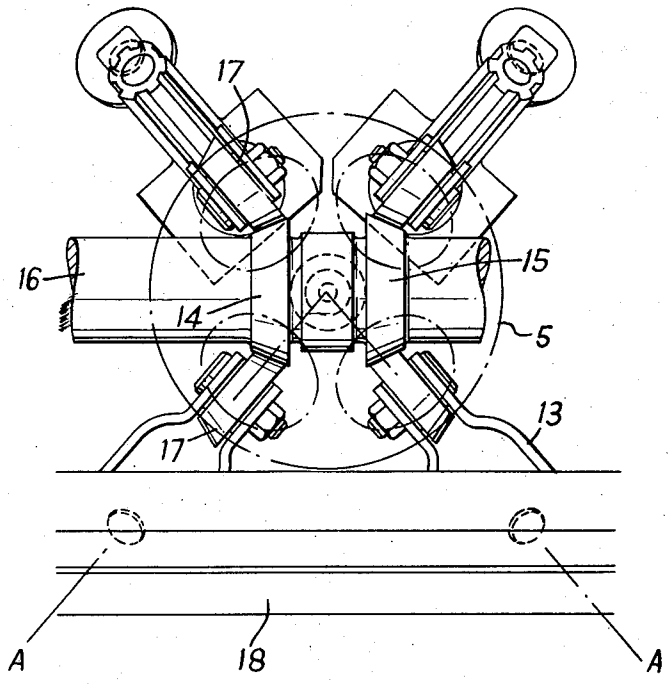
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VALVE GEAR

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Fig. 1.




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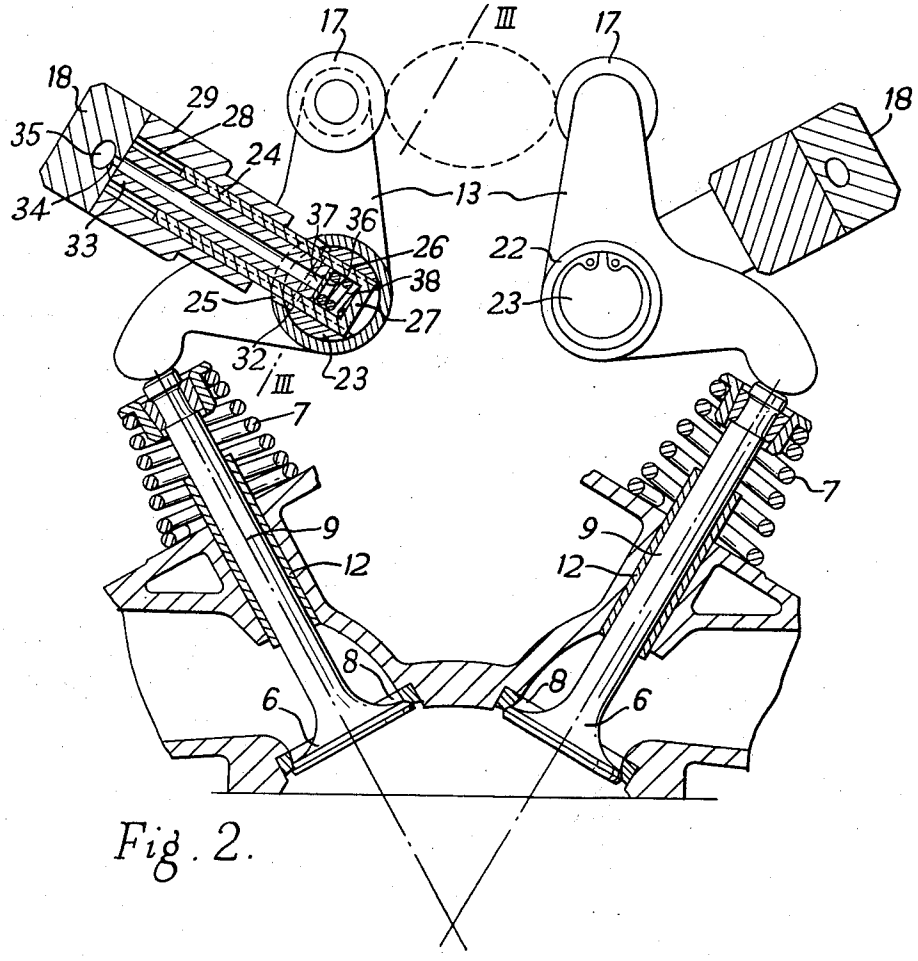



Fig. 2.

