

Sept. 29, 1964

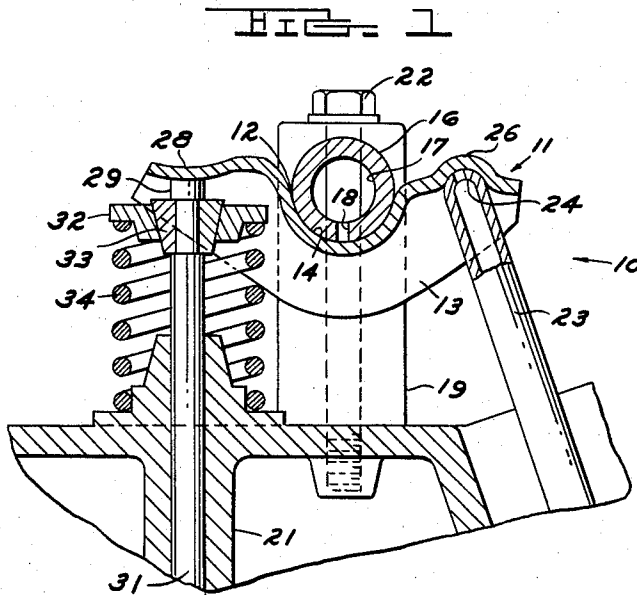
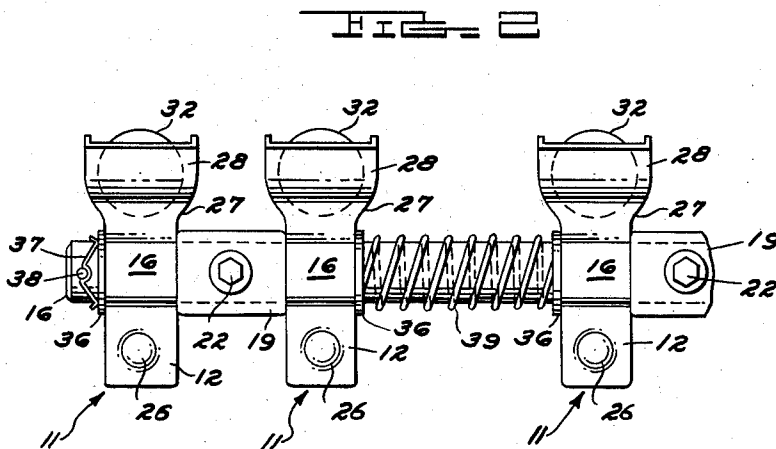
K. H. GROPP

