Feb. 5, 1929. 1,701,391

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VALVE MECHANISM

Filed Nov. 13, 1925 2 Sheets-Sheet 1

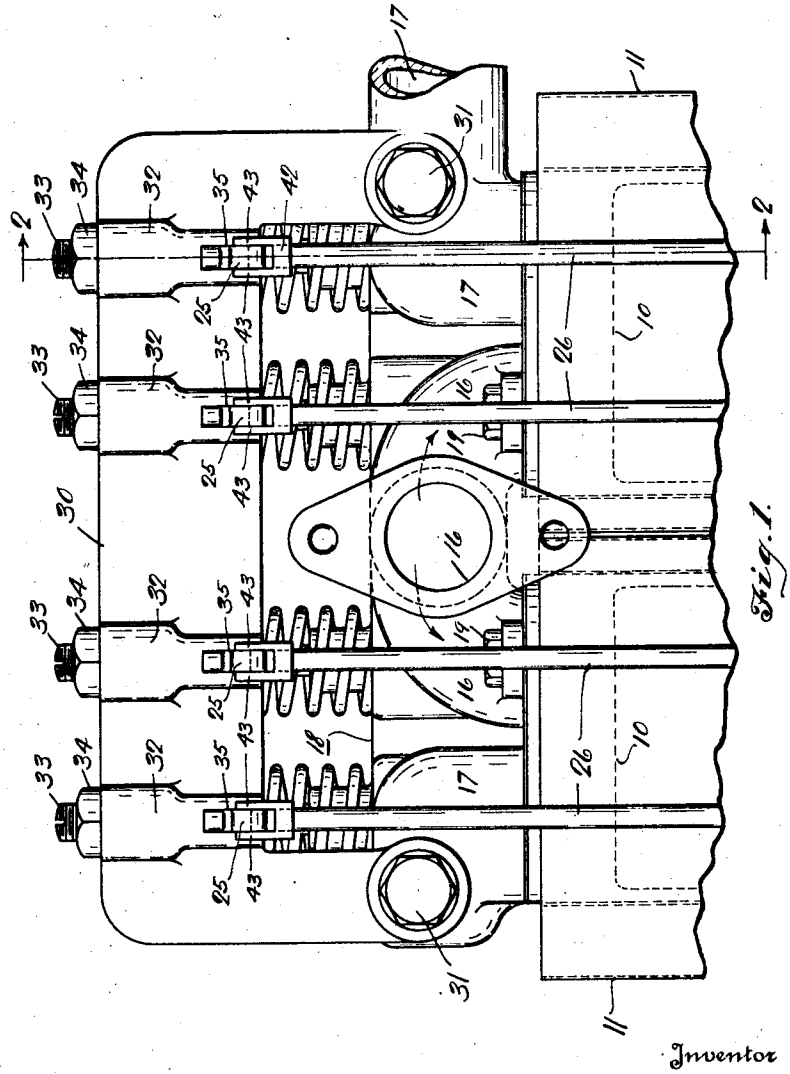


Fig. 1.

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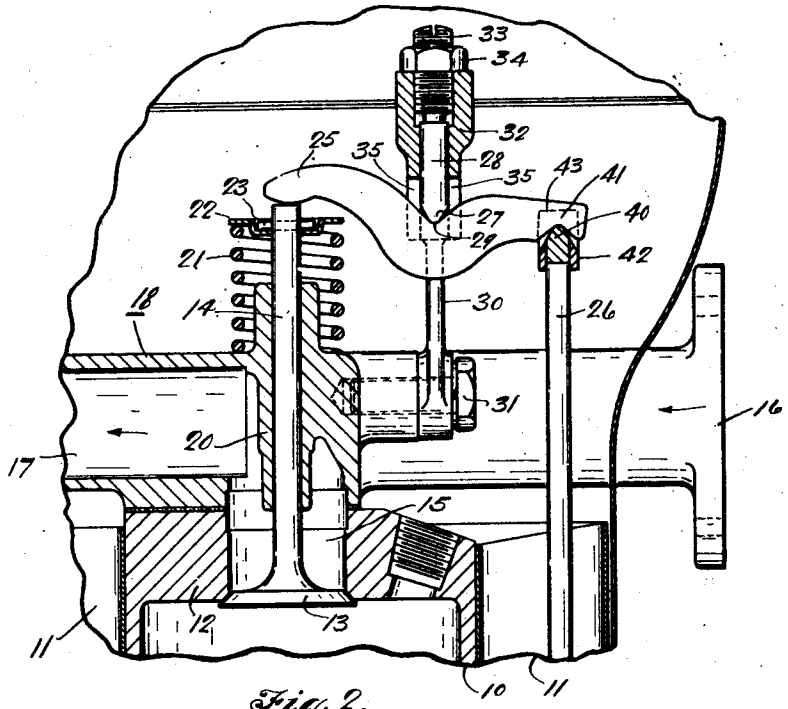