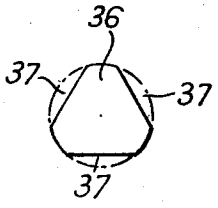



Fig. 3.

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# VALVE GEAR

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3 Claims. (Cl. 123—90)

The present invention relates to a valve gear and provides a self-adjusting mounting for a valve rocker arm in an internal combustion engine.

Self-adjusting mountings for rocker arms are known, but the present mounting has an improved construction which assists in maintaining accurate location and orientation of the rocker arm.

According to the present invention, there is provided a valve operating gear including a rocker arm having a hollow cylindrical portion extending transversely of the arm between its two ends, the rocker arm being supported for rocking movement on a cylinder which is engaged in the hollow cylindrical portion of the rocker arm and which is carried on a tube extending into the hollow cylindrical portion through an aperture in the wall thereof, the tube having an open end portion splined externally and slidingly engaged in a splined bore in a support, the other end portion of the tube being closed, a second tube located within said bore and extending as a close sliding fit into the splined tube through the open end of the splined tube, the second tube being locked against movement towards the support and being connected to means for supplying fluid under pressure and having at its end within the splined tube a one-way valve permitting flow of fluid from the second tube into the closed end portion of the splined tube.

An embodiment of the invention will now be described by way of example, with reference to the accompanying drawings in which:

FIG. 1 is a plan of the valve gear of one cylinder of an internal combustion engine, some parts being omitted for clarity,

FIG. 2 is a view on the line A—A in FIG. 1, partly in section and partly in elevation, and

FIG. 3 is a part section on the line III—III in FIG. 2.

Referring to the drawings, the engine comprises a cylinder head 5 having a spherical combustion chamber and poppet valves 6 which are urged by springs 7 to positions in which they close ports 8. Four valves 6 are shown in the cylinder head 5, the stem 9 of each valve being slidably engaged in a guideway 12 in the cylinder head and disposed along a radius of the spherical combustion chamber.

The four valves 6 are actuated by means of rocker arms 13 from two cams 14 and 15 on the single cam shaft 16 which extends across all the cylinders of the engine. Each rocker arm 13 carries at one end a roller 17 which is in contact with the corresponding cam 14 or 15, the other end of the roller being shaped to form a pad 10 which is in contact with the tip of the corresponding valve stem.

Each of the four rocker arms is supported on a separate mounting, two of the mountings being secured on each of two longitudinal supports 18 which extend over the engine cylinders parallel to the cam shaft 16.

Each rocker arm 13 has a cylindrical portion 22 disposed with its axis extending transversely of the arm at a central position between the ends of the arm. Engaged within the cylindrical portion 22 is a cylinder 23 which is retained within the cylindrical portion 23 by means of two circlips 20, one of which is located in a groove formed internally at each end of the cylindrical portion 22. Each cylinder 23 supports the corresponding rocker



arm 13 for rocking movement, and for this purpose is formed with a central splined bore 26 extending transversely thereof.

A splined tube 24 extends into and is engaged in this bore 26 through an aperture 25 in the cylindrical portion 22. The end 27 of the tube 24 within the bore 26 is closed. The cylinder 23 is capable of sliding movement along the tube 24 but is prevented from moving beyond a certain position up the tube, i.e. towards the support 18 in FIG. 2, by a circlip 32 mounted on the tube 24.

The tube 24 is mounted for sliding movement in a splined bore 28 in a member 29 which is secured to and forms a part of one of the supports 18.

Within the tube 24 is engaged a tube 33 open at both ends and the upper end of which is connected to a passageway 34 in the support 18 which leads to a passageway 35 extending longitudinally of the support 18 and to which is supplied oil under pressure. The tube 33 is locked against movement towards the support 18 by abutting against the support.

The lower end of the tube 33 is a close sliding fit within the tube 24 and is closed by a valve plate 36 shaped as shown in FIG. 3, with the result that apertures 37 constituting passages for fluid are left between the rim of the plate 36 and the wall of the tube 24. The plate 36 is held against the lower end of the tube 33 by means of a spring 38 which presses against the inside of the closed end 27 of the splined tube 24.