3,150,648

VALVE GEAR

Original Filed Dec. 15, 1960

2 Sheets-Sheet 1



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FIG. 3

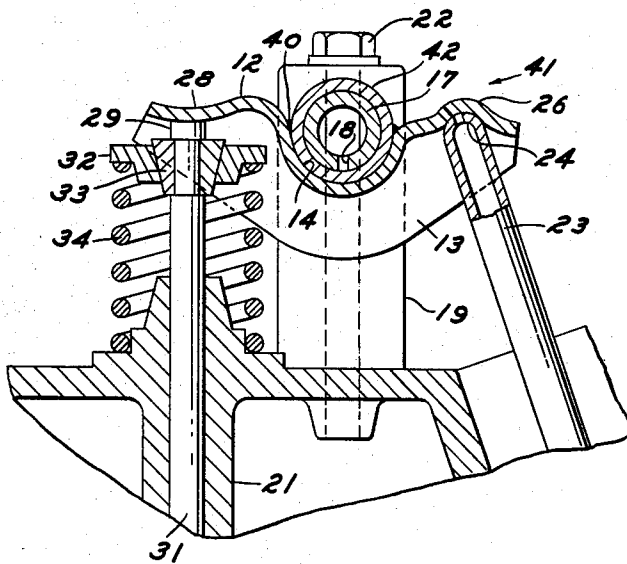


FIG. 4

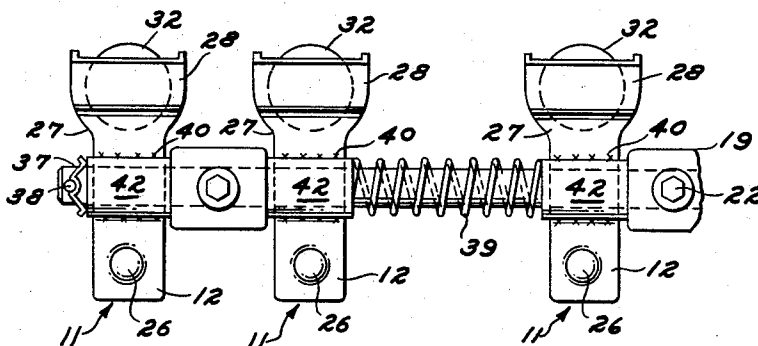
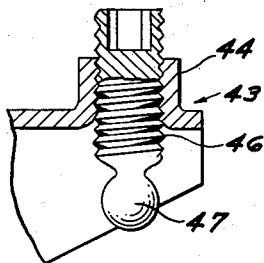


FIG. 5



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VALVE GEAR

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Continuation of application Ser. No. 76,025, Dec. 15, 1960. This application Dec. 20, 1962, Ser. No. 248,176
10 Claims. (Cl. 123—90)

This application is a continuation of my copending application entitled Valve Gear, Serial Number 76,025, filed December 15, 1960, and now abandoned.

The invention relates to an internal combustion engine valve gear and particularly to a stamped rocker arm and associated rocker arm shaft construction. This invention is an improvement over the valve gear construction disclosed in United States Letters Patent 2,572,968 issued to C. F. Bachle on October 30, 1951.

In a copending United States patent application on a valve gear by the inventor, Serial No. 74,416, filed December 7, 1960, now Patent No. 3,082,755, a rocker arm was provided having a web, a transversely extending saddle integral with the web, and dependent sides integrally connected with the web on the side of the web opposite to the saddle. The saddle was further provided with a slotted aperture through which a stud extended for the purpose of adjustably supporting a trunnion. The trunnion in turn was in engagement with the saddle and provided the fulcrum about which the rocker arm oscillated.

The present invention is directed to a valve gear embodying a rocker arm shaft and utilizing a rocker arm of the type disclosed in the above copending application. The proposed rocker arm, however, does not have a 360° bearing surface upon which the rocker arm locating spring may bear. The inventor therefore has provided a flat washer next to the rocker arm against which the locating spring bears to laterally position the rocker arm against its adjacent rocker arm support.

In an embodiment of an alternate construction, the inventor has secured a tubular member to the saddle portion of the rocker arm. The ends of the tubular member present a full bearing surface against which the locating spring may bear. The tubular member may be also dimensionally figured so that the tubular member may act as the positioning means between adjacent rocker arms if so desired.

It is the primary object of this invention to provide a valve gear arrangement which is simple in design, easy to manufacture and assemble, and dependable in operation.

Still a further object of this invention is to provide means for adapting a rocker arm used in valve gear arrangements embodying a support for each rocker arm in a valve gear arrangement embodying a rocker arm shaft.

Other objects and advantages of this invention will be made more apparent as this description proceeds particularly when considered in connection with the accompanying drawings, wherein:

FIGURE 1 is a fragmentary cross-sectional view of an internal combustion valve gear embodying the present invention, and

FIGURE 2 is a fragmentary plan view of a rocker arm and shaft construction embodying the invention shown in FIGURE 1, and

FIGURE 3 is a fragmentary cross-sectional view of an

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internal combustion valve gear embodying an alternate form of the invention, and

FIGURE 4 is a fragmentary plan view of a rocker arm and shaft construction embodying the alternate form of construction shown in FIGURE 3, and

FIGURE 5 is a fragmentary cross-sectional view taken through the push rod end of the rocker arm and showing a construction that is usable with solid tappets.

Referring now to the drawings and particularly FIGURE 1, a fragmentary portion of the valve gear is indicated at 10. The rocker arm is indicated generally at 11. Rocker arm 11 comprises a web 12 having dependent sides 13 integral therewith. Web 12 is provided also with rocker arm shaft engagement means that includes a saddle portion 14 likewise integral therewith. Saddle portion 14 is in engagement with the underside of the rocker arm shaft 16. Rocker arm shaft 16 is provided with the usual central bore 17 for the passage of oil. From the central bore 17 oil passes through aperture 18 in the bottom of the rocker arm shaft 16 onto the saddle portion 14 of the rocker arm 11. The rocker arm shaft 16 is secured to the supports 19 which in turn are secured to the cylinder head 21 by bolts 22 extending through the supports 19 and the rocker arm shaft 16.