Fig. 2.

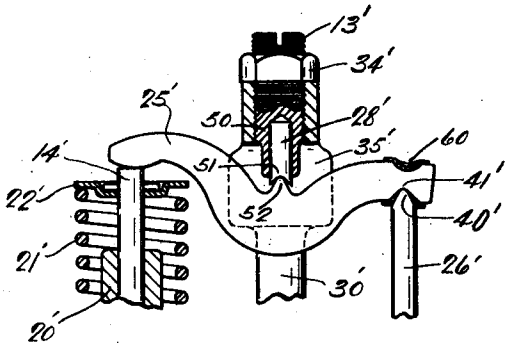


Fig. 3.

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UNITED STATES PATENT OFFICE.

CHARLES R. SHORT, OF DAYTON, OHIO, ASSIGNOR TO GENERAL MOTORS RESEARCH CORPORATION, OF DETROIT, MICHIGAN, A CORPORATION OF DELAWARE.

VALVE MECHANISM.

Application filed November 13, 1925. Serial No. 68,812.

This invention relates to valve actuating mechanism for internal combustion engines, and has as a general object to provide a very simple and efficient construction which is more economical to manufacture than those heretofore used.

A special object of the invention is to provide a rocker arm knife-edge fulcrum which is free to align itself and remain at all times exactly aligned so that the knife edge extends directly across the rocker arm and hence avoids the tendency of any possible misalignment of the knife edge to cause lateral cocking of the rocker arm.

Another object is to provide means for easy adjustment of the valve clearance while the engine is running.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of embodiment of the present invention is clearly shown.

In the drawings:

Figure 1 is a side elevation of two cylinders of a multi-cylinder air-cooled internal combustion engine having a valve mechanism according to this invention.

Figure 2 is a section on line 2—2 of Figure 1 and particularly illustrates the rocker arm and swivel fulcrum therefor.

Figure 3 shows a modified form of rocker lever and swivel fulcrum therefor.

Similar reference characters refer to similar parts through the several views.

In Figure 1 only one pair of cylinders 10 has been shown since the remaining pair or pairs of cylinders, as the case may be, are similar to the pair illustrated.

These cylinders 10 are shown cast separately and provided with cooling fins 11 which are made of sheet copper and brazed to the cylinder 10.

The cylinder heads 12 are each provided with intake and exhaust valve parts 15 and poppet valves 13, whose valve stems 14 extend substantially vertically.

The inlet ducts 16 and exhaust ducts 17 are preferably formed integrally in a single casting 18 for each pair of cylinders. This casting 18 is bolted to the top of the cylinder heads by means of suitable bolts 19. The valve stem guides 20 are also formed in the casting 18 as clearly illustrated in Figure 2.

The poppet valves 13 are urged closed by the coil spring 21 which engages the spring seat cup 22, which in turn is held against upward movement on the valve stem 14 by the transverse pin 23.

The rocker arms 25 engage the upper ends of the valve stems 14 and push rods 26 and pivot about the knife-edge fulcrums 27.

The fulcrum supporting bracket 30 bridges across all the rocker arms for one pair of cylinders 10 (see Figure 1), and is rigidly bolted in place upon the casting 18 by means of the two bolts 31.

This bracket 30 is provided with the enlarged bosses 32 which are bored out to form recesses in which the fulcrum pins 28 are rotatably mounted. The vertically adjustable screws 33 hold the pins 28 against upward movement. The lock nuts 34 lock the screws 33 in adjusted position, as will be readily understood.

