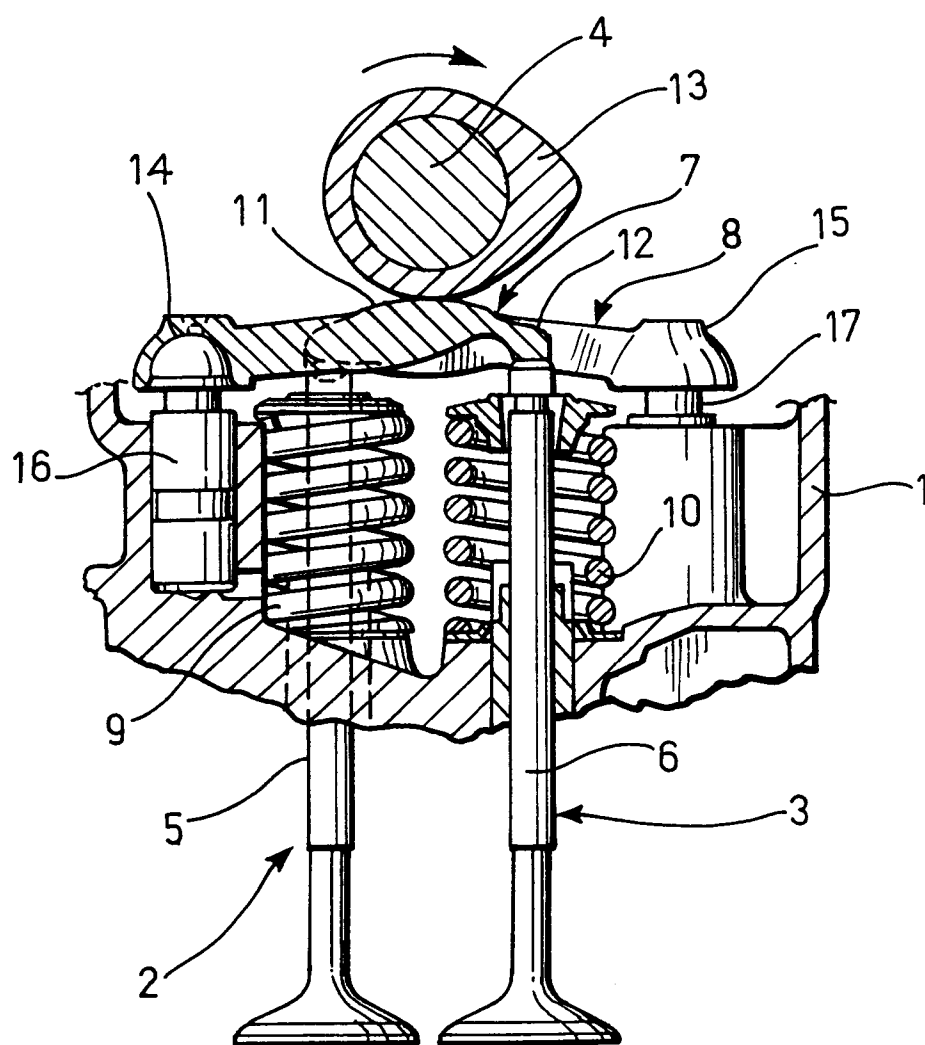


FIG. 2

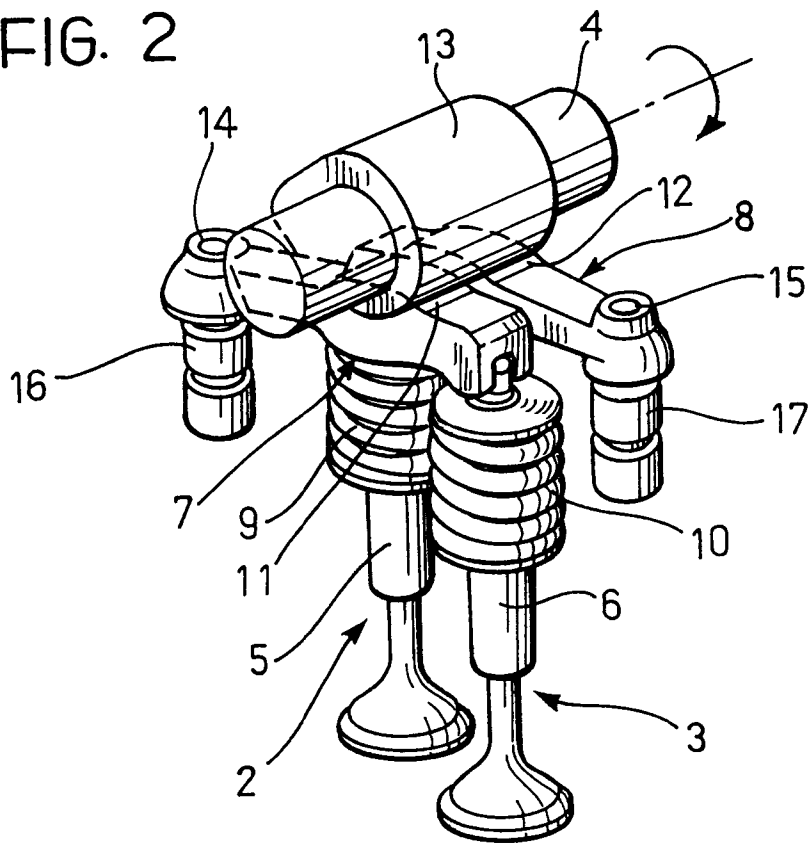


FIG. 3

