Jan. 12, 1932. H. E. MOREHOUSE 1,840,633

TAPPET

Filed May 8, 1931

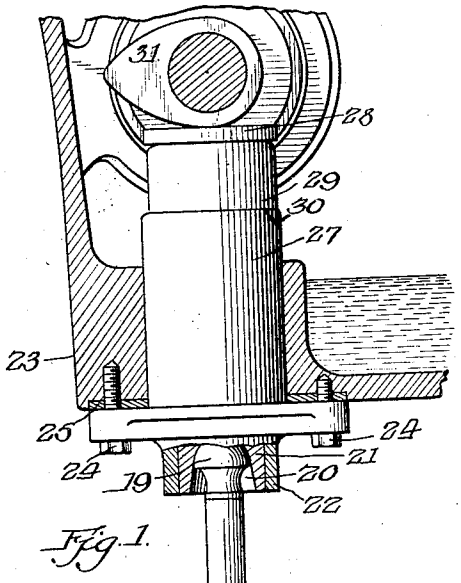


Fig. 1.

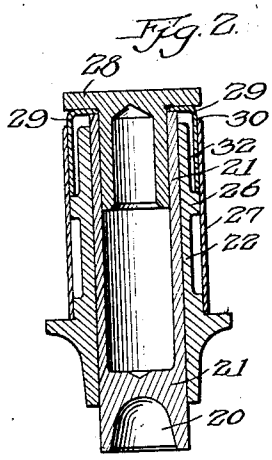
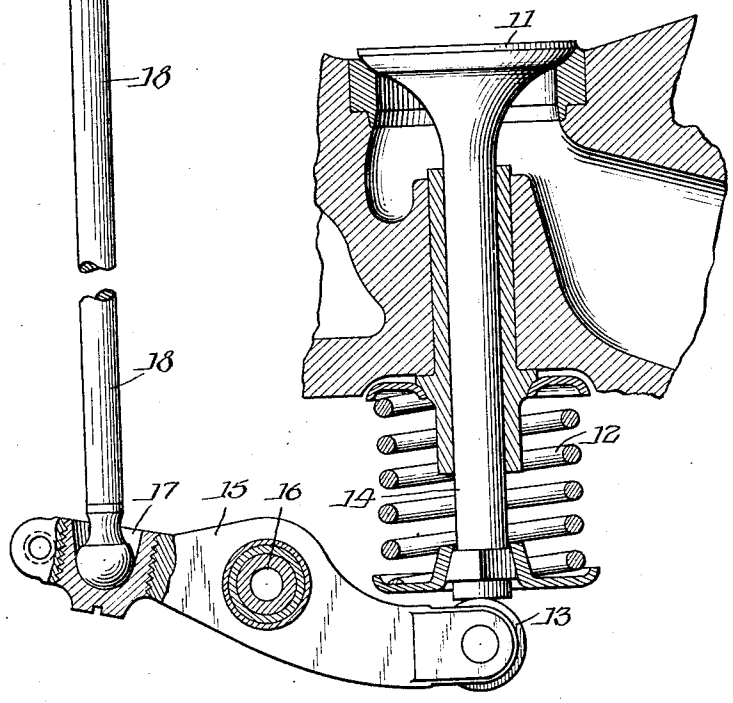


Fig. 2.



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UNITED STATES PATENT OFFICE

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TAPPET

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In the development of inverted internal combustion engines for aircraft, considerable trouble has been experienced with excessive oil leakage past the cam followers or tappets which naturally must operate in an inverted position from the crank case. This applies particularly to engines using a push rod and rocker arm valve-actuating mechanism, which type is much in favor for the particular type of engine referred to.

The conventional arrangement comprises a movable cam follower reciprocating under the action of the cam within a fixed outer guide. Naturally, as a bearing, this follower member must be lubricated. In mechanism other than the inverted type, provision has been made by means of grooves, ports, and the like for drawing lubricant into the bearing space between the follower and guide and discharging the same back into the crank case. This is not permissible in connection with the inverted type for the reason that the bearing is necessarily open below and oil leakage would be excessive.

The problem which confronts the designer of an inverted type of tappet mechanism is entirely different from that to be met within the other type, and its solution demands provision for introducing precisely the amount of lubricant required without excess, whereby to avoid oil waste and also the spraying of wasted oil.

I have found the solution of this problem to reside in providing a close fitting sliding engagement between the relatively movable parts throughout, that is to say, without ports or grooves for the conduct of lubricant, and additionally to shield the open end of the guide against the splashing of oil to such an extent that only a predetermined amount of oil may find its way into the bearing surface, sufficient to lubricate but without excess to waste.

In order that the invention may be readily understood, a preferred embodiment of the same is set forth in the accompanying drawings and in the description predicated thereon, it being understood that variations of structure and arrangement may be adopted without departure from the essence of the invention as set forth in the appended claims.

In the drawings,

Fig. 1 is a view in elevation and partly in section illustrating the general assembly; and

Fig. 2 is a vertical section through a preferred form of the tappet mechanism itself.