The enlarged bosses 32 are provided with slots 35 on their under side in which slots the rocker arms 25 ride and are guided laterally thereby. The rocker arms 25 each have a V-shaped transverse slot 29 which cooperates with the knife-edge fulcrum 27. It is thus seen that the rocker arms are held against lateral movement by the guide slots 35, and against longitudinal movement by the knife-edge 27 engaging the V-slot 29.

The push rod 26 and valve stem 14 holds the rocker arm up within the guide slot 35, as will be readily understood from viewing Figure 2. The push rods 26 may be guided at their lower ends (not shown) in any suitable and well-known manner. The upper ends of push rods 26 are provided with a blunt knife edge 40 which cooperates with a V-slot 41 in the rocker arm 25. The upper ends of push rods 26 are held against lateral movement relative to the rocker arms 25 by a small slotted sleeve 42 suitably fixed to the upper end of the push rod. The portions 43 of the sleeve 42 serve as lateral lugs which prevent the push rods 26 from working sidewise off the V-slots 41.

In the operation of the valve mechanism it is obvious that the fulcrum pin 28 is free to swivel within the recess in the bracket 30, and hence the knife-edge 27 will automatically align itself properly with the V-slot 29 in the rocker arm. This prevents any possible misalignment of the knife edge and V-slot from causing lateral cocking of the rocker arm, and hence improper actuation of the

poppet valves. This construction also permits easy vertical adjustment of the fulcrum 27 while the engine is running, and hence permits a more accurate adjustment of the "valve clearance".

In the modification shown in Figure 3 the vertically adjustable screw 13′ is provided with a bore 50 in which the fulcrum 28′ swivels. This fulcrum pin 28′ is provided with a V-slot 51 which cooperates with the knife edge 52 on the rocker arm 25′. The rocker arms 25′ ride within the guide slots 35′ in the supporting bracket 30′ similarly as in Figures 1 and 2.

By thus inverting the knife edge and V-slot arrangement there is no possibility of particles of sand or other foreign matter lodging in the V-slot and causing wear or other more serious trouble.

The knife edge 40′ at the upper end of push rod 26′ is held against sidewise displacement from the V-slot 41′ in the rocker arm by a small sheet metal clip 60 which is suitably fixed to the end of rocker arm 25′. Portions of this clip 60 serve as end walls to the V-slot 41′, and thus hold the knife edge 40′ against movement laterally of the rocker arm.

Vertical adjustment of the fulcrum pin 28′ is easily accomplished while the engine is running simply by loosening lock nut 34′ and turning the screw 13′ with a screw-driver until the desired "valve clearance" is obtained.

While the form of embodiment of the present invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

I claim:

1. In valve mechanism of the class described, a bracket supported above an engine cylinder and having a vertically disposed slot in its under side; a rocker arm fitting closely within said slot and held in a vertical position by the side walls thereof, and one end of which arm engages the upper end of a valve stem; a vertically movable push rod the upper end of which engages the other end of said arm; a fulcrum pin having a knife edge at its lower end, and which edge engages the upper side of said rocker arm so as to provide a fulcrum therefor; a vertically arranged guide passage within which said fulcrum pin is arranged, and which pin is freely movable within said passage and about its vertical axis so that the knife edge may adapt itself to the seat upon said arm with which said edge engages; and an adjusting screw carried by said bracket and arranged in line with said fulcrum pin for adjusting the position of the latter relative to said rocker arm.

2. In valve mechanism of the class described, a bracket supported above an engine cylinder and having a vertically arranged slot in its under side; a rocker arm fitting closely within said slot so as to be held in a vertical position by the side walls thereof, and one end of which rocker arm engages the upper extremity of the stem of a valve to be operated; a vertically movable push rod the upper end of which engages the other end of said arm; an adjusting screw vertically movable in a threaded opening provided in said bracket, and having a vertically arranged passage in its lower end; and a fulcrum pin loose in said passage, and the lower end which engages the upper side of said rocker arm so as to provide a fulcrum therefor.

In testimony whereof I affix my signature.

CHARLES R. SHORT.