In the mounting just described, the splined tube 24 is accurately located within the splined bore 28 and the cylinder 23 is accurately oriented on the splined tube 24. The rocker arm 13 thus has an accurately orientated fulcrum for its rocking movements.

Any play between a rocker arm 13 and the corresponding cam or the tip of the valve stem is taken up as follows. The pressure of the oil supplied to the tube 33 from the passageway 35 forces the plate 36 away from the end of the tube 33 and oil flows into the space within the closed end part of the tube 24 through the apertures 37 between the plate 36 and the wall of the tube 24. This oil forces the tube 24 downwardly until the play is taken up. When the cam causes the rocker arm 13 to be urged upwardly, the increase in the pressure of oil within the tube 24 causes the plate 36 to be forced against the end of the tube 33 to prevent egress of oil from the tube 24. A firm fulcrum for the rocker arm is thus provided.

In an alternative arrangement, the cylinder 23 projects from the cylindrical portion 22 at both ends and the cylindrical portion is kept in the correct position on the cylinder by means of circlips which are engaged in external grooves in the cylinder.

I claim:

1. A valve operating gear including

(*a*) a rocker arm, said rocker arm having a hollow cylindrical portion extending transversely of the arm between its two ends;

(*b*) a supporting cylinder for the rocker arm engaged in the said hollow cylindrical portion and providing a fulcrum for rocking movement of the rocker arm;

(*c*) a tube extending into the hollow cylindrical portion through an aperture in the cylindrical wall thereof and carrying on it the cylinder within said cylindrical portion;

(*d*) a support for said tube having in it a splined bore, an externally splined open end portion of said tube being slidingly engaged in said bore, the other end portion of the tube being closed;

(*e*) a second tube located within said bore and extending as a close sliding fit into the splined tube through

the open end of the splined tube, the second tube being locked against movement towards the support and being in communication with duct means in the support for supply of fluid under pressure; and

(*f*) a one-way valve located at the end of the second tube within the splined tube and permitting flow of fluid from the second tube into the closed end portion of the splined tube.

2. A valve operating gear including

(*a*) a rocker arm, said rocker arm having a hollow cylindrical portion extending transversely of the arm between its two ends;

(*b*) a supporting cylinder for the rocker arm engaged in the said hollow cylindrical portion and providing a fulcrum for rocking movement of the rocker arm;

(*c*) a tube extending into the hollow cylindrical portion through an aperture in the cylindrical wall thereof and having an externally splined portion engaged in a mating transverse splined bore in said cylinder;

(*d*) a support for said tube having in it a splined bore, an externally splined open end portion of said tube being slidingly engaged in said bore, the other end portion of the tube being closed;

(*e*) a stop on said splined tube restraining movement of said cylinder towards the support;

(*f*) a second tube located within said bore and extending as a close sliding fit into the splined tube through the open end of the splined tube, the second tube being locked against movement towards the support and being in communication with duct means in the support for supply of fluid under pressure; and

(*g*) a one-way valve located at the end of the second tube within the splined tube and permitting flow of fluid from the second tube into the closed end portion of the splined tube.

3. A valve operating gear including

(*a*) a rocker arm, said rocker arm having a hollow



cylindrical portion extending transversely of the arm between its two ends;

(*b*) a supporting cylinder for the rocker arm engaged in the said hollow cylindrical portion and providing a fulcrum for rocking movement of the rocker arm;

(*c*) a tube extending into the hollow cylindrical portion through an aperture in the cylindrical wall thereof and having an externally splined portion engaged in a mating transverse splined bore in said cylinder;

(*d*) a support for said tube having in it a splined bore, an externally splined open end portion of said tube being slidingly engaged in said bore, the other end portion of the tube being closed;

(*e*) a stop on said splined tube restraining movement of said cylinder towards the support;

(*f*) a second tube located within said bore and extending as a close sliding fit into the splined tube through the open end of the splined tube, the second tube being locked against movement towards the support and being in communication with duct means in the support for supply of fluid under pressure; and

(*g*) a one-way valve comprising a plate normally urged against the end of the second tube within the splined tube by a spring acting against the closed end of the splined tube, said plate being so shaped as to provide passages between its rim and the wall of the splined tube for flow of fluid and being adapted to allow flow of fluid only from the second tube into the closed end portion of the splined tube.

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