Oscillatory movement may be imparted to the rocker arm 11 through a hollow push rod 23. Push rod 23 may be provided with a semispherical apertured tip 24 received by concave portion 26 located in the rocker arm web 12.

Referring now to the poppet valve end of the rocker arm 11, web 12 is provided with a convex portion 28 that engages the poppet valve foot 29 of the poppet valve 31. Poppet valve 31 is conventionally secured in place by spring retainer 32, locking means 33 that engage the poppet valve stem, and valve spring 34.

Referring now to FIGURE 2, web 12 and dependent sides 13 may be flared outwardly at 27 to provide a cover over the poppet valve 31 and its associated parts. By providing a cover for the poppet valve, excessive wetting and possible carbonizing of oil on the valve stem is prevented.

The rocker arms 11 are arranged so that the saddle portion 14 of each rocker arm 11 is in engagement with the underside of the rocker arm shaft 16. At the same time, one of the dependent sides 13 is in contact with an adjacent support 19. A flat washer 36 is mounted upon the rocker arm shaft 16 and is in contact with the other dependent side 13 of the rocker arm. The flat washer 36 thus provides a 360° surface against which rocker arm locating spring means may bear to resiliently hold the rocker arms 11 in position upon the rocker arm shaft 16.

A spring washer 37, one of the rocker arm locating spring means, is anchored by pin 38 in each end of the rocker arm shaft 16. Spring washer 37 contacts the flat washer 36 and resiliently positions the end rocker arms against their adjacent support 19. The operation of the spring washer 37 is described in detail in United States Letters Patent 2,908,262 issued in the name of the inventor on October 13, 1959.

The positioning of the rocker arms intermediate of the terminal ends of the rocker arm shaft is accomplished by locating springs 39, the other of said rocker arm locating spring means. Locating springs 39 are disposed on the rocker arm shaft 16 between each pair of spaced apart flat washers 36. By bearing against the flat washer 36, locating springs 39 urge the intermediate located rocker arms 11 against their adjacent supports 19.

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Referring now to FIGURES 3 and 4, an alternate embodiment of the invention and in particular the rocker arm shaft engagement means is disclosed. Tubular member 42 is welded at 40 or otherwise rigidly secured to the saddle portion 14. The rocker arm shaft 16 is journaled in the tubular member 42. The ends of the tubular member 42 provide a 360° surface for the spring washer 37 and/or the locating springs 39 to bear for positioning the rocker arms. In this embodiment, the tubular member 42 extends beyond the dependent sides 13 of the rocker arm. This latter provision may be varied by simply changing the length of the tubular member 42 so that it is of the same or lesser width than the width of the rocker arm.

Referring now to FIGURE 5, it can be seen that the present rocker arm construction may be used with push rod constructions using solid tappets as opposed to hydraulic tappets which are inherently self adjusting. When solid tappets are used, the rocker arm indicated at 43 may, for example, be provided with an apertured upstanding extruded end 44. An adjusting bolt 46 threadably engages extruded end 44 and has a spherical head portion 47 that engages a mating part of the push rod (not shown).

It will be understood, therefore, that the invention is not to be limited to the exact construction shown and described but that various changes and modifications may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim.