Referring to the drawings by way of illustration, the numeral 11 designates a conventional inlet valve to the combustion chamber, said valve being yieldingly seated by the spring 12 and adapted to be actuated in an opening direction by the roller 13 bearing upon the lower end of the valve stem 14. The rocker arm 15 which carries the roller 13 is mounted upon the rocker shaft 16 and at its opposite end is provided with an adjustable seat 17 for the lower end of the push rod 18 whereby vertical movement of the push rod serves to open the valve 11 to be returned to its closed position by the spring 12.

The upper end of the push rod 18, headed as indicated at 19, is seated within the cup bearing 20 at the lower end of a cylindrical follower or tappet 21 which is mounted for close fitting sliding engagement within a cylindrical guide 22. This guide is fixed within the lower wall 23 of the crank case in any suitable manner as by means of lag bolts 24 with interposed gasket 25.

Carried by the guide and uniformly spaced therefrom as by ribs 26 is a sleeve 27 and carried by the follower member 21, advantageously clamped to the upper end thereof by means of the head 28, is a depending shield 29, disposed within the sleeve 27 in close fitting sliding engagement therewith. The upper edge of the sleeve 27 is slightly beveled outwardly and downwardly as indicated at 30.

The follower head 28 is acted upon by the cam 31, whereby a downward movement of the follower from the retracted position shown in Fig. 1 is effected to the position shown in Fig. 2, the former position corresponding to the closed condition of the valve 11 and the latter position to the open condition of said valve.

The upper edge of the sleeve 27 is above the normal level of oil within the crank case,

and it is only by the splashing of the oil that any lubricant is transferred to the outer face of the shield 29 and the upper edge of the sleeve. The shedding of oil from the outer surface of the shield 29 is facilitated by the beveled upper edge of the sleeve so that the entrance of oil to the bearing between the shield and sleeve is restricted to a practically infinitesimal amount entering under each actuation of the follower, merely sufficient in the aggregate to insure the necessary lubrication. During the operation of the device enough oil accumulates within the space 32 between the shield and the upper end of the guide to find its way over the upper edge of the guide to insure necessary lubrication of the bearing surface between the follower and guide, but without excess.

It has been found that by accurate machining of the contacting faces of the follower and the guide on the one hand, and the shield and the sleeve on the other, whereby to insure a close fitting sliding engagement, there will be provided sufficient lubrication of the bearing surfaces without leakage of oil past the follower.

I claim:

1. A valve tappet mechanism comprising a fixed guide, a follower having sliding engagement within the guide, and a shield carried by the follower and enveloping the upper end of the guide, the sliding engagement of the follower within the guide being uniformly close fitting throughout.

2. A valve tappet mechanism comprising a fixed cylindrical guide, an external sleeve spaced thereabout, a follower having sliding engagement within the guide, and a shield carried by the follower and disposed within the space between the guide and sleeve in close fitting sliding engagement with the latter.

3. A valve tappet mechanism comprising a fixed cylindrical guide, an external sleeve spaced thereabout, a follower having sliding engagement within the guide, and a shield carried by the follower and disposed within the space between the guide and sleeve in close fitting sliding engagement with the latter, the upper edge of the sleeve outwardly and downwardly beveled.

4. A valve tappet mechanism for internal combustion engines comprising the combination with an inlet valve to the combustion chamber, a rocker arm operatively connected therewith, and a push rod acting on the arm, of a guide member mounted in the crank case, a follower disposed within the guide in close fitting sliding engagement and acting upon the push rod under cam actuation, and a shield carried by the follower and loosely enveloping the upper end of the guide.

5. A valve tappet mechanism for internal combustion engines comprising the combination with a spring-pressed inlet valve to the combustion chamber, a rocker arm operatively connected therewith, and a push rod acting on the arm, of a cylindrical guide member mounted in the crank case, a sleeve disposed in external spaced relationship about the guide, a headed follower disposed within the guide in sliding engagement therewith and acting upon the push rod under cam actuation, and a shield carried by the follower head and disposed between the guide and sleeve in sliding engagement with the latter, the sliding engagement of the follower within the guide and of the shield within the sleeve being uniformly close fitting throughout.

6. A valve tappet mechanism for internal combustion engines of the inverted type comprsing the combination with an inlet valve to the combustion chamber, a rocker arm operatively connected therewith, and a push rod acting from above on the arm, of a cylindrical guide member mounted in the crank case, a sleeve disposed in external spaced relationship about the guide with the upper ends of the guide and sleeve extending above the normal level of the oil within the crank case, a follower disposed within the guide in sliding engagement therewith and acting downwardly upon the push rod under cam actuation, and a shield carried by the follower and depending between the guide and sleeve in sliding engagement with the latter, the engagement of the follower within the guide and of the shield within the sleeve being uniformly close fitting throughout.

In testimony whereof I have hereunto subscribed my name.

HAROLD E. MOREHOUSE.