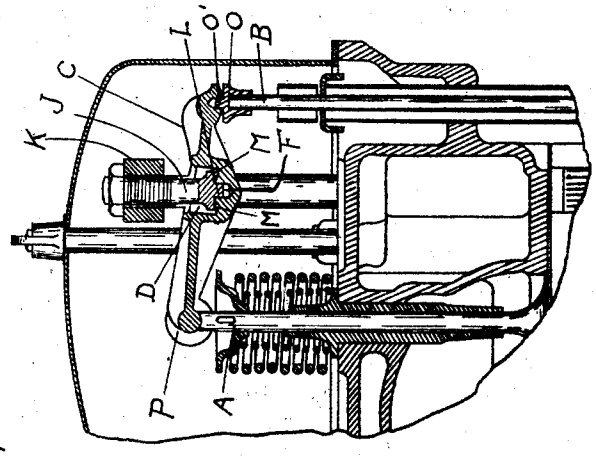
Oct. 13, 1925. 1,556,986

A. P. BRUSH

ROCKER ARM FOR VALVE OPERATING MECHANISMS

Filed April 1, 1920

Fig. 1.



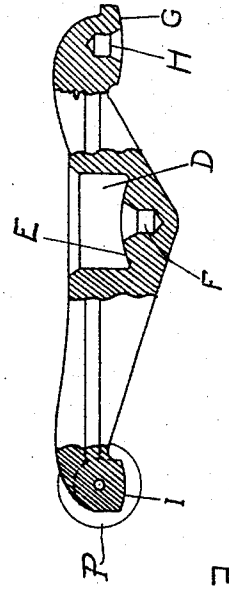


Fig. 3.

Fig. 4.

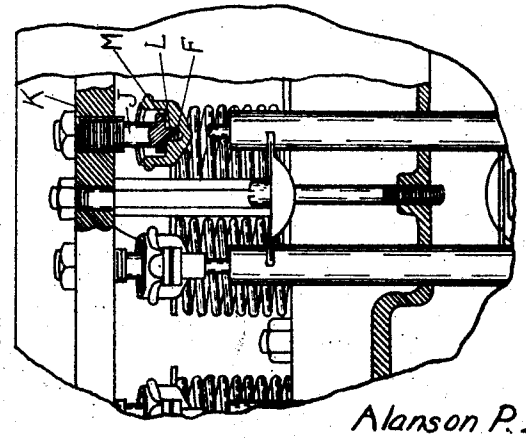


Fig. 2.

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UNITED STATES PATENT OFFICE.

ALANSON P. BRUSH, OF DETROIT, MICHIGAN.

ROCKER ARM FOR VALVE-OPERATING MECHANISMS.

Application filed April 1, 1920. Serial No. 370,614.

To all whom it may concern:

Be it known that I, ALANSON P. BRUSH, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Rocker Arms for Valve-Operating Mechanisms, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to valve operating mechanisms of that type in which the movement is transmitted from the actuating rod to the valve stem through the medium of a rockable lever. It is the object of the invention to obtain a construction which dispenses with pivot pins, which hold the rocker in a fixed plane of movement and which is easily adjusted. The invention therefore consists in the construction as hereinafter set forth.

In the drawings:

Figure 1 is a section in the central plane of the rocker arm;

Figure 2 is a section at right angles to Figure 1;

Figure 3 is an enlarged section through the rocker arm detached; and

Figure 4 is a perspective view of the fulcrum bearing for the rocker.

A is the valve stem; B is the push rod for operating the valve arranged parallel to said valve stem; and C is a rocker arm for transmitting movement of the rod to the stem. To avoid the use of pivot pins, this rocker arm is provided with bearings in the form of cylindrical segments for engaging respectively the valve stem, rod and fulcrum, the axes of said segments being parallel so as to maintain the movement of the rocker in a fixed plane. The bearing for the fulcrum is formed by a recess D, preferably of cylindrical shape and formed in an enlargement of the rocker intermediate the end portions thereof. At the bottom of this recess is a cylindrical segment E and centrally thereof is an aperture F, preferably of tapering form. At one end of the rocker is a second cylindrical segment G having a central recess H and at the opposite end of the rocker is the cylindrical segment I. The segments G and I face in the opposite direction from the segment E. J is the fulcrum member, which is preferably a screw-threaded stud engaging a supporting bar K. The lower end of this stud is formed with a central pintle L for engaging the recess F and extending upon opposite sides of this pintle is the straight bearing face M adapted to engage with the cylindrical segment E. The diameter of the lower portion of the stud J is such that it will enter the recess D and provide clearance for the rocking of the lever.