1. An internal combustion engine valve gear comprising a support, a rocker arm shaft secured to said support, a rocker arm, said rocker arm having a web terminating in integral dependent sides, and rocker arm shaft engagement means including at least a saddle portion in the web integral therewith and on the side of the web opposite to the dependent sides, and a tubular member secured to said saddle portion, said rocker arm shaft being journaled in said tubular member.
2. An internal combustion engine valve gear comprising a support, a rocker arm shaft secured to said support, a rocker arm, said rocker arm having a web terminating in integral dependent sides, poppet valve and push rod engaging end portions integrally connected to said web, and rocker arm shaft engagement means including at least a saddle portion in the web integral therewith and intermediate of said end portions and on the side of the web opposite to the dependent sides, said rocker arm shaft engagement means being in engagement with said rocker arm shaft, and spring means encircling said rocker arm shaft, means interposed between said web and said spring means providing a 360 degree bearing surface for said spring means whereby said spring means urges said rocker arm against said support.
3. An internal combustion engine valve gear as recited in claim 2 wherein said means interposed between said web and said spring means comprises a flat washer.
4. An internal combustion engine valve gear comprising a plurality of spaced apart rocker arm supports, a rocker arm shaft supported by said rocker arm supports, a plurality of rocker arms, each of said rocker arms having a web terminating in integral dependent sides, poppet valve and push rod engaging end portions integral with said web and rocker arm shaft engagement means intermediate of said end portions and on the side of the web opposite to the dependent sides, each of said rocker arms being disposed adjacent to a rocker arm support and having said rocker arm shaft engagement means in engagement with said rocker arm shaft, spring means encircling said rocker arm shaft adjacent each of said rocker arms, and means interposed between said webs and said spring means providing a 360 degree bearing surface for said spring means whereby said spring means urges each of said rocker arms laterally into abutment with a rocker arm support.

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5. An internal combustion engine valve gear as recited in claim 4 wherein the means interposed between the webs and the spring means comprises flat washers.

6. An internal combustion engine valve gear comprising a plurality of rocker arm supports, a rocker arm shaft secured to said supports, a plurality of rocker arms, each of said rocker arms being disposed alongside a rocker arm support, each of said rocker arms having a web terminating in integral dependent sides, poppet valve and push rod engaging end portions integrally connected to said web, rocker arm shaft engagement means including at least a saddle portion in the web integral therewith and on the side of the web opposite to the dependent sides, and a tubular member secured to said saddle portion, said rocker arm shaft extending through each of the tubular members thereby supporting each of said rocker arms, spring means on the side of the rocker arm remote from the rocker arm support, said spring means bearing against one of the ends of the tubular member and urging one of said rocker arm dependent sides and the other end of the tubular member remote from the spring means to abut the side of the adjacent rocker arm support.

7. An internal combustion engine valve gear comprising a plurality of rocker arm supports, a rocker arm shaft secured to said supports, a plurality of rocker arms, each of said rocker arms being disposed alongside a rocker arm support, each of said rocker arms having a web terminating in integral dependent sides, poppet valve and push rod engaging end portions integrally connected to said web, a rocker arm shaft engagement means including at least a saddle portion in the web integral therewith and on the side of the web opposite to the dependent sides, and a tubular member secured to said saddle portion, said rocker arm shaft extending through each of the tubular members thereby supporting each of said rocker arms, a pair of first spring means, each of said first spring means being anchored at each end of the rocker arm shaft and resiliently bearing against an end of the tubular member remote from the rocker arm support of an end rocker arm and urging each of said rocker arms against the adjacent rocker arm support, and a plurality of second spring means, each of said second spring means being disposed on the rocker arm shaft and resiliently bearing at each end against the ends of the tubular members of the rocker arms intermediate of the end rocker arms to urge said rocker arms against the adjacent rocker arm supports.

8. An internal combustion engine valve gear comprising a support, a rocker arm shaft secured to said support, a rocker arm, said rocker arm having a web terminating in integral sides, poppet valve and push rod engaging end portions integrally connected to said web and rocker arm shaft engagement means including at least a saddle portion in the web integral therewith and intermediate said end portions and on the side of the web opposite to the integral sides, said rocker arm shaft engagement means being in engagement with said rocker arm shaft, said integral sides extending adjacent said rocker arm shaft less than the full circumference of said rocker arm shaft, spring means encircling said rocker arm shaft, bearing means interposed between said web and said spring means providing a bearing surface for said spring means substantially around the circumference of said rocker arm shaft whereby said spring means urges said rocker arm against said support.

9. An internal combustion engine valve gear as recited in claim 8 wherein said bearing means comprises a flat washer.

10. An internal combustion engine rocker arm comprising a web terminating at integral dependent sides, and rocker arm shaft engagement means including at least a saddle portion in the web integral therewith and on the side of the web opposite to the dependent sides, said saddle portion having a tubular member attached thereto.

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