When the lever is rocked, the opposite ends thereof will move in segments instead of parallel lines. On the other hand, the valve stem A and operating rod B being arranged in parallel relation, provision must be made for relative movement. As shown, the rod B is guided at its lower end only, permitting of a slight lateral movement of its upper end to compensate for the segmental movement of the bearing portion of the lever. At the upper end of the rod is a bearing member O having a central pintle O′ for engaging the recess H in the bearing G and having straight faces on opposite sides of said pintle for engagement with the segment G. At the opposite end of the lever the segmental bearing portion I is arranged between cheek plates P secured to opposite sides of the rocker and which embrace the upper end of the valve stem.

In use, when movement is imparted to the rocker by the reciprocation of the rod B, the cylindrical segments will roll upon the contacting surfaces. The fulcrum J being fixed in position will hold the rocker from any lateral movement at the fulcrum bearing, the rod B being guided only at its lower end and being somewhat flexible will accommodate itself to the rocker in each position of adjustment. The segmental bearing I, which engages the valve stem, is free to slide in contact with said stem, but displacement of the plane of movement is prevented by the engagement of the cheek plates P with the valve stem. Thus during the rocking movement there will be a slight relative lateral movement between the valve stem and the bearing I engaging the same. There will not, however, be any lateral movement between the bearings E and the bearing faces M and M′. The cheek plates P engaging the valve stem will hold the rocker in its plane of movement and the slight lateral movement of the bearing G will be taken care of by the flexing of the rod B.

What I claim as my invention is:

1. In a valve operating mechanism, a rocker provided with a plurality of bearing

portions in the form of cylindrical segments having parallel elements, cooperating members with which said bearings have a rolling engagement, and means carried by said rocker engageable with said valve mechanism for holding said rocker from lateral displacement with respect to its plane of movement.

2. In a valve operating mechanism, a rocker comprising a plurality of bearings in the form of cylindrical segments having parallel elements perpendicular to the plane of movement of said rocker, cooperating members having bearings on which said cylindrical segments roll on the rocking of said member, and pintles on said cooperating members for engaging recesses in said cylindrical segments to hold said rockable member to its plane of movement.

3. In a valve operating mechanism, a rocker comprising a central recessed portion for engaging a fulcrum bearing and end portions for engaging respectively the actuating rod and valve stem, all of said portions having bearing surfaces in the form of cylindrical segments, having parallel elements and perpendicular to the plane of movement, a fulcrum member engaging the recess in said lever, presenting a flat surface for rolling engagement with said cylindrical segment, and a pintle on said fulcrum member engaging a recess in said segment.

4. In a valve operating mechanism, a rocker comprising a lever having cylindrical segments at opposite ends thereof facing in one direction and an intermediate cylindrical segment facing in the opposite direction, the latter being formed in the recess in said lever, a fulcrum member engaging said recess having a bearing portion for engaging the cylindrical segment, and a pintle for engaging a central recess in said segment, and cooperating members for engaging the opposite end bearings, one of said cooperating members being held from lateral displacement and the other of said members being free for a limited lateral displacement.

5. In a valve operating mechanism, a rocker and a cooperating bearing, the one having a cylindrical segment and the other a non-parallel surface, and a pintle on one of said members engaging a recess in the other, compelling a relative rolling movement.

6. In a valve operating mechanism, a rocker provided with a plurality of bearing portions in the form of cylindrical segments and parallel elements, cooperating elements with which said bearings have a rolling engagement, and a rolling fulcrum intermediate to the ends of said rocker formed at the base of a recess in said rocker.

7. In a valve operating mechanism, a rocker having a cylindrical recess formed therein intermediate the ends thereof and provided with cylindrical segments at its extremities, a cylindrical segment located in the recess in said rocker, cooperating members having bearings on which said cylindrical segments roll on the rocking of said rocker, and means for holding said rocker from lateral displacement with respect to its plane of movement.

8. In a valve operating mechanism, a rocker having a cylindrical recess formed therein and provided with cylindrical segments at the opposite ends thereof, a cylindrical segment located in the recess of said rocker, a fulcrumed member having a flat surface for rolling engagement with the cylindrical segment in said recess, and cooperating members for engaging the segments at the opposite ends of said rocker.

9. In a valve operating mechanism, a rocker provided with a plurality of bearing portions in the form of cylindrical segments having parallel elements, cooperating members with which said bearings having a rolling engagement, and spaced members carried by said rocker engageable with said valve mechanism for holding said rocker from lateral displacement with respect to its plane of movement.

10. In a valve operating mechanism, the combination of a rocker and a cooperating bearing, one having a cylindrical segment and the other a plane surface, and a pintle projecting from one surface and engaging a recess in the other surface to compel a relative rolling movement.

11. In a valve operating mechanism, a rocker provided with a plurality of bearing portions in the form of cylindrical segments, and cooperating members having rolling contact with said segments, whereby the ratio of leverage is alternate during the rocking movement.

12. In a valve operating mechanism, the combination of a rocker having a cylindrical segment, a member having a plane surface cooperating therewith, said member threadedly engaging a support for adjusting the plane surface in a direction normal thereto, and a pintle projecting from one surface and engaging a recess in the other to prevent lateral displacement of said rocker while permitting said adjustment.

13. In a valve operating mechanism, the combination of a rocker having a cylindrical segment, a member having a plane surface cooperating with said cylindrical segment to form a fulcrum for said rocker, said member being rotatable to effect an adjustment in a direction perpendicular to said plane surface, and a pintle projecting from one surface and engaging a recess in the other to prevent lateral displacement of said rocker while permitting the adjustment of said fulcrum.

14. In a valve operating mechanism, the

combination of a rocker having a cylindrical recess therein intermediate the ends. a cylindrical segment in said recess, a fixed support, an adjustable screw threadedly engaging said support and having a plane surface cooperating with said cylindrical segment, and a pintle projecting from one of said surfaces and engaging a recess in the other to compel a rolling movement while permitting the rotation of said screw.

15. In a valve operating mechanism, a rocker having having a cylindrical recess formed therein, and provided with cylindrical segments at the opposite ends thereof, a cylindrical segment located in the recess of said rocker, a fulcrumed member having a flat surface for rolling engagement with the cylindrical segment in said recess, said member being adjustable by a rotational movement thereof, a pintle projecting from said flat surface in alignment with the rotative axis thereof and engaging a recess in the cooperating cylindrical segment, and cooperating members for engaging the segments at the opposite ends of said rocker.

16. In a valve operating mechanism, a rocker having cylindrical segments at the opposite ends thereof, a cylindrical segment intermediate the ends of said rocker, cooperating members engaging the segments at the opposite ends of said rocker, an adjustable member having a plane surface engaging the intermediate cylindrical segment, and a pintle in axial alignment with said member engaging a recess in said cylindrical segment to prevent lateral displacement of said rocker.

17. A valve-operating mechanism for internal combustion engines, comprising, in combination with the valve stem and a push rod, a rocker arm, the ends of which engage the valve stem and the push rod, and a fulcrum which an intermediate point of the rocker arm engages, each of the three pairs of engaging surfaces between the rocker arm and its associated parts comprising a plane surface and a convex surface which rolls on said plane surface.

18. A valve-operating mechanism for internal combustion engines, comprising, in combination with the valve stem and a push rod, a rocker arm, the ends of which engage the valve stem and the push rod, and a fulcrum which an intermediate point of the rocker arm engages, the surfaces on said rocker arm which engage said associated parts all being convexly curved so that they rock on such associated parts.

19. A valve-operating mechanism for internal combustion engines, comprising a fulcrum, a rocker arm having at an intermediate point a rocking mounting on the under face of said fulcrum, a push rod and a valve stem upon the upper ends of which the end portions of said rocker arm have rocker mountings respectively, said rocker mounting being arranged so that as either end of the rocker arm is moved upwardly its point of contact with the part cooperating with that end is shifted toward the fulcrum and the point of contact of the rocker arm with the fulcrum is shifted toward the end moving upwardly.

In testimony whereof I affix my signature.

ALANSON P. BRUSH.